

DIGITAL Server 5220 Series

Service Maintenance Manual

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DIGITAL Server 5220

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DIGITAL Server 5220 Series Service Maintenance Manual

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- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

All external cables connecting to this basic unit need to be shielded. For cables connecting to option cards, see the option manual or installation instructions.

This digital apparatus does not exceed the Class B limits for radio noise emissions set out in the radio interference regulations of the Canadian Department of Communications.

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This equipment meets or exceeds the ergonomic requirements of ZH1/618 and is certified to bear the GS mark by TUV Rheinland of Germany.

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

Laser Safety Notice

All CD-ROM drives included in DIGITAL computers are classified as Class 1 laser products and comply with safety standards as set by U.S. government and applicable European agencies.

No hazardous radiation is emitted from this CD-ROM drive; the laser beam is completely enclosed in the CD-ROM subassembly during all customer operations and maintenance. In the event that repair or service of the CD-ROM subassembly is required, only authorized Digital service personnel should perform such repairs.

Contents

DIGITAL Server 5220

Preface

1

Product Description

Introduction	1-1
Reliability/Availability	1-1
Server Expansion	1-2
Server Management and Security	1-3
Server Configurations	1-4
Server Naming Guidelines	1-4
Product Model Numbering Convention	1-5
Related Material	1-7
Latest Product Information and Updates	1-9

2

Server Software and Utilities

Introduction	2-1
ServerWORKS Quick Launch	2-2
BIOS Setup Utility	2-2
Accessing the BIOS Setup Utility	2-4
Helpful Hints	2-5
Changing The Server's Configuration	2-6
Changing Time and Date	2-6
Changing I/O Port Settings	2-7
Assigning IRQs	2-8
Advanced	2-8
PCI IRQ Assignments	2-9
PCI Device Interrupt and Slot INT Routing	2-9
Setting Up Security	2-12
Setting Supervisor and User Passwords	2-12

Contents

Enabling Password On Boot	2-14
Eliminating User and Supervisor Passwords.....	2-14
Other Security Options	2-15
Changing the Boot Sequence	2-16
Speeding up the Boot Process.....	2-17
Checking System Management Parameters	2-18
BIOS Upgrade Utility	2-19
SCSI Configuration Utility	2-20
Determining Devices Attached to Each SCSI Channel.....	2-21
RAID Configuration Utility	2-22
Diagnostics	2-22

3

BIOS Setup Utility Features

Introduction	3-1
BIOS Setup (F2).....	3-2
Main.....	3-2
Advanced.....	3-7
Security Options	3-13
Boot	3-15
System Management (F3)	3-16
Summary — System Summary.....	3-16
Environment — Environment Monitoring and Summary.....	3-17
Memory — Memory Slots Information.....	3-17
POST — POST Error Summary.....	3-18
SYS — System Asset Number and I/O Management	3-18
MLB — Main Logic Board Asset Number Management	3-18
CPU — Processor Module Asset Number Management	3-19
PCI — PCI IRQ Assignment Status.....	3-19

4

Troubleshooting

Introduction	4-1
Initial Troubleshooting.....	4-2
When to Use the Diagnostics.....	4-3
Running the Diagnostics	4-4
Running Quick Tests or Groups of Tests.....	4-4
Running DIGITAL Vendor Extended Tests	4-5
Running the Diagnostics Tests from the Server's Hard Disk Drive	4-5
Obtaining Information about The Server	4-6

Contents

Obtaining Information Using the BIOS Setup Utility	4-8
DIGITAL ServerWORKS Manager	4-8
Displaying Server Status Using the Hardware	4-10
Server Status Messages.....	4-11
POST OCP Messages.....	4-13
POST/Boot Codes for the Processor Module	4-13
OCP Messages	4-16
OCP Status and Error Messages.....	4-17
Processor Module Voltage and Temperature Ranges	4-19
Processor Voltage Range	4-19
Processor Voltage Range (V_{CCP}).....	4-20
Processor Temperature Sensing.....	4-21
Advanced Troubleshooting	4-21
Server Troubleshooting.....	4-22
Disk Drive Troubleshooting.....	4-26
Hot Swap Drive Troubleshooting.....	4-30
Tape Drive Troubleshooting.....	4-31
Monitor Troubleshooting	4-32
CD-ROM Troubleshooting.....	4-33
Diskette Drive Troubleshooting	4-34
RAID Troubleshooting.....	4-35
Flash BIOS Troubleshooting.....	4-36

5

FRU Replacement

Introduction	5-1
Server Front View.....	5-2
Server Left-Side View	5-4
Server Right-Side/Rear View	5-6
Miscellaneous.....	5-8
Labels and Nameplates	5-9
Service Procedures	5-9
Recommended Tools.....	5-10
BIOS Version Information	5-10
Disconnecting External Devices and Power.....	5-10
Removing and Installing the Side Panels.....	5-12
Server Front View.....	5-14
Server Left Side View	5-16
Server Right Side View	5-18
Server Rear View	5-20
Main Logic Board Connectors	5-22

Contents

Main Logic Board Components	5-24
Processor Module Components	5-26
Video/Ethernet Daughter Card Connectors and Indicators.....	5-27
Jumpers and Switch Settings.....	5-28
Processor Module Switch Settings.....	5-30
Installing Additional Memory	5-32
Server DIMM Requirements.....	5-32
Memory Configuration Guidelines	5-33
Memory Configurations.....	5-34
Memory Troubleshooting	5-35
Removing and Replacing the Power Supply	5-36
Removing and Replacing the Diskette Drive.....	5-38
Removing and Replacing the CD-ROM Drive.....	5-40
Removing and Replacing a Cooling Fan.....	5-42
Removing and Replacing the Secondary Cooling Fan 2	5-44
Removing and Replacing Cooling Fan 5.....	5-46
Removing and Replacing the Speaker	5-48
Removing and Replacing the Main Logic Board	5-50
Replacing the Real Time Clock (RTC) Battery.....	5-52
Removing and Replacing the Storage Backplane	5-54
Removing and Replacing a Caster.....	5-56

6

Device Mapping

Introduction	6-1
Processor Memory Address Map	6-2
I/O Address Map	6-2
Server Interrupt Levels	6-3
PCI Configuration Space Address Map	6-4

7

Upgrade Procedure

Model 5200 and Model 5220 Comparison Chart.....	7-1
Upgrade Procedure	7-2
Troubleshooting Guidelines.....	7-4

A

Block Diagram

Main Logic Board	A-1
CPU/Memory Connector.....	A-4

Contents

PCI ISA IDE Xcelerator (PIIX4).....	A-4
BIOS ROM.....	A-4
System I/O.....	A-5
Ultra I/O Controller.....	A-5
Serial Interface	A-5
Serial Interface Pin Assignments	A-6
Parallel Interface.....	A-6
Parallel Interface Pin Assignments.....	A-7
Diskette Controller	A-7
Keyboard/Mouse Controller.....	A-8
Keyboard/Mouse Connector Pin Assignments.....	A-8
SCSI Interface.....	A-8
SCSI Controller	A-9
SCSI Connectors.....	A-9
IDE Interface.....	A-9
Display Interface	A-9
Super Video Graphics Array.....	A-9
SVGA Connector Pin Assignments	A-10
Ethernet Interface.....	A-11
Network Interface Pin Assignments.....	A-11
Peripheral Component Interconnect (PCI) Bus.....	A-11
PCI Bus Expansion.....	A-12
PCI-to-PCI Bridge (PPB).....	A-12
ISA Bus.....	A-12
System Management	A-12

B

Supported Options List

Supported Options List	B-1
------------------------------	-----

C

Service Notes

.....	C-1
-------	-----



Contents

Figures

Typical DIGITAL Server 5100/5200	viii
2-1. Typical BIOS Setup Utility Screen	2-2
2-2. PCI IRQ Assignment Example Menu.....	2-14
5-1. FRU Front View.....	5-3
5-2. FRU Left-Side View.....	5-5
5-3. FRU Right-Side/Rear View.....	5-7
5-4. Server Brake.....	5-10
5-5. Unlocking and Removing the Side Panels	5-12
5-6. Service Front View	5-14
5-7. Service Left Side View	5-16
5-8. Service Right Side View	5-18
5-9. Service Rear View.....	5-20
5-10. Main Logic Board Connectors.....	5-22
5-11. Main Logic Board Components.....	5-24
5-12. Processor Module Component Locations	5-25
5-13. Video/Ethernet Daughter Card Connectors	5-26
5-14. Main Logic Board Switch Locations	5-28
5-15. Processor Module Switch Locations	5-29
5-16. DIMM Socket Locations.....	5-31
5-17. Installing a DIMM	5-34
5-18. Removing and Replacing the Power Supply.....	5-37
5-19. Location of the Optional Second Power Supply.....	5-38
5-20. Removing and Replacing the Diskette Drive.....	5-40
5-21. Removing and Replacing the CD-ROM Drive.....	5-42
5-22. Removing and Replacing a Cooling Fan.....	5-44
5-23. Removing and Replacing the Secondary Cooling Fan 2.....	5-46
5-24. Removing and Replacing Cooling Fan 5.....	5-48
5-25. Removing and Replacing the Speaker.....	5-50
5-26. Removing and Replacing the Main Logic Board	5-52
5-27. Replacing the Server Battery/RTC.....	5-54
5-28. Removing and Replacing the Storage Backplane.....	5-56
5-29. Removing and Replacing a Caster	5-58
A-1. Main Logic Board Block Diagram	A-2

Preface **P**

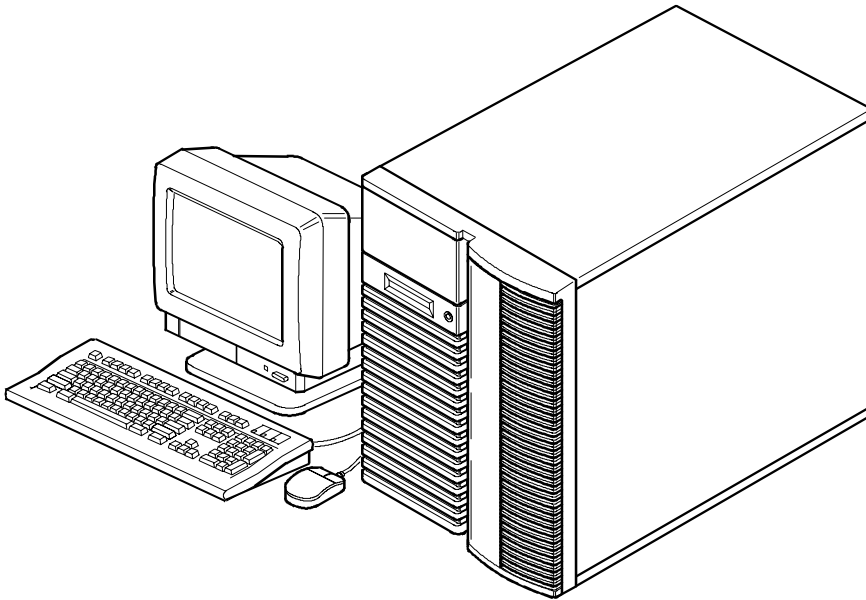
This *Service Maintenance Manual* is a troubleshooting guide that can be used for reference when servicing DIGITAL Servers.

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.

Preface



DEC00421

Typical DIGITAL Server 5220

Product Description

1

DIGITAL Server 5220

Introduction

The DIGITAL Server 5220 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>Processor Module</i>	Support for one or two processors with 512 KB L2 cache.
<i>Dual-Channel SCSI Controller</i>	Onboard dual-channel SCSI controller with wide Ultra internal signaling up to 40 MB/s and wide Ultra2 for external signaling on SCSI channel B. Low Voltage Differential (LVD) is supported externally but not internally.
<i>Super I/O Controllers</i>	Diskette drive, 2 serial ports, an ECP/EPP parallel port, 2-channel DMA, and IDE CD-ROM.
<i>Dual-Channel Storage Backplane</i>	Redundant disk subsystems using integrated SCSI controllers or expansion storage controllers.
<i>Power Supply</i>	The DIGITAL Server ships with one power supply for normal operation. An optional second power supply can be purchased to provide redundant power.

continued

Product Description

<i>Flexible Memory Architecture</i>	Server memory can be upgraded from 64 MB to a maximum of 1 GB using 64 MB, 128 MB, or 256 MB registered SDRAM.
<i>SDRAM DIMMs</i>	168-pin registered SDRAM DIMMs, 10 ns or faster, with 100 MHz bus speed.
<i>Variable Fan Speed</i>	Automatically adjusts fan speed according to ambient temperature.
<i>Internal Sensors</i>	Monitors internal server temperatures, fan operation, and voltages for the main logic board and processor module.
<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>Expansion Slots</i>	Eight PCI expansion slots, one shared PCI/ISA slot, and one dedicated ISA slot.
<i>Dual-Channel SCSI Controller</i>	Supports wide Ultra SCSI internal and wide Ultra2 external devices.
<i>Internal Storage Devices</i>	Accommodates one IDE CD-ROM drive (standard), seven 3½-inch half-height hot swap drives in the form of Storage Building Blocks (SBBs), and two half-height, 5¼-inch devices or one full-height 5¼-inch device (CD-ROMs or tape drives).

continued

Product Description

<i>Hot Swap Disk Capability</i>	Allows replacement of hot swap drives while the server is operating.
<i>External SCSI Ports</i>	The server can be cabled to a rear panel SCSI knockout to provide a connection to an external storage expansion box.
<i>Universal Serial Bus</i>	Two integrated USB ports.
<i>External I/O Ports</i>	Two serial ports and one Extended Capabilities Port (ECP)/ Enhanced Parallel Port (EPP) to support external options, such as a printer, modem, or local terminal.
<i>Integrated Video and Network Controllers</i>	A Video-Network (V-Net) daughter card on the main logic board provides a video port for connecting an integrated S3 Trio64V2 video controller and one 10/100Base-T (10/100 Mb/s) Ethernet port (RJ45).

DIGITAL Server 5220

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>BIOS Setup Utility</i>	Allows configuration of the server's factory-default settings.
<i>BIOS and Firmware Upgrade Utility</i>	Upgrades the BIOS and firmware versions.
<i>Operator Control Panel (OCP)</i>	Back-lit, 16-character display for diagnostic and error messages.
<i>Hot Swap Drive Indicator Lights</i>	Provides immediate status information on hot swap drive activity or failure.
<i>Key Lock</i>	Limits access to the server's internal components.
<i>Interlock Sensor Switches</i>	Automatically turns off server power if either side panel is removed when the server power is on.

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 500)

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

- 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 5678 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



Product Description

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 = CPU CLOCK SPEED IN MHz

Related Material

The following related material is available:

Document or Software Title	Order Number	Description
Installation Guide	ER-J2BWW-IM (Multi-language)* ER-J2BWW-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-J2BWW-UA (English) ER-J2BWW-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	36-45369-09 (left side panel) 36-45369-10 (right side panel)	Provides an overview of major server components, configuration guidelines, and SCSI cabling information. These labels are located on the inside of the server's side panels.
Warranty and Service Information	ER-PCWAR-CM (Multi-language)*	Provides warranty information and a listing of phone numbers for technical support.

* Multi-language includes: English, French, Italian, German, and Spanish

continued

Product Description

Document or Software Title	Order Number	Description
DIGITAL ServerWORKS software	QB-4WY9A-SA (Multi-language)*	<p>Contains ServerWORKS Quick Launch and ServerWORKS Manager software and documentation.</p> <p>Quick Launch consists of a bootable CD-ROM disc, a companion CD-ROM, and <i>Getting Started</i> 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	Refer to the Quick Launch CDROM in the DIGITAL ServerWORKS software kit	Provides additional product information and product change history.
Option documentation - Quick Launch CD-ROM	Refer to the Quick Launch CDROM in the DIGITAL ServerWORKS software kit	These files are provided in PDF format on the Quick Launch CD-ROM that can be viewed and printed using Adobe Acrobat Reader software.
Diagnostic Software - Quick Launch CD-ROM	Refer to the Quick Launch CDROM in the DIGITAL ServerWORKS software kit	Contains an advanced set of diagnostic utilities for identifying and correcting problems on 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). Refer to chapter 2 for information on using the diagnostic utilities.
PC Product Support Information Kit	QA-5RJAA-G8 (English only)	Provides all the latest product documentation for all NTSBU mobile, desktop, and server products.

* Multi-language includes: English, French, Italian, German, and Spanish

Latest Product Information and 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

2

DIGITAL Server 5220

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 device drivers and on-line documentation.
- **BIOS Setup Utility** — This utility allows configuration of the server after installing additional options and when changing the server's factory-default settings. The BIOS Setup utility is available each time you boot the server.
- **BIOS Upgrade Utility** — This utility allows you to update or restore the server's BIOS. The BIOS Upgrade utility is available on the Internet.
- **SCSI Configuration Utility** — This utility allows you to configure and view settings of the onboard SCSI controllers and SCSI devices. The SCSI configuration utility is available each time you boot the server.
- **RAID Configuration Utility** — This utility is available for RAID-ready servers only. This utility allows configuration of the RAID array and is available each time you boot the server.
- **Diagnostics** — Diagnostics are used to verify server operation. The diagnostics are available on the Quick Launch CD-ROM discs.

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 device drivers, documentation, and the ability to make diskettes of utilities such as diagnostics. For more information, refer to the *Quick Launch Getting Started* guide.

BIOS Setup Utility

The BIOS Setup utility enables you to select and store information about the server's hardware and software in the battery-backed memory of the CMOS RAM. This information takes effect each time the server boots and can be changed any time you run setup.

Use the BIOS Setup utility each time you need to reconfigure or expand the server.



CAUTION: The server was setup for normal operation at the factory and will operate properly without additional configuring.

It is important to read carefully and understand this section before attempting to modify the server's factory settings. Changing some settings might cause the server to operate improperly.

The following is an example of a BIOS Setup utility screen.

Main	Advanced	Security	Boot	Exit
System Time:	[13:11:10]			Item Specific Help
System Date:	[10/29/1997]			
Diskette A:	[1.44 MB, 3½"]			
>Primary Master	[CD-ROM]			
>Secondary Master	[None]			
Video System:	[EGA/VGA]			
Monitor Type:	[Color]			
>Cache and Shadow				
>Keyboard Features				
System Memory:	640 KB			
Extended Memory:	80896 KB			
At Bus Space:	[Disabled]			
Extended Memory Report:	[Compatibility]			

DEC01706

Figure 2-1. Typical BIOS Setup Utility Screen



Server Software and Utilities

Use the BIOS Setup utility to:

- Set time and date
- Change I/O port settings
- Set security options
- Change the boot sequence
- Check system management parameters

The remainder of this section explains how to run the BIOS Setup utility, maneuver through the options, and perform specific tasks.

Accessing the BIOS Setup Utility

To access the BIOS Setup utility:

1. Turn on the server and allow the Power-On Self Test (POST) to complete.
2. Make a note of any configuration errors listed, and then press [F2] to display the Main menu.
3. Follow the instructions on the monitor screen and any on-line help pop-up screens to configure the server.

Helpful Hints

When using the System Setup (F2) in the BIOS Setup utility:

- Several keyboard keys are assigned to help select menus and sub-menus, options, change option values, and display help information. These keys are displayed at the bottom of all menus as follows:

Key	Function
F1	Help (provides a general help screen)
Esc	Exit (Exits the Setup utility and exits sub menus within the Setup utility)
↑↓ arrow keys	Select Item
← → arrow keys	Select Menu
-/+ or spacebar	Change Values
Enter	Select > Sub-Menu
F9	Setup Defaults (Restore all current Setup screen values to their factory default settings)
F10	Save and Exit

- Item-specific help is available anytime during the setup process and appears at the right of the setup screen when an option is highlighted.
- Choosing the “Exit” menu allows you to:
 - Select “Save Changes & Exit” to save all Setup values and exit Setup.
 - Select “Exit Without Saving Changes” to exit Setup without recording any changes.
 - Select “Get Default Values” to set all setup options to their factory default values.
 - Select “Load Previous Values” to restore all setup values from the last session.
 - Select “Save Changes” to save all setup selections without exiting Setup.

Changing The Server's Configuration

The following sections provide detailed information on changing the server's factory configuration.

Changing Time and Date

To change the time and date:

1. Reboot the server.
2. Press <F2> when the DIGITAL logo screen appears.
3. In the Main menu, using the cursor keys and [Tab], select (highlight) the System Time or System Date field to change.
4. Use [+] or [-] to change the field to the desired value.

You can also enter the desired date and time by typing the required numbers.

5. Press [Esc] then [Enter] twice to exit the BIOS Setup utility and to reboot the server so changes immediately take effect.

Changing I/O Port Settings

The following list shows the settings that can be made to the I/O ports via the *Advanced* section of the BIOS Setup utility.

- PS/2 mouse
- COM1
- COM2
- Parallel port
- Parallel port mode
- Floppy disk controller
- Integrated PCI Ethernet
- Integrated PCI SCSI
- Integrated IDE controller

For more information on changing I/O port settings, refer to Chapter 3, "BIOS Setup Utility Features."

To change the I/O port settings:

1. Reboot the server
2. Press <F2> when the DIGITAL logo screen appears.
3. Select *Advanced*.
4. Select *Integrated Peripherals*.
5. Select the port(s) to change.
6. Use the +/- keys to change values.
7. Press [Esc] then [Enter] twice to exit the BIOS Setup utility and to reboot the server so changes immediately take effect.

Assigning IRQs

The following information is important for managing server IRQ assignments.

The default setting for PCI expansion boards is Auto Select, which automatically assigns IRQs to PCI expansion boards. If you have ISA expansion boards or you wish to manually control PCI IRQ assignments, you must do the following to assign IRQs to expansion slots.

1. Reboot the server and press <F2> when the DIGITAL logo screen appears.
2. Select *Advanced* at the top of the screen menu.
3. Select *PCI Configuration*. The following table shows the menu selections.

Advanced

Menu Fields	Settings	Comments
PCI Configuration: [submenu]		
PCI IRQ line #	Disabled	Disables the specific IRQ Line number.
	Auto select ⁽¹⁾	Automatically assigns IRQs to PCI slots.
	3	Select a number to assign to the PCI IRQ line. If
	4	the IRQ number is already in use, an asterick (*)
	5	appears to the left of the line.
	7	
	9	
	10	
	11	
	12	
	14	
	15	
PCI/PNP ISA UMB Region Exclusion		Use this selection to reserve a specific block of upper memory for ISA adapters. Press [Enter] to display memory addresses available.
PCI/PNP ISA IRQ Resource Exclusion		Use this selection to reserve IRQ numbers for ISA adapters. Press [Enter] to display IRQs.

⁽¹⁾ Factory default

4. Follow the guidelines for PCI IRQ Assignments

PCI IRQ Assignments

In the BIOS, the PCI slots are assigned PCI IRQ A, B, C, or D, using mnemonics PIRQA, PIRQB, PIRQC, and PIRQD. PIRQD is reserved for the USB ports (USB IRQ). The V-Net card is installed in the Proprietary slot and uses PIRQA for the SVGA controller and PIRQB for the Ethernet controller. The on-board SCSI uses PIRQC for both Channel A and Channel B. The interrupt assignments for the PCI slots are shown in the following table.



NOTE: PCI slots 7-10 have two different PIRQs assigned. If the adapter installed uses only one IRQ, it will use the PIRQx in the first column. If the adapter uses multiple IRQs (example: Adaptec 3940), it will use the associated IRQs in both columns.

PCI Device Interrupt and Slot INT Routing

Slot Number	INTA, INTB, INTC, INTD	
Proprietary Slot	PIRQB (E-NET)	PIRQA (SVGA)
Slot 1	PIRQA	PIRQA
Slot 2	PIRQA	PIRQA
Slot 3	PIRQB	PIRQB
Slot 4	PIRQB	PIRQB
Slot 5	PIRQC	PIRQC
Slot 6	PIRQC	PIRQC
Slot 7	PIRQA	PIRQC
Slot 8	PIRQB	PIRQC
Slot 9	PIRQA	PIRQB
Slot 10	PIRQA	PIRQB
On-Board SCSI	PIRQC (Ch.A)	PIRQC (Ch.B)

Server Software and Utilities

In BIOS Setup [F2], PCI IRQ lines 1 to 4 can be mapped to any one of the IRQs (3, 4, 5, 7, 9, 10, 11, 12, 14, 15) that are displayed in the Setup menu. However, there are certain rules that must be followed to avoid IRQ conflicts.

1. Use "Auto Select" (the default) for most Window NT installations, unless an ISA legacy card is installed. Do not choose "Auto Select" if an ISA legacy card is installed in the server.
2. ISA assignments take priority over PCI assignments.
3. A PCI device cannot use the same IRQs that is already used by an ISA device.
4. In the 5220 and 5225 series servers, IRQ14 and 15 are fixed for the dual channel IDE.

Limitations: The following limitations are only for DOS and Novell operating systems.

5. SCSI and Ethernet cards cannot share the same PIRQ line in a uniprocessor environment; therefore, do not insert a SCSI board into a slot with the same PCIRQ assignment as the Ethernet. Likewise, do not insert an Ethernet card into a slot that has the same PCIRQ assignment as a SCSI controller.

Examples:

- A. The E-Net controller in the Proprietary slot uses PIRQB; therefore, do not install a SCSI controller into slots 3, 4, or 8, because the first IRQ in these slots are also assigned PIRQB. In addition, do not install a SCSI adapter that uses multiple IRQs in slots 9 and 10, because the second IRQ in these slots is also assigned PIRQB.
- B. The on-board SCSI uses PIRQC, so do not use slot 5 and 6 for an E-net card, because these slots are also assigned PIRQC. In addition, do not install an E-net card that uses multiple IRQs in slots 7 and 8, because the second IRQ in these slots is also assigned PIRQC. These two examples are summarized in the following table. Do not install the type of card in the left column in the PCI slot marked with "NO."

Added Card	PCI Slot									
	1	2	3	4	5	6	7	8	9	10
SCSI Controller with single IRQ			NO	NO				NO		
SCSI Controller with multiple IRQs			NO	NO				NO	NO	NO
E-Net Card with single IRQ					NO	NO				
E-Net Card with multiple IRQs					NO	NO	NO	NO		

- C. As another example, if you install a SCSI card into slot 1, which uses PIRQA, do not install an E-net card into slot 2, 7, 9, or 10, because these slots also use PIRQA.

To map hardware IRQs, during the BIOS POST, press [F2] to enter the BIOS Setup. Select the **Advanced** menu at the top of the screen. Select the **PCI Configuration** submenu. PCI IRQ lines can be mapped to any one of the IRQs that are displayed in the Setup menu.

- PIRQA => PCI IRQ line 1
- PIRQB => PCI IRQ line 2
- PIRQC => PCI IRQ line 3
- PIRQD (USB IRQ) => PCI IRQ line 4

Setting Up Security

The following sections describe the security features available and how to use them.

Setting Supervisor and User Passwords

The server has password protections that can be set to prevent unauthorized access to the BIOS Setup utility. If a supervisor password is set, the server prompts you to enter a password before accessing the BIOS Setup utility.

If "Password On Boot" is enabled, and both the supervisor and user passwords have been set, enter either the supervisor or user password to use the server. The following list provides more information about setting passwords.

- Enable the password during boot.
- Setting the supervisor password allows you to make changes to the boot process.
- Setting the user password allows a lower level user to access files.



NOTE: A supervisor password must be set before setting a user password. If the supervisor password is later deleted, the user password is automatically removed.

Perform the following steps to set a supervisor password:

1. Reboot the server and enter Setup.
2. Highlight the "Security" menu.
3. Highlight "Set Supervisor Password" and press [Enter].
4. Type in a seven (7) digit alpha-numeric supervisor password and then press [Enter].
5. Retype the password as instructed and press [Enter]. (Notice that "Supervisor Password Is" field now indicates Enabled.)

If desired, set a user password as follows:

1. Highlight "Set User Password" and press [Enter].
2. Type in a seven (7) digit alpha-numeric user password and then press [Enter].
3. To confirm, retype the user password as instructed and press [Enter]. (Notice that "User Password Is" field now indicates Enabled.)
4. Press [Esc] then [Enter] twice to exit the BIOS Setup utility and to reboot the server so changes immediately take effect.

The server runs the POST and then asks for the password, which has just been set.

Enabling Password On Boot

When “Password On Boot” is enabled, a screen appears after POST. The screen asks for the supervisor or user password to allow the server to finish the boot process.

Perform the following steps to set “Password On Boot”:

1. Reboot the server and enter Setup.
2. Highlight the “Security” menu.
3. Highlight “Password On Boot.”
4. Press the [+] key. (Pressing the [+] key again reverses the action.)
5. Press [Esc] then [Enter] twice to exit the BIOS Setup utility and to reboot the server so changes immediately take effect.

Eliminating User and Supervisor Passwords

To eliminate the server’s password(s):

1. Reboot the server and enter Setup.
2. Enter the supervisor password and press [Enter].
3. Eliminate the User Password or the Supervisor Password?

If User Password, select “Set User Password.”

If Supervisor Password, select “Set Supervisor Password.”

4. Press [Enter] three times.

You have cleared the old password and are returned to the “Security” menu. Verify that the appropriate password is disabled by checking “User Password is” or the “Supervisor Password is” field, whichever is relevant.

5. Press [Esc] then [Enter] twice to exit the BIOS Setup utility and to reboot the server so changes immediately take effect.

Other Security Options

These options can provide further security for the server under certain conditions:

- If “Password On Boot” is enabled and “Diskette Access” is set to “Supervisor,” entering the supervisor password at boot allows access to a diskette. Entering the user password at boot, however, prevents the server from accessing a diskette.



CAUTION: Consider the security needs carefully before using the Password on Boot option. While this option is enabled, the contents of the hard disk drive cannot be backed up to diskettes and the server cannot be booted from a diskette drive.

- *Sign On Banner*— When enabled, allows a custom banner to be displayed every time you turn the server on.
- *Diskette Access*— While enabled, this option prevents the server from accessing a diskette.
- *Network Server*— Locks the keyboard and mouse to prevent tampering during network operation. Enter a supervisor password to unlock the keyboard and mouse.
- *System BIOS Flash*— When disabled, prevents the server’s BIOS from being flashed (rewritten).

Changing the Boot Sequence

It is sometimes necessary to change the server's boot sequence. Follow the network manual's instructions to determine the correct boot sequence.

To change the boot sequence, proceed as follows:

1. Reboot the server and enter Setup.
2. Highlight the "Boot" menu.

If the CD-ROM drive is listed as the first boot device in the BIOS, the server will boot from the CD-ROM drive. Otherwise, the server can be booted from the diskette drive (drive A) or the hard drive (drive C). If the diskette drive (drive A) then the hard drive (drive C) is selected, the server searches the diskette drive (drive A) first to boot the operating system. When no diskette is in the diskette drive (drive A), the server then tries to boot from the hard drive (drive C).

3. Use the [↑] and [↓] arrows to locate the field to change. Use the [+] to raise the order and [-] to lower it.
4. Press [Esc] twice then [Enter] twice to exit the BIOS Setup utility and to reboot the server so changes immediately take effect.

Following is a typical boot sequence:

- CD-ROM
- Diskette drive (drive A)
- Hard drive (drive C)

Speeding up the Boot Process

There are four options for speeding up the boot process which, in essence, eliminate or replace displays or checks. To make these changes, proceed as follows:

1. Reboot the server and enter Setup.
2. Highlight the `Boot` menu.

The following table lists and describes the items displayed.

Field	Description
Floppy check	Verifies the diskette boot drive.
Setup prompt	Displays the Setup prompt message during the boot sequence. If disabled, the Setup prompt message will not be displayed; however, you can still access the BIOS Setup utility by pressing <F2> before POST completes.
POST errors	Pauses and displays the Setup prompt or Resume boot prompt, if an error occurs during the boot sequence. If disabled, the server always attempts to boot.
Sign-on banner	When enabled, displays the DIGITAL logo during POST.

3. Select the item(s) you wish to change and use the [+] or [-] as follows:

Field	Speed Up Boot Selection
Floppy check	Disable
Setup prompt	Enable
POST errors	Disable
Sign-on banner	Disable

4. Press [Esc] twice then [Enter] twice to exit the BIOS Setup utility and to reboot the server so changes immediately take effect.

Checking System Management Parameters

These screens allow you to see an overview of your server's system and environment parameters, and details of the system assets (environment, memory, POST system, processor module, main logic board, and PCI IRQ assignment). To manage the system:

1. Reboot the server and press <F3> when the DIGITAL logo screen appears.
2. The "Summary" menu appears. Use the [←] and [→] arrows to select the parameter you want to view or change.
3. In screens that are editable, use the [↑] and [↓] arrows to select the field you want to change. Enter the new parameter(s) and then press [Enter] to accept the changes.
4. Press [Esc] then [Enter] to exit System Management and reboot the server so changes immediately take effect.

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 a keyboard and disk drives.

You can upgrade your server's BIOS to future releases by executing the BIOS upgrade utility (PHLASH.EXE) located in the BIOS upgrade kit. PHLASH.EXE and BIOS upgrades are available on the Internet.

For technical support, use the address:

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

For access to the software library for BIOS and driver upgrades, 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. Also, when upgrading the BIOS, you must remove any video expansion boards and enable the onboard VGA. In the rare event that you might need to use the Crisis Recovery Diskette, the server will require that the onboard VGA be used in this mode.

Two switches and one BIOS option affect the result of executing the PHLASH.EXE program:

1. *BIOS Protection (SW1-1)* — This switch, located on the main logic board, must be set to *Normal* (Off) before you can upgrade the server's BIOS.
2. *Recovery Mode Switch (SW1-2)* — This switch, located on the main logic board, must be set to *Recovery* so the server BIOS can enter "Recovery Mode."
3. *System BIOS Flash (BIOS option)* — This BIOS option must be set to *Enable BIOS Upgrade* before you can upgrade the server's BIOS.

If you are having trouble flashing your server's BIOS, refer to Chapter 11, "Troubleshooting."

SCSI Configuration Utility

Your DIGITAL Server comes with an onboard, dual channel SYMBIOS 896 SCSI controller and a SCSI Configuration utility. This utility, located within the server BIOS, allows you to change SCSI controller settings without opening the server.

Use the SCSI Configuration Utility to:

- Check global factory default settings for each SCSI channel and devices connected to it.
- Change factory default settings for individual SCSI devices.
- Change the device boot order.

To start the SCSI Configuration utility:

Press [Ctrl] + [C] when the following message appears during the boot process:

```
Press Ctrl-C to start Symbios Configuration Utility...
```

This message stays on the screen for about five seconds. If you invoke the Configuration utility, the Main Menu of the Symbios SCSI Configuration utility is displayed.

Main Menu	Port Num	Irq----- Level	Status----- Current	Next-Boot	NVRAM Found
	9000	9	On	On	Yes
	9400	9	On	On	Yes
Change Adapter Status					
Adapter Boot Order					
Additional Adapter Configuration					
Display Mode = Verbose					
Mono/Color					
Language					
Help					
Quit					

Figure 2-2. Typical BIOS Setup Utility Screen

The Main menu fields are described in the table that follows.

Menu Fields	Allows you to...
SYM port number	Change adapter setup specifications and device selections.
Change adapter status	Activate or deactivate an onboard or external SCSI channel and all devices attached to it. The changes take place after a reboot.
Adapter boot order	Change the boot sequence of the adapters in the server.
Additional adapter configuration	Select adapters other than those displayed on the first screen.
Display mode	Select a <code>Verbose</code> or a <code>Terse</code> text.
Mono/Color	Change the screen instantly between <code>Mono</code> and <code>Color</code> .
Language	Select a language for this utility.

(1) Factory default

Determining Devices Attached to Each SCSI Channel

To check the devices connected to each channel, use the following procedure:

1. Start the Symbios SCSI Configuration utility to display the Main menu.
2. Use the arrow keys to select the SYM port number and press [Return]. The following menu items are displayed:


```

Adapter Setup
Device Selections
Help
Exit this menu
      
```
3. Choose `Device Selections` to display the SCSI devices attached to this port.
4. Press the [Esc] key to exit from this menu.

For additional information, refer to the Symbios User's Manual on the Quick Launch CD-ROM discs. Select your server model, then "User Documentation". Click on "Additional Documentation" to view the Symbios User's manual.

RAID Configuration Utility

If a RAID adapter is installed in the server, the RAID configuration utility appears when you boot the server. If desired, you can skip this utility, or use this utility to configure the RAID array during initial setup.

Refer to the RAID User's Manual on the Quick Launch CD-ROM discs. Select the "User Documentation" button.

Diagnostics

Diagnostic software is shipped with every DIGITAL Server on the Quick Launch CD-ROM discs. 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 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 Quick Launch MS-DOS partition (only if you selected the option to create a partition). This allows you to run the diagnostic software from the MS-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 you 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."

Refer to Chapter 4, "Troubleshooting," for more information on using the diagnostics software.

BIOS Setup Utility Features

3

Introduction

After entering the BIOS Setup utility, you can edit a variety of resources and configure the server for the most optimized condition. The menu items in the BIOS Setup utility, listed as menu pages below, provide the necessary options to configure the server.

BIOS Setup (F2)

This section provides example tables and displays for the BIOS Setup utility.

Main

Menu Fields	Settings	Comments
System time	Current time	Displays the current time.
System date	Current date	Displays the current date.
Diskette A	Disabled 360 KB, 5¼ 1.2 MB, 5¼ 720 KB, 3½ 1.44 MB, 3½ ⁽¹⁾ 2.88 MB, 3½	Sets the size and density of the diskette drive.
Primary Master	None Auto CD-ROM ⁽¹⁾ User	Determines which device will be the primary bus master. Press [Enter] to display fields.
Video system	EGA / VGA ⁽¹⁾ CGA 80x25 Monochrome	Sets the video controller type.
Monitor type	Color ⁽¹⁾ Monochrome	Sets the monitor type.
Cache and Shadow	[submenu]	Press [Enter] to display fields.
Keyboard Features	[submenu]	Press [Enter] to display fields.
System memory	Not user selectable	Displays the amount of base (conventional) memory each time the server boots.
Extended memory	Not user selectable	Displays the amount of extended memory each time the server boots.
AT bus space	Disabled ⁽¹⁾	Memory hole not available; upper memory is contiguous.

⁽¹⁾ Factory default

continued

BIOS Setup Utility Features

Menu Fields	Settings	Comments
	F00000h, 512 KB	Sets the memory hole at address F00000 with 512 KB memory available.
Extended memory report	Compatibility ⁽¹⁾ Non-compatibility	Select the BIOS report mechanism for the amount of external memory. Select <i>Compatibility</i> when using a conventional operating system. Select <i>Non-compatibility</i> for extended memory above 64 MB under Windows NT.
Primary Master: [submenu]		
Auto		Automatically determines the hard device and parameters of that device installed in the system.
Multi-sector transfers	Disabled ⁽¹⁾	Not user selectable.
LBA mode control	Disabled ⁽¹⁾	Not user selectable.
32-bit I/O	Enabled Disabled ⁽¹⁾	Enables 32-bit IDE.
Transfer mode standard	Standard ⁽¹⁾	Not user selectable.
CD-ROM		Allows you to select the CD-ROM as the primary bus master.
Multi-sector transfers	2, 4, 8, 16 Disabled ⁽¹⁾	Specifies the number of sectors per block for multiple sector transfers.

⁽¹⁾ Factory default

continued

DIGITAL Server 5220

BIOS Setup Utility Features

Menu Fields	Settings	Comments
LBA mode control	Enabled Disabled ⁽¹⁾	Enables the use of logic block addressing instead of cylinders, heads, and sectors.
32-bit I/O	Enabled Disabled ⁽¹⁾	Enables 32-bit IDE.
Transfer mode standard	Standard ⁽¹⁾ Fast PIO 1 Fast PIO 2 Fast PIO 3 Fast PIO 4 FPIO 3/DMA 1 FPIO 4/DMA 2	Select the method for optimum data transfer.
User		Allows you to enter the installed disk drive parameters from the manufacturer's specifications for cylinders, heads, and sectors.
Cylinders	0 - 65535	
Heads	1 - 16	
Sectors	0 - 63	
Maximum capacity	Not selectable	The maximum capacity of the disk drive is displayed.
Multi-sector transfers	2, 4, 8, 16 Disabled ⁽¹⁾	Specifies the number of sectors per block for multiple sector transfers.
LBA mode control	Enabled Disabled ⁽¹⁾	Enables the use of logic block addressing instead of cylinders, heads, and sectors.
32-bit I/O	Enabled Disabled ⁽¹⁾	Enables 32-bit IDE.
Transfer mode standard	Standard ⁽¹⁾ Fast PIO 1 Fast PIO 2 Fast PIO 3 Fast PIO 4 FPIO 3/DMA 1 FPIO 4/DMA 2	Select the method for optimum data transfer.

⁽¹⁾ Factory default

continued

BIOS Setup Utility Features

Menu Fields	Settings	Comments
Cache and Shadow: [submenu]		
L1 cache	Enabled ⁽¹⁾	Always set to Enabled. Not selectable.
L2 cache	Enabled ⁽¹⁾ Disabled	Enables the processor's internal L2 cache.
System BIOS shadow	Enabled ⁽¹⁾	Always set to Enabled. Not selectable.
System BIOS cache	Enabled ⁽¹⁾ Disabled	Enables the server BIOS to be cached in the internal cache to increase server performance, because BIOS instructions are executed in cache instead of RAM.
Video BIOS shadow	Enabled ⁽¹⁾ Disabled	Copies the video BIOS to shadow RAM for improved performance.
Shadow 16 KB at C800 - CBFF: CC00 - CFFF: D000 - D3FF: D400 - D7FF: D800 - DBFF: DC00 - DFFF:	Enabled Disabled ⁽¹⁾	Enables or disables shadowing of individual segments of ROM to increase server performance. CAUTION: Some option ROMs do not operate properly when shadowed.

⁽¹⁾ Factory default

continued

DIGITAL Server 5220

BIOS Setup Utility Features

Menu Fields	Settings	Comments
Keyboard Features: [submenu]		
NumLock	Auto ⁽¹⁾ On Off	Turns NumLock on or off each time the server boots. If Auto is selected, the server will turn on NumLock if it detects a numeric keypad.
Key click	Disabled ⁽¹⁾ Enabled	Enables or disables the audible key click feature.
Keyboard auto-repeat rate	2/sec 6/sec 10/sec 13.3/sec 18.5/sec 21.8/sec 26.7/sec 30/sec ⁽¹⁾	Sets the number of times a second to repeat a keystroke while the key is held down.
Keyboard auto-repeat delay	1/4 sec 1/2 sec ⁽¹⁾ 3/4 sec 1 sec	Sets the delay time after a key is held down before it begins to repeat a keystroke.

⁽¹⁾ Factory default

continued

Advanced

Menu Fields	Settings	Comments
Integrated Peripherals	[submenu]	Press [Enter] to display fields.
Advanced Chipset Control	[submenu]	Press [Enter] to display fields.
PCI Configuration	[submenu]	Press [Enter] to display fields.
Plug & Play O/S	No ⁽¹⁾ Yes	Select Yes if using a Plug & Play operating system; otherwise, select No .
Reset configuration data	Yes No ⁽¹⁾	Select Yes to clear the system configuration data if it is suspected to be corrupted, which sometimes occurs after a power outage. This option also clears the Plug and Play databases. After entering the correct settings (or accepting the default settings), the computer switches this setting back to No . If it is not necessary to clear system configuration data, leave the setting at No .
Onboard SCSI BIOS	Enabled ⁽¹⁾ Disabled	Enables or disables the onboard SCSI BIOS. Set to disabled when installing a new adapter board with a later BIOS revision.
Legacy USB support	Enabled ⁽¹⁾ Disabled	Enables support for Legacy Universal Serial Bus. Check if your operating system supports USB before using this feature.

⁽¹⁾ Factory default

continued

BIOS Setup Utility Features

Menu Fields	Settings	Comments
System monitoring warning beep	Enabled ⁽¹⁾ Disabled	Enables or disables the 8031 warning beep.
Integrated Peripherals: [submenu]		
PS/2 mouse	Disabled Enabled Auto detect ⁽¹⁾	Enables, disables, or auto detects the mouse port.
Local bus IDE adapter	Disabled Primary ⁽¹⁾	Enables or disables the local bus IDE adapter.
Serial port A	Disabled Enabled Auto ⁽¹⁾	<p>Enables, disables, or auto detects an available address and IRQ for the serial port A.</p> <p>Select <code>Auto</code> unless interrupts IRQ4 and/or IRQ3 are allocated as a server resource.</p> <p>Two devices cannot share the same IRQ. Choosing <code>Disabled</code> makes serial port A unusable. Choosing <code>Auto</code> automatically configures COM1 to address = 3F8h and IRQ = 4 if they are available.</p> <p>If <code>Enabled</code> is selected, the information at the right will appear.</p> <p>Base I/O address 3F8⁽¹⁾ 2F8 3E8 2E8</p> <p>Interrupt IRQ3 IRQ4⁽¹⁾ IRQ10 IRQ11</p>

⁽¹⁾ Factory default

continued

BIOS Setup Utility Features

Menu Fields	Settings	Comments
Serial port B	Disabled Enabled Auto ⁽¹⁾	Enables, disables, or auto detects an available address and IRQ for serial port B. Choosing Disabled makes serial port B unusable. Choosing Auto automatically configures COM2 to address = 2F8h and IRQ = 3 if they are available.
	If Enabled is selected, the information at the right will appear.	Base I/O address 3F8 2F8 ⁽¹⁾ 3E8 2E8 Interrupt IRQ3 ⁽¹⁾ IRQ4 IRQ10 IRQ11
Parallel port	Disabled Enabled Auto ⁽¹⁾	Enables, disables, or auto detects an available address and IRQ for the parallel port. Auto is the recommended setting.

⁽¹⁾ Factory default

continued

DIGITAL Server 5220

BIOS Setup Utility Features

Menu Fields	Settings	Comments
	If Enabled is selected, the information at the right will appear.	Base I/O address: 378 ⁽¹⁾ 278 3BC Interrupt: IRQ5 IRQ7 ⁽¹⁾
Parallel port mode	Output only Bi-directional ⁽¹⁾ EPP ECP	Sets the onboard parallel port mode for the Enable and Auto settings. Standard printer connection. PS/2 compatible mode to transmit and to receive at the same time. Enhanced parallel port mode. Extended capabilities port mode.
Floppy disk controller	Enabled ⁽¹⁾ Disabled Auto	Enables, disables, or auto detects the onboard diskette controller.
Base I/O address	If Enabled is selected, the information at the right will appear. Primary ⁽¹⁾ Secondary	Base I/O address Primary ⁽¹⁾ Secondary Sets the base I/O address for the diskette drive controller
Diskette write protection	Enabled Disabled ⁽¹⁾	Enables or disables the diskette drive's write protect option.

(1) Factory default

continued

BIOS Setup Utility Features

Menu Fields	Settings	Comments
Integrated PCI Ethernet	Enabled ⁽¹⁾ Disabled	Enables or disables the onboard Ethernet controller.
Integrated PCI SCSI	Enabled ⁽¹⁾ Disabled	Enables or disables the onboard SCSI controller.
Advanced Chipset Control: [submenu]		
ACPI & MP table	Disabled ⁽¹⁾ 1.1 1.4	Configures the MP specification revision level. ACPI (Advanced Configuration and Power Interface) is disabled as a default setting. When this feature is enabled, the power button must be pressed more than four seconds to power off the system (an ACPI feature). Before enabling this feature, check if the Operating System supports it.
Error correction code	Enabled ⁽¹⁾ Disabled	Enables or disables the Error Correction Code (ECC).
PCI Configuration: [submenu]		
PCI IRQ line #	Disabled Auto select ⁽¹⁾ 3 4 5 7 9 10 11 12 14 15	Assigns IRQs to PCI slots. An asterick (*) appears to the left of the line if the IRQ is in use.
PCI/PNP ISA UMB Region Exclusion		Press [Enter] to display addresses.
PCI/PNP ISA IRQ Resource Exclusion		Press [Enter] to display IRQs.

⁽¹⁾ Factory default

continued

BIOS Setup Utility Features

Menu Fields	Settings	Comments
PCI/PNP ISA UMB Region Exclusion: [submenu]		
C800 - CBFF	Available ⁽¹⁾	Reserves a specific block of upper memory for use by legacy ISA devices.
CC00 - CFFF	Reserved	
D000 - D3FF		
D400 - D7FF		
D800 - DBFF		
DC00 - DFFF		
PCI/PNP ISA IRQ Resource Exclusion: [submenu]		
IRQ 3	Available ⁽¹⁾	Reserves the specified IRQ for use by a legacy ISA device.
IRQ 4	Reserved	
IRQ 5		
IRQ 7		
IRQ 9		
IRQ 10		
IRQ 11		
IRQ 12		
IRQ 15		

⁽¹⁾ Factory default

Security Options

Menu Fields	Settings	Comments
Set supervisor password	Press [Enter].	<p>Allows a supervisor password to be set.</p> <p>The supervisor password must be set if a user password is to be used.</p> <p>NOTE: Entering Setup with a supervisor password provides full access to all BIOS Setup utility menus.</p>
Set user password	Press [Enter].	<p>Allows a user password to be set.</p> <p>This password can be set only if a supervisor password is entered.</p>
Password on boot	Enabled Disabled ⁽¹⁾	<p>Enables or disables the enter password on boot option.</p> <p>If you enable this option, a user or supervisor password must be entered in order for the boot process to complete. If a user or supervisor password is not entered, the operating system cannot be accessed.</p>

⁽¹⁾ Factory default

continued

BIOS Setup Utility Features

Menu Fields	Settings	Comments
Diskette access	Supervisor User ⁽¹⁾	Controls who might have access to diskette drives. If Supervisor is selected, access to the diskette drive is limited to the supervisor, who must enter a password. If User is selected, the diskette drive is accessed by entering either the supervisor or the user password. Whatever setting is chosen, it only becomes functional if both a Supervisor Password and a User Password have been set (if the User setting is chosen).
Network server	Enabled Disabled ⁽¹⁾	When enabled, the system is secured at boot to prevent tampering during network operation.
System backup reminder	Disabled ⁽¹⁾ Daily Weekly Monthly	When enabled, displays a backup reminder message at boot, daily, every Monday, or the 1 st of each month.
Virus check reminder	Disabled ⁽¹⁾ Daily Weekly Monthly	When enabled, displays a reminder message to check for viruses at boot, daily, every Monday, or the 1 st of each month.
System BIOS flash	Enabled Disabled ⁽¹⁾	When enabled, allows the server BIOS in the flash ROM to update.

⁽¹⁾ Factory default

Boot

Menu Fields	Settings	Comments
Floppy check	Enabled Disabled ⁽¹⁾	Enabled permits verification of FDD type at boot. Disabled prevents FDD verification and speeds up the boot process.
Setup prompt	Enabled ⁽¹⁾ Disabled	Enables or disables the <F2> setup prompt each time the server boots. Disables the prompt "Press <F2> to enter Setup". Setup can still be entered by pressing <F2> before POST completes.
POST errors	Enabled ⁽¹⁾ Disabled	Enabling this option causes the server to pause and display a setup entry or resume the boot prompt if an error occurs at boot. Disabling this option causes the server to always attempt to boot regardless of a setup entry or error.
Sign-on banner	Enabled ⁽¹⁾ Disabled	Enabling this option causes the DIGITAL logo to appear during POST.
Boot device priority	1. ATAPI CD-ROM drive 2. Diskette drive 3. Hard drive	Allows you to select the boot drive options. To change the order, use the Up and Down cursor keys to select the device you want to move. Then use the + and – keys, on the numeric keypad, to move the device to the desired boot order.
Hard drive	1. Onboard SCSI controller 2. Bootable add-in cards	Selects the ROM scan sequence to determine which device will be the boot device. The first device encountered with bootable media will be the boot device.

⁽¹⁾ Factory default

System Management (F3)

This section provides example tables and displays for each System Management utility.

Summary — System Summary

Menu Fields	Settings	Comments
Processor 1	350 MHz PII, L1/L2=, ID=	Indicates processor speed, installed status, cache size, and ID number.
Processor 2	350 MHz PII, L1/L2=, ID=	
Co-processor	Installed	Internal component of processor.
System RAM	64 MB	RAM size.
System BIOS	1.0	BIOS version being used.
PS/2 mouse	Installed	Mouse installed
Diskette A	1.44 MB 3½-inch	Size and availability.
Parallel port	Bi-directional, 0378, IRQ7	Parallel port mode selected and availability and assigned IRQ.
Serial port 1	03F8, IRQ4	Availability and assigned IRQ.
Serial port 2	02F8, IRQ3	Availability and assigned IRQ.
E-net address	0000F87AA3E9	Ethernet address.

Environment — Environment Monitoring and Summary

Menu Fields	Settings	Comments
Processor 1 status	OK	No problem.
Processor 2 status	OK	No problem.
Processor 1 temperature	43 °C	Actual temperature.
Processor 2 temperature	34 °C	Actual temperature.
Processor 1 VRM 2.0 V	2.01 V	VRM voltage.
Processor 2 VRM 2.0 V	2.06 V	VRM voltage.
Processor GTL 1.5 V	1.50 V	Gunning transistor logic.
Processor IO 2.5 V	2.52 V	
Sys 12 V	11.8 V	Server 12 V voltage rating.
Sys 5 V	5.06 V	Server 5 V voltage rating.
Sys 3.3 V	3.32 V	Server 3.4 V voltage rating.
Sys -12 V	-12.10 V	Server -12 V voltage rating.
P/S status	OK	Power supply status OK.
Fan 1 status	OK	Fan 1 status OK.
Fan 2 status	OK	Fan 2 status OK (model 3220).

DIGITAL Server 5220

Memory — Memory Slots Information

Slot	Type	Size	Speed	Status
Bank 0	SDRAM	64M	10 ns	OK
Bank 1	SDRAM	64M	10 ns	OK
Bank 2	SDRAM	64M	10 ns	ECC ⁽¹⁾
Bank 3	SDRAM	64M	10 ns	OK

DEC01593

(1) ECC here indicates that one bit error correction occurred.

POST — POST Error Summary

Contains a POST error summary if post fails.

SYS — System Asset Number and I/O Management

You can only change the Asset# in the following display.

Enter Required Parameters For The Selected Items:		
Assembly	System	
Asset#		
System ID	FR-J2B8W-AA	
Model#	5220 2350	
Serial#	TA 1234567890	
System IDs Of Each Assembly		
Assembly	Model#	Serial#
Main Logic Board		
Processor Module		

DEC01703

MLB — Main Logic Board Asset Number Management

Assembly:	Main Logic Board
Asset#:	2224Z
Part#:	54-25462-01
Revision:	AX01
Serial#:	TA2544679
Artwork#:	B01

DEC01595

CPU—Processor Module Asset Number Management

```
Assembly:      Processor Module
Asset#:       2224Z
Part#:        70-3323X-01
Revision:     AX01
Serial#:      TA 2544831
Artwork#:     B01
```

DEC01596

PCI—PCI IRQ Assignment Status

```
Integrated Universal Serial Bus(USB)[IRQ09][Enable]
Integrated SCSI Bus Controller A  [IRQ10][Enable]
Integrated SCSI Bus Controller B  [IRQ][Enable]

PCI Slot 1 Empty
PCI Slot 2 Empty
PCI Slot 3 Empty
PCI Slot 4 Raid Controller          [IRQ15][Enable]
PCI Slot 5 Empty
PCI Slot 6 Empty
PCI Slot 7 Empty
PCI Slot 8 Empty
PCI Slot 9 Empty

Proprietary Slot-Ethernet Controller[IRQ11][Enable]
VGA- Compatible Controller[Not Required]
```

DEC01702



Troubleshooting **4**

Introduction

This chapter provides initial troubleshooting procedures. The tables that follow list specific problems, probable causes, and recommended actions to take if the server fails. Tables include:

- Server Troubleshooting
- Disk Drive Troubleshooting
- Hot Swap Drive Troubleshooting
- Tape Drive Troubleshooting
- Monitor Troubleshooting
- CD-ROM Troubleshooting
- Diskette Drive Troubleshooting
- RAID Troubleshooting

Refer to the documentation supplied with additional options if you are experiencing problems with specific options that you have installed.

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 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. Refer to the next section “When to Use the Diagnostics.”
- Run the SCSI configuration utility if you have problems after connecting devices.
- Run the BIOS Setup utility (F2).
- Run the System Management utility (F3) to check IRQ settings.

Refer to Chapter 2, “Server Software and Utilities,” to ensure the server is correctly configured for all installed hardware and software.

- Run the SCSI or RAID configuration utility if you have problems after connecting devices.

Refer to Chapter 2, “Server Software and Utilities,” for additional information.

When to Use the Diagnostics

The diagnostic software is a versatile tool for verifying proper hardware installation and isolating intermittent problems that are not detected by the Power-On Self Test (POST). You should run the diagnostic software if:

- 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 additional memory, processors, 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.
- 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 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 the Diagnostics Tests from the Server's Hard Disk Drive

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

1. Boot the system and select *Programs*, then the *MS-DOS Prompt* from the *Start* 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 to load the AMIDiag program. 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

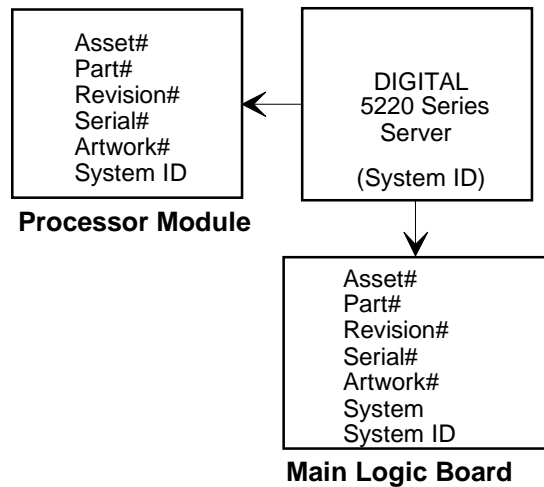
The System ID is also located on the main logic board and processor module. The System ID contains the following information:

- 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 BIOS Setup utility or by using the ServerWORKS management software.



DEC0103

Figure 4-1. DIGITAL Server Component Information



Obtaining Information Using the BIOS Setup Utility

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

You can view the details for the main logic board or processor module by pressing <F3> and then selecting the *SYS* option. The BIOS Setup utility 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's back panel.

Refer to Chapter 3, "BIOS Setup Utility Features," for more detailed information about the BIOS Setup utility.

DIGITAL ServerWORKS Manager

The DIGITAL Server is shipped with DIGITAL ServerWORKS Manager software. ServerWORKS Manager is a workgroup and server management product for DIGITAL's family of servers. ServerWORKS Manager utilizes 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' POLYCENTER Manager/NetView, Hewlett-Packard's OpenView UX for Windows, and IBM's Netview/6200 AIX. Also included with the DIGITAL ServerWORKS Manager are Network Operating System (NOS) Agents for Windows NT V4.x, Novell NetWare™ V3.12 and V4.x, and SCO UNIX V5.x. 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 Installation and User's 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 Installation and User's 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.
Fan 5	The rear fan fails.	A message displays and a warning beep sounds.
CPU 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.
CPU 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.
CPUs present	The incorrect number of CPUs are present in the server.	A message displays indicating the number of CPUs present in the server.

continued

Troubleshooting

Component	Possible Failures	Result
CPU temperature sensing	The temperature exceeds 72 °C (161.6°F).	Backup fans activate without warning. If the temperature drops below 70 °C the backup fans are turned off.
	The temperature exceeds the warning level (>75 °C; >167°F).	A warning message appears and a warning beep sounds. If the temperature exceeds the warning level for more than five minutes, the server automatically shuts down.
	The temperature exceeds the upper limit (>80 °C; >176°F).	The server automatically shuts 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

For the processor, 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 middle button located below the OCP once after a beep sounds. To enable it, press the button again.

POST/Boot Codes for the Processor Module

POST Code Descriptions	Count Down Code ⁽¹⁾	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

⁽¹⁾ Count down codes are displayed on the server's monitor.

continued

Troubleshooting

POST Code Descriptions	Count Down Code⁽¹⁾	Normal OCP Display	OCP Error Display	Beep Codes
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

(1) Count down codes are displayed on the server's monitor.

The following table lists the messages that appear during POST in support of the processor module.

POST Message	Description
PROC 01 present (Speed:xxx, ID:xxxx, L2:xxxKB)	Indicates 1 or 2 processor(s) found.
PROC 02 present (Speed:xxx, ID:xxxx, L2:xxxKB)	The ID is the processor ID value that indicates the stepping of the processor. Like stepping chips should be installed on any given processor module.
PROC 01 present(Speed:xxx, ID:xxxx, L2:xxxKB)	Indicates processor 1 or 2 found, but has failed.
PROC 02 present (Speed:xxx, ID:xxxx, L2:xxxKB)	
The PROC slot terminator card is not installed	Indicates that for a single processor module the second bus is not terminated with a terminator card. Halts system after message prints.
Processor module failed	Indicates that there may be a problem with the processor module itself (not the processor). Halts system after message prints.

OCP Messages

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



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

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 back light 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 appear 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	PROC1 temp=XXX C	PROC 1 overheat	Temperature of Processor 1 is out of range.
	PROC2 temp=XXX C	PROC 2 overheat	Temperature of Processor 2 is out of range. Action: Verify fans are operational.
Power supply status	P/S1 OK	P/S1 fail	Power supply 1 is not working. Action: Check that power supply cables and connectors are connected correctly.
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.
		Sys fan 5 fail	Fan 5 is not working. Action: Check that fan connectors are connected correctly.
CPU status		PROC 1 failure	Internal defect of Processor 1 or internal temperature exceeds the upper limit .
		PROC 2 failure	Internal defect of Processor 1 or internal temperature exceeds the upper limit .
		No PROC detected	No processor(s) present in the server.
		PROC module fail	Processor module failed.

continued

Troubleshooting

Status	Normal OCP Display	OCP Error Display	Description of Error Display/Action
System voltages	PROC voltages OK	GTL1 1.5V =x.xxV IO VOL 25V = x.xxV	Most likely a processor module failure.
CPU voltages	CPU voltages OK	VRM1 y.yyV=x.xxV VRM2 y.yyV=x.xxV	Voltage regulator 1 should be y.yy volts and is being measured at x.xx volts. Voltage regulator 2 should be y.yy volts and is being measured at x.xx volts. Action: Diagnose whether the CPU 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
System date/time	yyyy/mm/dd hh:mm		yyyy = year mm = month dd = day hh = hour mm = minute

Processor Module Voltage and Temperature Ranges

The following tables list the operating voltage and temperature ranges for the processor module.

Processor Voltage Range

	Normal	Error Range	Error Based Voltage Range	Power Good Voltage	Shutdown Voltage Value	Bad Voltage Value
CPU I/O voltage	2.5V	± 5%	+2.375 ≈ 2.625V	+2.2 ~ 2.8V	> +3.0V	< +1.85V
Vtt of GTL	1.5V	± 10%	+1.35 ≈ 1.65V	+1.32 ~ 1.68V	> +1.8V	< +1.10V

Processor Voltage Range (V_{ccp})

V_{ccp}	$\pm 7\%$ Power Good Range	+10% Shutdown Value	-10% Hardware Bad Value
1.80V	1.6740 ~ 1.9260V	> +1.980V	< +1.620V
1.85V	1.7205 ~ 1.9795V	> +2.035V	< +1.665V
1.90V	1.7670 ~ 2.0330V	> +2.090V	< +1.710V
1.95V	1.8135 ~ 2.0865V	> +2.145V	< +1.755V
2.00V	1.8600 ~ 2.1400V	> +2.200V	< +1.800V
2.05V	1.9065 ~ 2.1935V	> +2.255V	< +1.845V
2.10V	1.9530 ~ 2.2470V	> +2.310V	< +1.890V
2.20V	2.0460 ~ 2.3540V	> +2.420V	< +1.980V
2.30V	2.1390 ~ 2.4610V	> +2.530V	< +2.070V
2.40V	2.2320 ~ 2.5680V	> +2.640V	< +2.160V
2.50V	2.3250 ~ 2.6750V	> +2.750V	< +2.250V
2.60V	2.4180 ~ 2.7820V	> +2.860V	< +2.340V
2.70V	2.5110 ~ 2.8890V	> +2.970V	< +2.430V
2.80V	2.6040 ~ 2.9960V	> +3.080V	< +2.520V
2.90V	2.6970 ~ 3.1030V	> +3.190V	< +2.610V
3.00V	2.7900 ~ 3.2100V	> +3.300V	< +2.700V
3.10V	2.8830 ~ 3.3170V	> +3.410V	< +2.790V
3.20V	2.9760 ~ 3.4240V	> +3.520V	< +2.880V
3.30V	3.0690 ~ 3.5310V	> +3.630V	< +2.970V
3.40V	3.1620 ~ 3.6380V	> +3.740V	< +3.060V
3.50V	3.2550 ~ 3.7450V	> +3.850V	> +3.150V

Processor Temperature Sensing

Description	Possible Failures	Result
Temperature	The temperature exceeds 85 °C (185 °F)	Displays an error message and warning beep. Server shuts down after five minutes.
	The temperature exceeds 90 °C (194 °F)	Server immediately shuts down.

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
- Speakers
- 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

Problem	Possible Cause	Action
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 switches incorrectly set.	Set all appropriate switches.
	Processor module switches incorrectly set.	Make sure all switches are correctly set.
	Side panels removed.	Install side panels.
	Power supply failed.	Replace power supply.
	Processor module has failed.	Reseat the processor module. If problem persists, replace the processor module.
	Main logic board failed.	Replace main logic board.

continued

Troubleshooting

Problem	Possible Cause	Action
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 video/Ethernet daughter card.
Server does not boot from CD-ROM drive.	Monitor has failed.	Replace monitor
	CD-ROM drive is not connected to the IDE controller.	Connect the CD-ROM to the IDE connector located on the main logic board.
	CD-ROM disc is not bootable.	Insert a bootable CD-ROM disc.
Server operates incorrectly after installing a processor module.	Processor module installed incorrectly.	Reinstall processor module.
	BIOS Setup utility indicates an error after installing a processor module.	Replace the terminator and reboot. If server boots without errors, replace processor module.
	Mismatched stepping.	Check processor stepping information.

continued

Troubleshooting

Problem	Possible Cause	Action
Server operates incorrectly after installing optional expansion board.	Expansion board installed incorrectly.	Remove expansion board and reinstall.
	IRQ conflict.	Run System Management <F3> to check status of IRQ assignments. Refer to Chapter 2.
	Expansion board has failed.	Remove expansion board and reboot. If server boots without errors, replace expansion board.
Server operates incorrectly after installing 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 ."
	DIMMs installed incorrectly	Remove DIMMs and reinstall.
	DIMMs have failed.	Replace DIMMs.
	Processor module installed incorrectly.	Reinstall processor module.
	Processor module failed.	Replace processor module.

continued

Troubleshooting

Problem	Possible Cause	Action
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. Keyboard failed.	Power down the server and connect the keyboard to the keyboard port. Replace keyboard
No response to mouse commands.	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 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 BIOS Setup utility and disable external cache. Refer to Chapter 2.

Troubleshooting

Disk Drive Troubleshooting

Problem	Possible Cause	Action
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.
	Termination not removed from the SCSI device.	Remove termination. Refer to the supplied kit installation instructions.
	Loose SCSI cable.	Secure all cable connections.
	SCSI cable incorrectly installed between SCSI controller, SCSI device or backplane.	Check cabling arrangement.
	SCSI device has failed.	Replace SCSI device.
	SCSI controller has failed.	Replace main logic board.

continued

Troubleshooting

Problem	Possible Cause	Action
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.
	Termination not removed from the SCSI device.	Remove termination. Refer to the supplied kit installation instructions.
	Loose SCSI cable.	Secure all cable connections.
	SCSI cable incorrectly installed between SCSI controller, SCSI device or backplane.	Check cabling arrangement.
	SCSI device has failed.	Replace SCSI device.
SCSI controller has failed.	Replace main logic board.	

continued

Troubleshooting

Problem	Possible Cause	Action
Server does not boot from an internal SCSI hard disk drive.	Boot device not attached to the SCSI controller at the lowest ROM address.	Run the BIOS Setup utility to define the server boot device.
	PCI/ISA scanning order incorrect.	Refer to the bus scanning examples in Chapter 8 of the <i>System Reference</i> manual
	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.
	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 boot hard disk drive not formatted.	Format the SCSI hard disk drive. CAUTION: Formatting the SCSI hard disk drive will destroy all the data on the drive.
	SCSI device has failed.	Replace SCSI device.

continued

Troubleshooting

Problem	Possible Cause	Action
SCSI hard disk drive cannot read or write information.	Incorrect disk drive jumper settings.	Refer to the supplied kit installation instructions.
	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.
Hot swap drive failure.	Check hot swap drive status LEDs for a failure indication.	Replace failed drive

Troubleshooting

Hot Swap Drive Troubleshooting

Problem	Possible Cause	Action
Drive fault LED lit.	Drive failed.	Replace hot swap drive.
Drive activity and fault LEDs lit.	Drive is hung or has failed.	Replace hot swap drive.
Drive fault LED flashing.	Drive is in recovery mode or has failed and is spinning down.	Allow the drive array to build or fully spin down.

Tape Drive Troubleshooting

Problem	Possible Cause	Action
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>

Troubleshooting

Monitor Troubleshooting

Problem	Possible Cause	Action
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 power indicator
No screen display.	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

Problem	Possible Cause	Action
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.
	On the CD-ROM drive, slave jumper selected instead of master	Change master/slave switch jumper to master.
	IDE cable disconnected.	Properly connect the IDE cable.
Power is on but indicator shows no activity.	Tray open.	Close the tray.
	No disc or tray is open.	Insert a disc and close the tray.
Disc is spinning but drive is idle.	Check cable connections.	Make sure cables are correctly connected.
	Application software not running.	Run application software.

Troubleshooting

Diskette Drive Troubleshooting

Problem	Possible Cause	Action
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 BIOS Setup utility and set the Diskette Write Protection option to "Disabled."
Server does not boot from a target diskette drive.	Disabled in BIOS Setup utility.	Run the BIOS Setup utility and enable the diskette drive.
	Diskette drive not enabled.	Run the BIOS Setup utility and enable the diskette drive.
	Diskette boot option disabled.	Run the BIOS Setup utility and set boot option to 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 BIOS Setup utility and disable the diskette write protection option.

RAID Troubleshooting

Problem	Possible Cause	Action
Replaced drive does not spin up to speed.	Drive not seen by RAID host adapter.	Manually rebuild the drive. Remove the drive, wait 20 seconds, reinsert drive. Wait one minute and then rebuild the drive.
Multiple drives have failed.	No power available.	Restore power, run the RAID configuration utility and change the state of any failed (FLD) drive to optimal (OPT). Run the RAID configuration utility and check for bad blocks on the drives. Repair any bad blocks.
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 drive SCSI ID settings.
	Defective RAID adapter.	Replace the RAID adapter
	Drive improperly inserted.	Reinsert drive.
	Defective drive.	Replace drive.

Troubleshooting

Flash BIOS Troubleshooting

Problem	Possible Cause	Action
Cannot flash the server's BIOS	Main logic board switch settings incorrectly set.	Make sure main logic board switch SW1-2 "Recovery Mode" is set to Recovery and SW1-1 "BIOS Protection" is set to Normal.
	BIOS Setup utility switch setting incorrectly set.	Make sure the "System BIOS Flash" option in the BIOS Setup utility is set to Enabled.

FRU Replacement **5**

Introduction

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

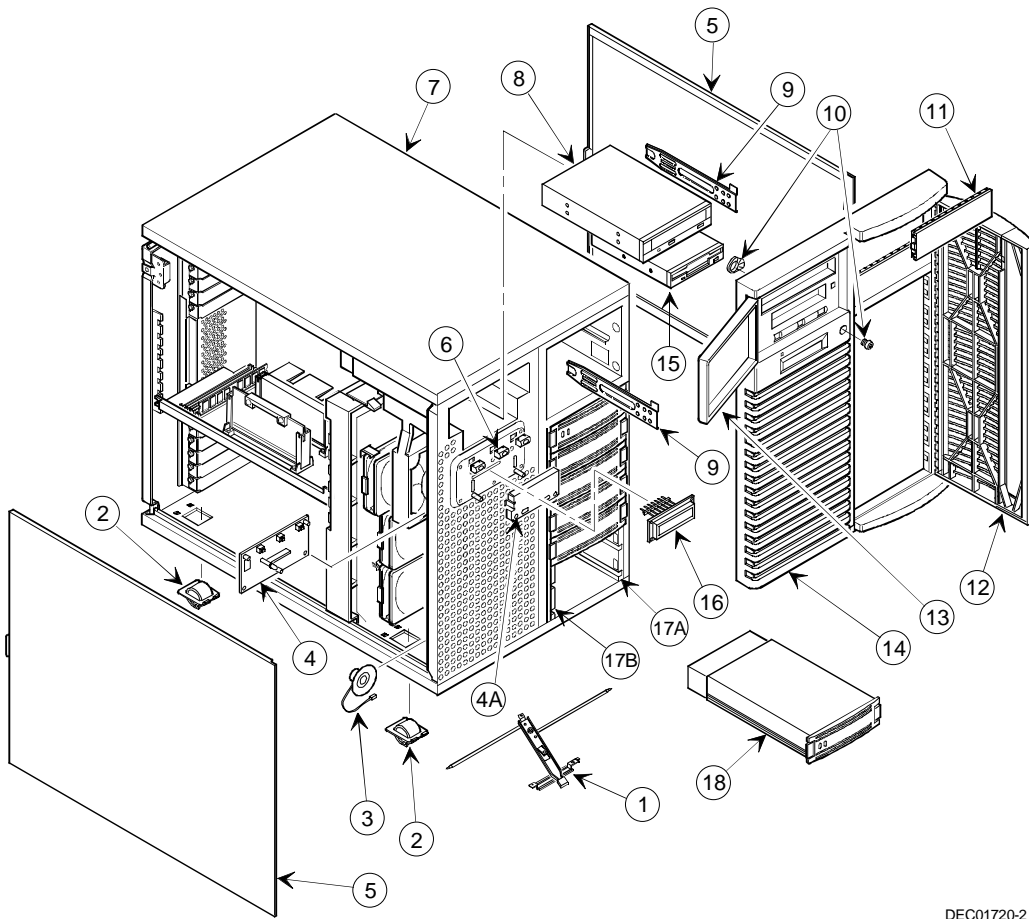


NOTE: Customer installable devices, such as expansion boards, memory, and disk drives are discussed in the *System Reference Manual*.

Server Front View

Figure Legend	Orderable Spare Part	Description
1	70-31918-02	Brake assembly, frost white
2	70-31897-01	Caster left (front and back)
	70-31897-02	Caster right (front and back)
3	12-39309-04	Speaker assembly, 270 mm
4	54-23594-02	OCP module
4A	74-49856-01	Shield, OCP
5	70-31675-01	Side panels (left and right), frost white
6	74-49277-01	Push button (3)
7	70-31901-07	Enclosure subassembly (without power supply), frost white
8	PCXRN-AR	32x ATAPI CD-ROM drive
9	74-49365-01	Drive bracket (CD-ROM drive and right side)
10	12-43231-04	Front keylock assembly
11	70-30796-05 or 70-33222-01	Cover assembly, 5.25-inch drive, frost white
12	70-31906-02	Door assembly, frost white
13	70-31927-02	Door assembly, drive
14	70-31898-03	Front bezel assembly, frost white
15	PCXRJ-AD	3.5-inch, floppy disk drive, 1.44 MB, frost white
16	30-43447-01	Module, Liquid Crystal Display (LCD)
17A	74-48642-01	SBB rail, right
17B	74-48642-02	SBB rail, left
18	RZ28C-VW	2 GB 3.5-inch SCSI SBB
	RZ29C-VW	4 GB 3.5-inch SCSI SBB

FRU Replacement



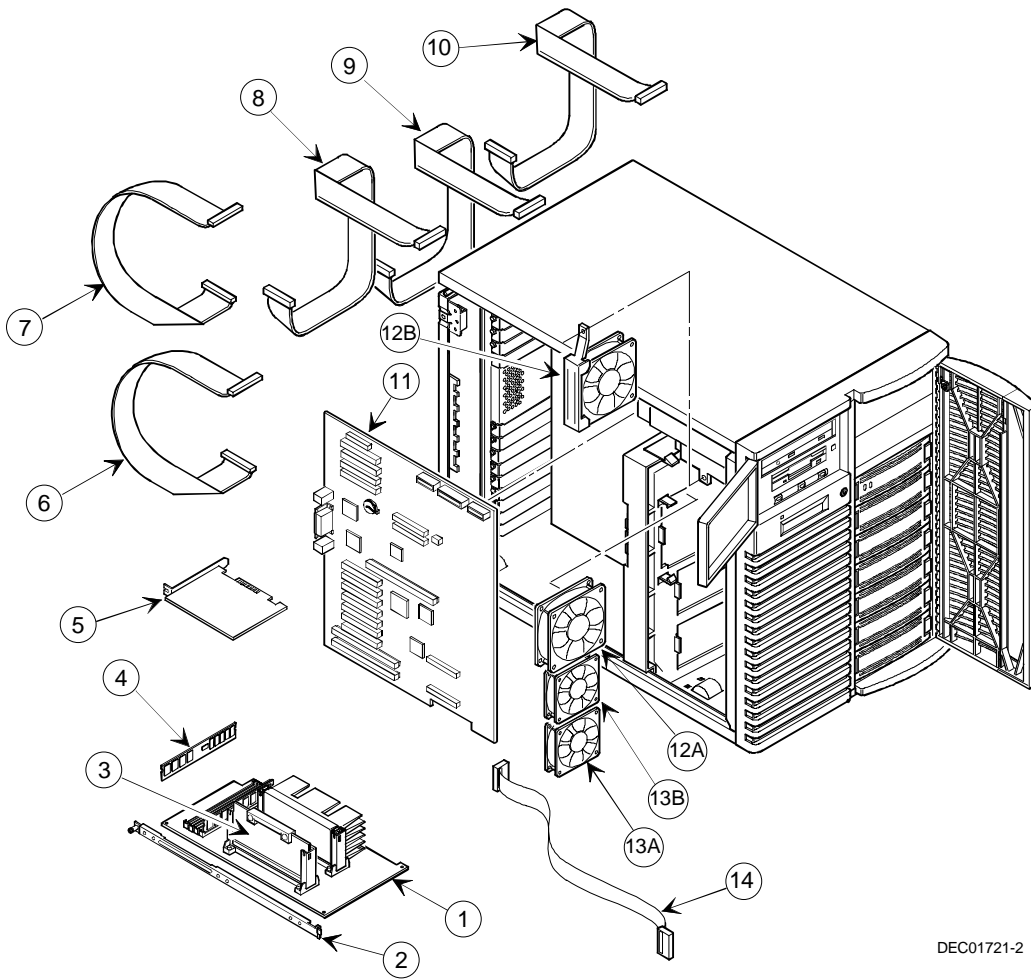
DIGITAL Server 5220

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Figure 5-1. Server Front View

Server Left-Side View

Figure Legend	Orderable Spare Part	Description
1	70-33231-01 70-33231-02 70-33232-01 70-33232-02	Processor module assembly, SP Pentium II 350 MHz Processor module assembly, DP Pentium II 350 MHz Processor module assembly, SP Pentium II 400 MHz Processor module assembly, DP Pentium II 400 MHz
2	70-32520-01	Retainer assembly (for processor module)
3	54-25302-04	Terminator card
4	FR-SDSMA-AA FR-SDSMA-AB FR-SDSMA-AC	64 MB DIMM 128 MB DIMM 256 MB DIMM
5	54-25456-01	Video/Ethernet daughter card
6	17-03460-08	Flat 34-cond cable assembly (for diskette drive)
7	17-04866-01	40-cond IDE cable assembly (for CD-ROM drive)
8	17-04143-02	68-cond SCSI cable assembly (two unshielded connectors), 70 mm
9	17-04143-07	68-cond SCSI cable assembly (two unshielded connectors), 380 mm
10	17-04142-01	Cable assembly, 68-pin conductor, SCSI-3, 1 male connector, 1 female connector (connects to external SCSI knockout)
11	54-25462-01	Main logic board
12A	12-41569-02	Primary fan
12B	12-41569-06	Secondary fan
13A	12-44211-01	Primary fan
13B	12-44211-01	Secondary fan
14	17-04096-01	Flat 10-cond cable assembly (OCP power/data cable)



DIGITAL Server 5220

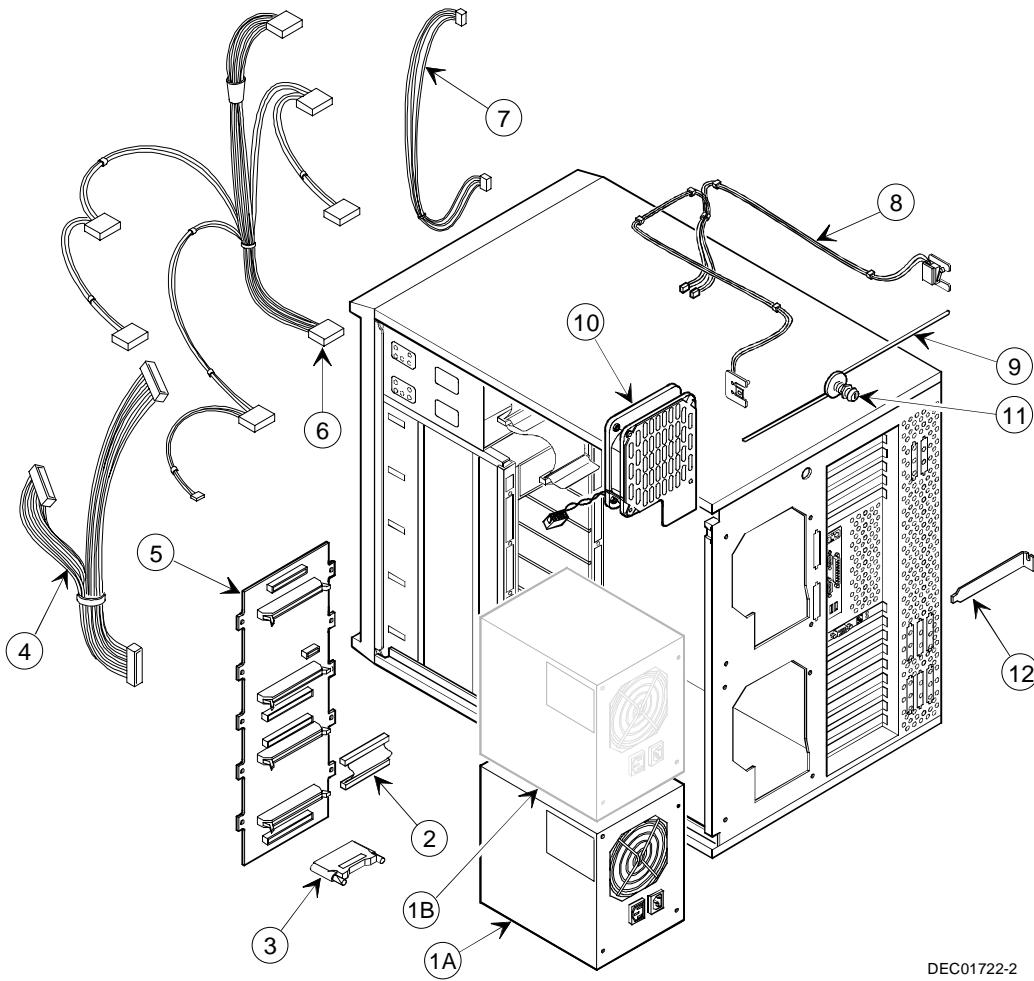
DEC01721-2

Figure 5-2. Server Left-Side View

Server Right-Side/Rear View

Figure Legend	Orderable Spare Part	Description
1A 1B	30-43120-01	Power supply (1) 450W, +3.3V, $\pm 5V$, $\pm 12V$ Optional second power supply
2	17-04143-02	68-pin SCSI cable assembly (jumper cable)
3	12-41768-03	SCSI terminator 68-position single-ended
4	70-31928-01	Wire assembly, system power
5	54-23384-02	Storage backplane module
6	70-31894-01	Wire assembly (12 wires)
7	70-31890-01	Wire assembly (3 wires)
8	70-31909-01	Microswitch cable assembly
9	70-31919-01	Side panel lock assembly
10	12-41569-07	Fan assy, 120 x 120 MM
11	12-37977-04	Rear keylock assembly
12	74-48303-01	I/O expansion board cover bracket

FRU Replacement



DIGITAL Server 5220

DEC01722-2

Figure 5-3. Server Right-Side/Rear View

Miscellaneous

Orderable Spare Part	Description
30-42584-01	Proteon EISA token ring NIC
30-41854-01	14.4 bps data/fax modem
30-42291-01	28.8 data/14.4 fax modem
30-43529-02	Adapter, host, PCI SCSI wide 2-channel (3940W)
30-48127-01	Adaptec 3940UW
30-46890-02	Rev C controller, 2-channel, RAID with battery (FR-PCTAR-BD)
30-48115-02	Rev E controller, 2-channel, RAID with battery (FR-PCTAR-BD)
30-47636-01	Battery backup (FR-PCTAR-UB)
PCXLA-NA	Keyboard, frost white
PCXLN-AB	PS/2 2-button mouse, frost white
70-31468-44	4 GB 5400 RPM ultra wide SBB (FR-CECAA-CA)
30-49113-01	1 channel PCI RAID ultra wide adapter with EDRAM (FR-PCTAR-GA)
30-49113-02	2 channel PCI RAID ultra wide adapter with EDRAM (FR-PCTAR-GB)
30-49113-03	3 channel PCI RAID ultra wide adapter with EDRAM (FR-PCTAR-GC)
30-48622-01	DLT 7000 35/70 GB (FR-PCXLT-AD)
FR-CK450-RP	RAID array 450 NT cluster kit, pedestal
54-24602-01	PCI fast Ethernet 10/100 (Digital Equipment Corp.)(FR-DE500-AA)
30-48628-01	PCI fast Ethernet 10/100 (FR-PCXDN-BA)

Labels and Nameplates

Orderable Spare Part	Description
74-49386-43	Nameplate, DIGITAL Server 5220
36-44556-01	Warning label, power switch
36-45369-10	Label, user info guide (right)
36-45369-09	Label, user info guide (left)

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 server to discharge any static electricity.
- Keep circuit boards and components away from non-conductors.

Recommended Tools

Have the following tools available:

- Phillips screwdriver
- Antistatic wrist strap (recommended, but not required)

BIOS Version Information

For access directly to the software library for BIOS upgrades, use the following Internet address:

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

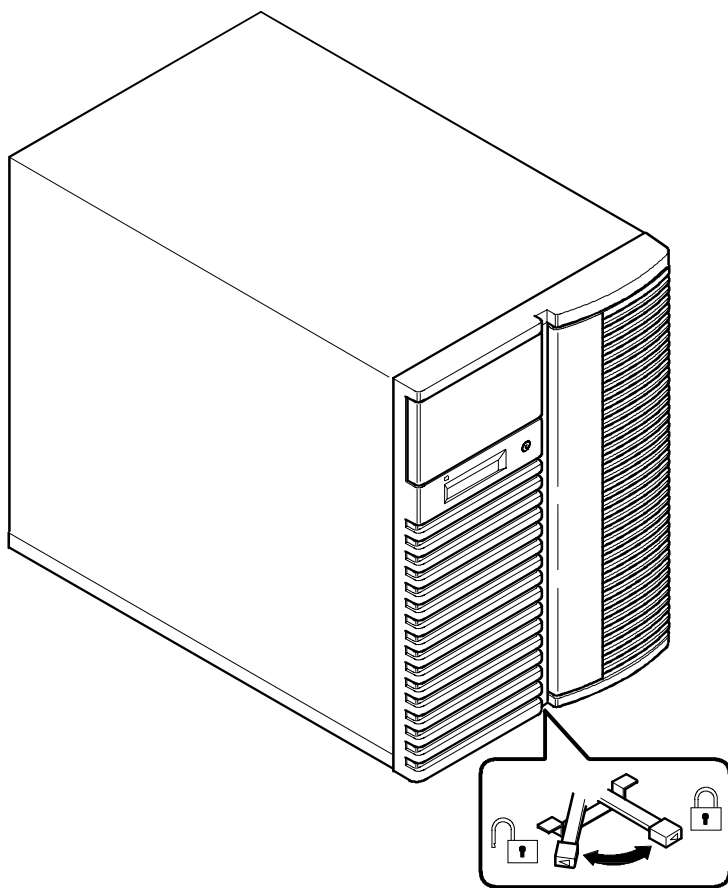
Disconnecting External Devices and Power

Before removing the side panels, perform the following:

1. Secure the server using the brake (see Figure 5-4).
2. Shut down any applications that are currently running, then shut down the operating system.
3. Turn off power to all external devices connected to the server.
4. Turn the server off.
5. Unplug the power cord from the wall outlet.

Disconnect the monitor's power cord from the external ac outlet and the data cable from the server.

FRU Replacement



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Figure 5-4. Server Brake

DIGITAL Server 5220

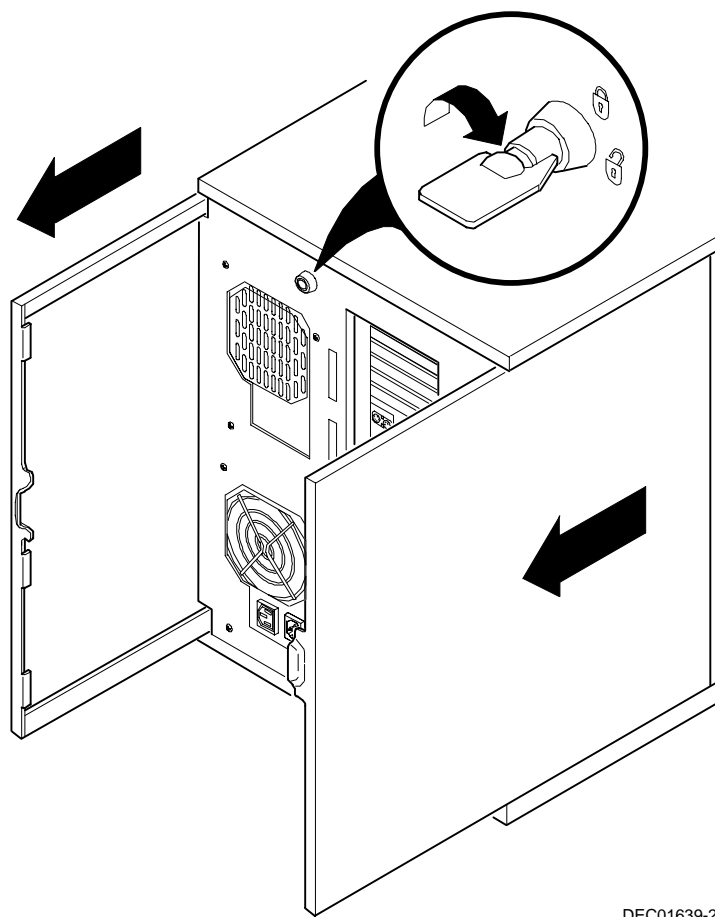
Removing and Installing the Side Panels

To remove the side panels, perform the following:

1. Unlock the side panels.
2. Slide the panels to the rear of the server.



WARNING: Removing the side panels activates two interlock switches located at the top-left and top-right of the server. These switches inhibit power to the server when activated. You might injure yourself or damage the server if you attempt to bypass these switches.



DIGITAL Server 5220

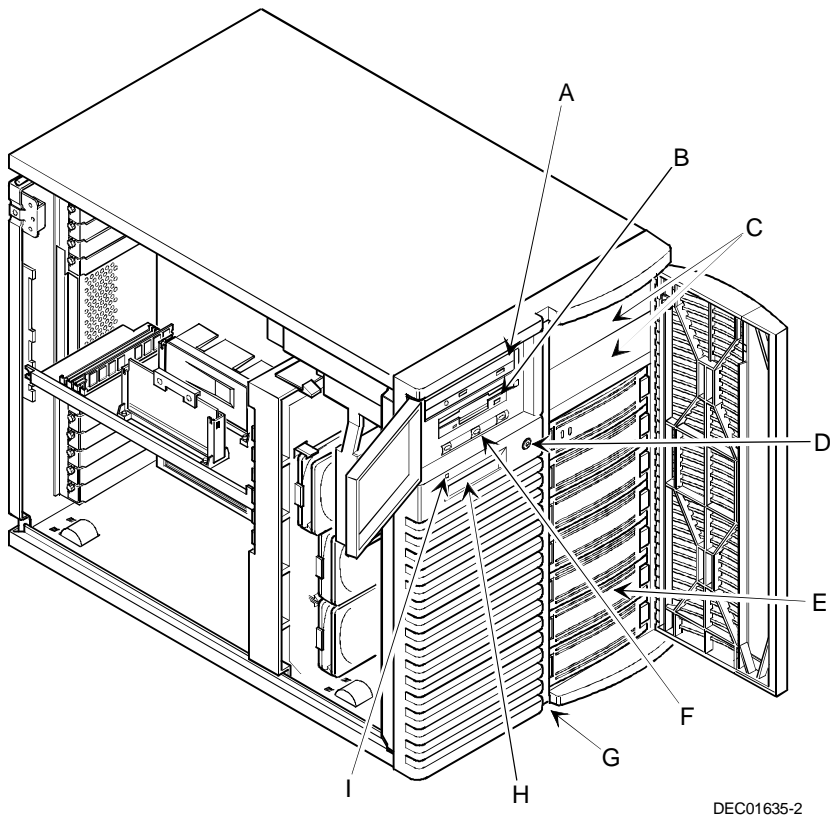
DEC01639-2

Figure 5-5. Unlocking and Removing the Side Panels

Server Front View

Figure Legend	Component
A	IDE CD-ROM drive
B	3½-inch diskette drive
C	Front access 5¼-inch or 3½-inch half-height drive bays
D	3-way security lock
E	Integral hot-swap device bay for hot swap drives
F	Power, OCP, and reset buttons
G	Brake
H	Operator control panel (OCP)
I	Power indicator

FRU Replacement



DEC01635-2

DIGITAL Server 5220

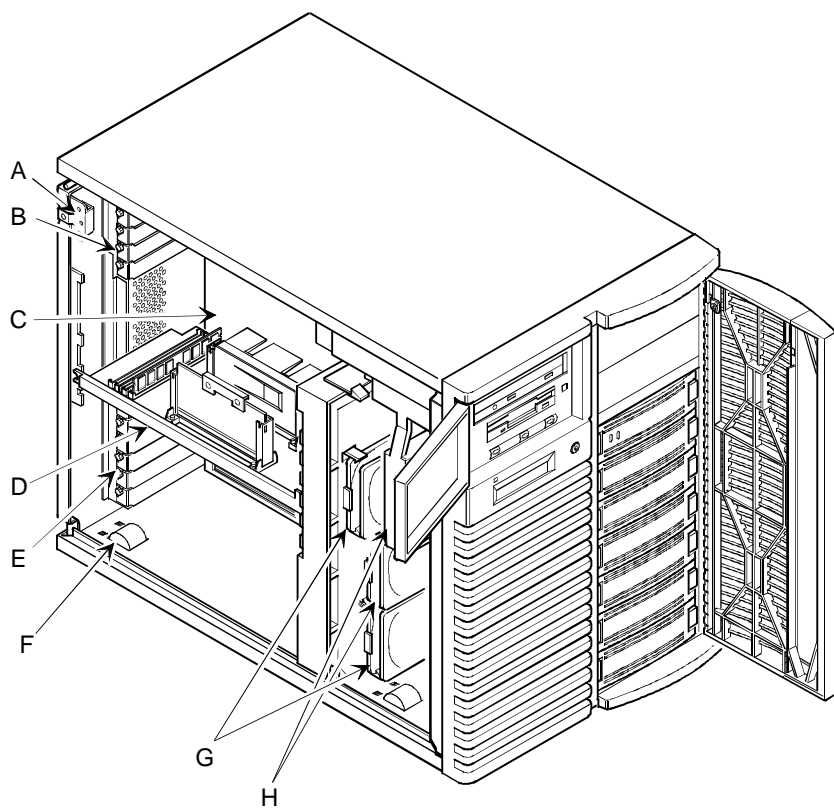
Figure 5-6. Server Front View

Server Left Side View

Figure Legend	Component
A	Power switch interlock
B	Upper expansion board slots
C	Main logic board
D ⁽¹⁾	Processor and memory module
E	Lower expansion board slots
F	Casters (4)
G	Primary cooling fans (1 and 3)
H	Secondary cooling fans (2 and 4)

⁽¹⁾ The video/Ethernet daughter card is installed in the proprietary slot (under the processor module).

FRU Replacement



DEC01635-3

Figure 5-7. Server Left Side View

DIGITAL Server 5220

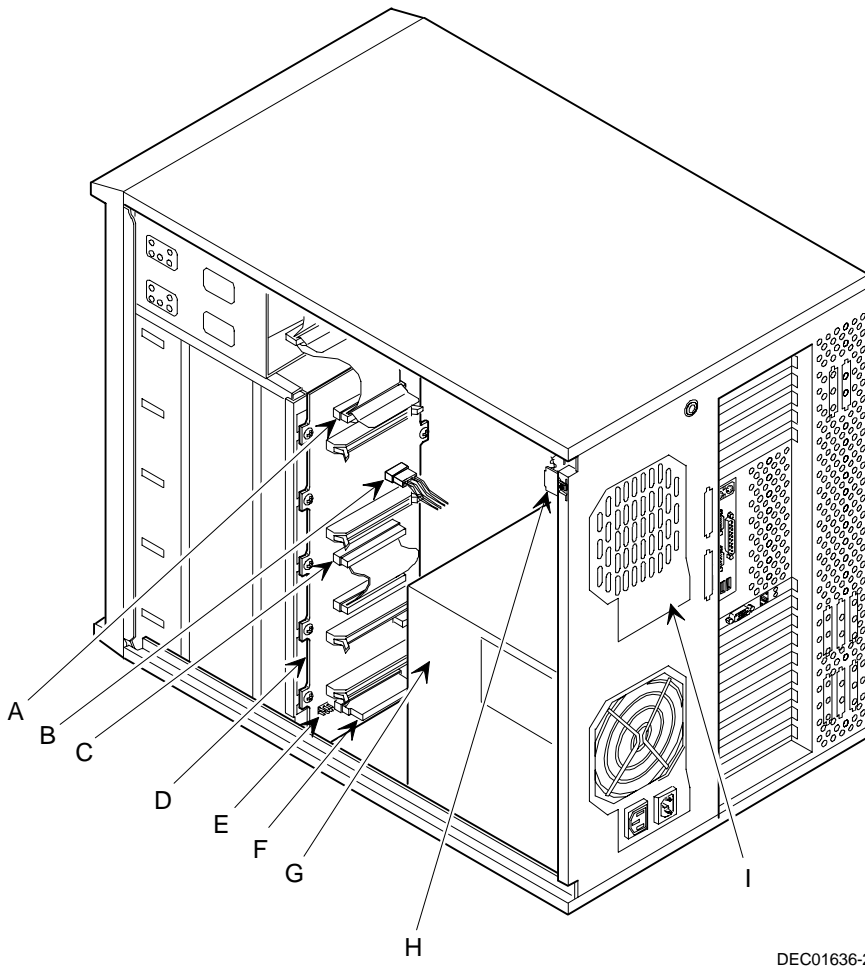
Server Right Side View

Figure Legend	Component
A	Wide SCSI 68-pin connector
B	Power plug
C	Jumper cable
D	Storage backplane
E	SCSI address jumpers (J181)
F	Storage backplane SCSI terminator
G	Power supply
H	Power interlock switch
I	Rear fan (fan 5)



NOTE: If installing a second or redundant power supply you must remove the rear fan, item I, and disconnect it from the main logic board.

FRU Replacement



DEC01636-2

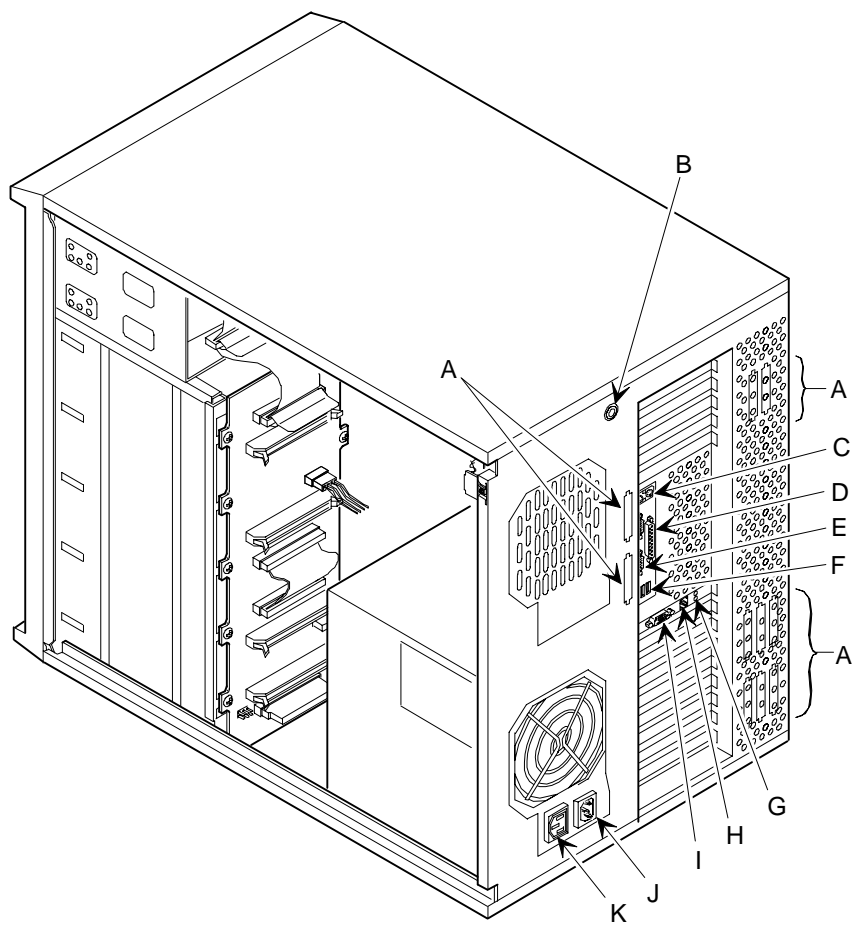
Figure 5-8. Server Right Side View

DIGITAL Server 5220

Server Rear View

Figure Legend	Component
A	SCSI knockouts (back panel)
B	Keylock
C	Keyboard and mouse ports
D	Parallel port
E	Serial ports
F	USB ports
G	Network activity and link LEDs
H	10/100Base-T port connector (RJ45)
I	Video port
J	ac power plug
K	ac power out/monitor plug

FRU Replacement



DEC01636-3

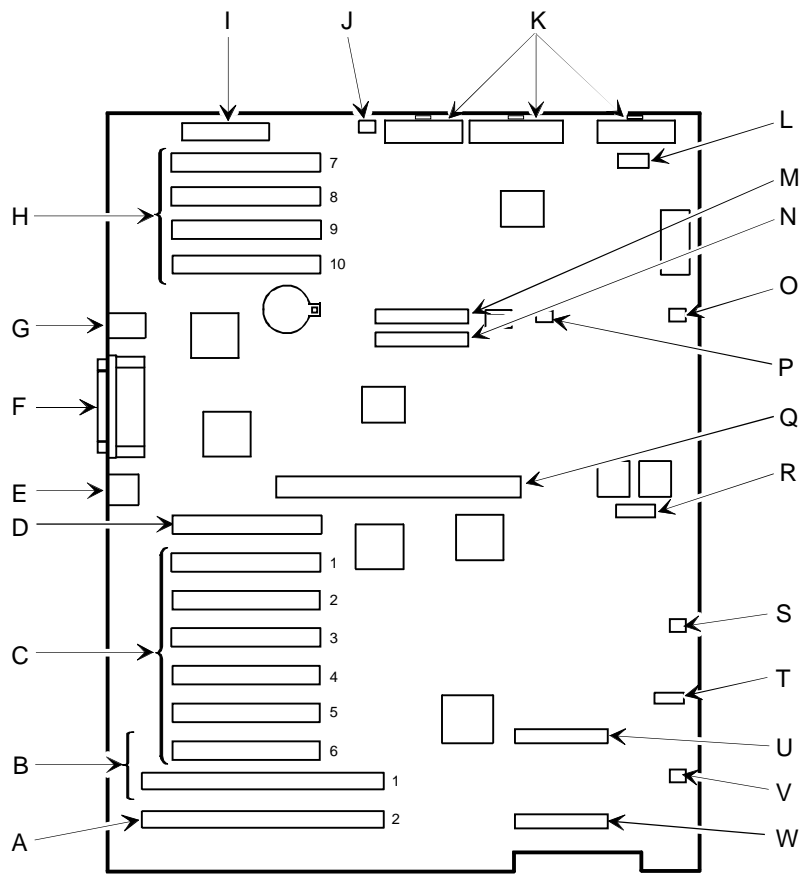
DIGITAL Server 5220

Figure 5-9. Server Rear View

Main Logic Board Connectors

Figure Legend	Connector
A	Dedicated ISA expansion slot (slot 2)
B	Shared PCI/ISA expansion slots (PCI slot 6; ISA slot 1)
C	PCI expansion slots (slots 1-6)
D ⁽¹⁾	Proprietary slot
E	USB ports
F	Two serial ports and one parallel port
G	Mouse and keyboard ports
H	PCI expansion slots (8-10)
I	Diskette drive connector
J	Hot swap drive bay fan connector (fan 5)
K	Power supply connectors
L	Power on/off and OCP display connector
M	Primary IDE connector
N	Secondary IDE connector
O	Fan 2 connector
P	Fan 1 connector
Q	Processor and memory module connector
R	Remote Server Management (RSM)
S	Fan 4 connector
T	Speaker connector
U	68-pin SCSI connector (channel A)
V	Fan 3 connector
W	68-pin SCSI connector (channel B)

⁽¹⁾ The video/Ethernet daughter card must be installed in the proprietary slot.



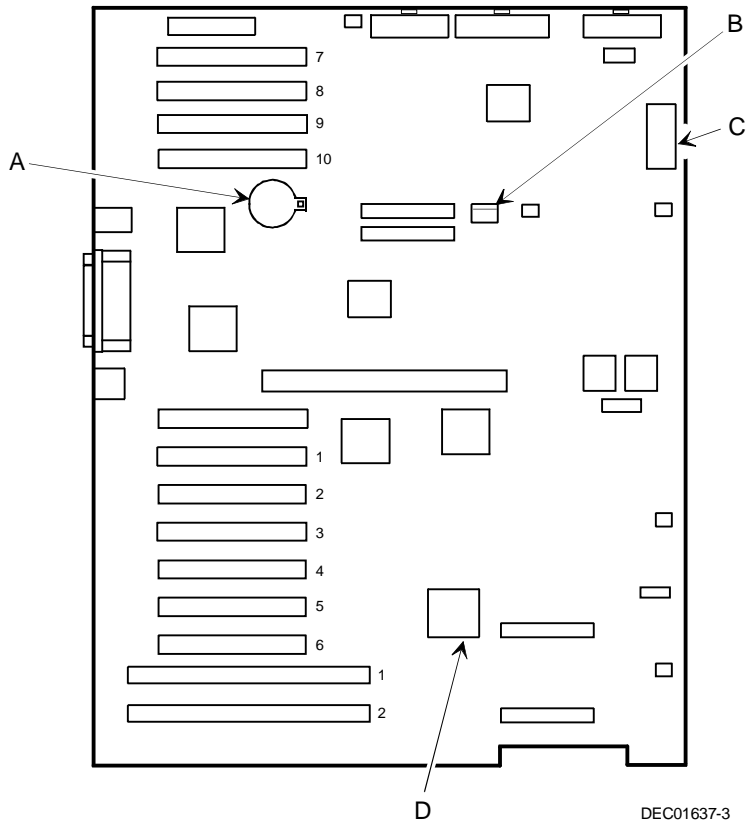
DEC01637-2

Figure 5-10. Main Logic Board Connectors

DIGITAL Server 5220

Main Logic Board Components

Figure Legend	Component
A	Real-time clock/server battery
B	Switch block
C	BIOS flash ROM
D	SCSI controller

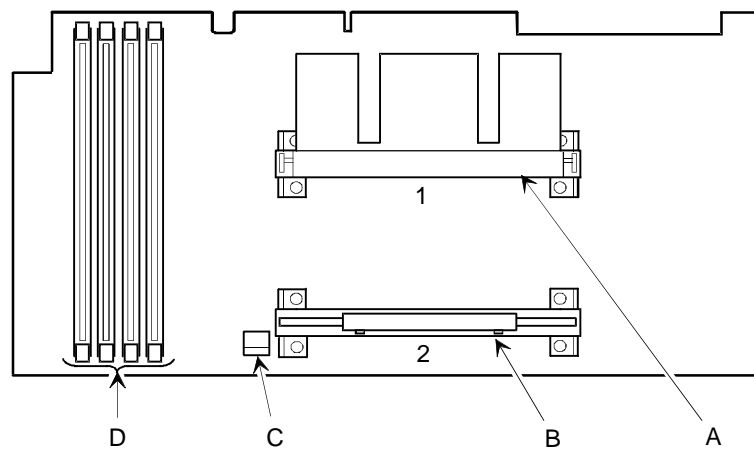


DIGITAL Server 5220

Figure 5-11. Main Logic Board Components

Processor Module Components

Figure Legend	Component/Connector
A	Processor 1
B	Processor 2 slot or terminator card
C	Switch for processor clock speed settings
D	Four DIMM sockets

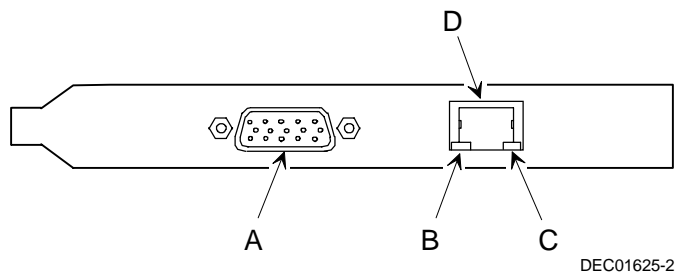


DEC01638-3

Figure 5-12. Processor Module Component Locations

Video/Ethernet Daughter Card Connectors and Indicators

Figure Legend	Connector
A	Video port
B	Network link indicator (green)
C	Network activity indicator (yellow)
D	10/100Base-T connector (RJ45)



DEC01625-2

DIGITAL Server 5220

Figure 5-13. Video/Ethernet Daughter Card Connectors

Jumpers and Switch Settings

The following table lists the main logic board switch settings and factory-default settings. Figure 5-14 shows the switch locations.

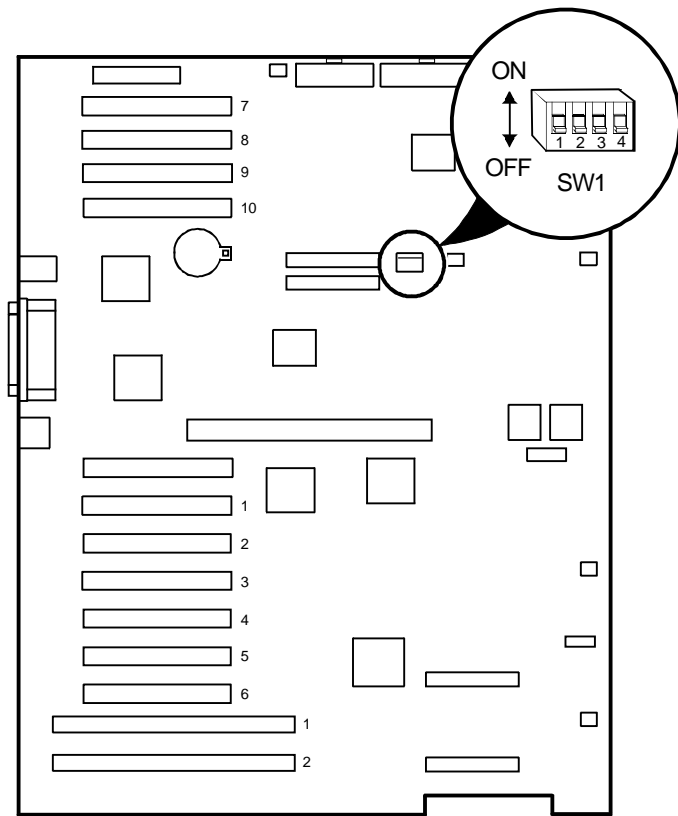


CAUTION: Do not touch any electronic component unless you are safely grounded. Wear a grounded wrist strap or touch an exposed metal part of the server chassis. A static discharge from the fingers can result in permanent damage to electronic components.

Feature	Function	Setting	Description
BIOS Protection	Normal ⁽¹⁾	SW1-1, off ⁽¹⁾	This switch should be set to BIOS Protection (ON) at the factory to prevent unauthorized personnel from loading a new server BIOS.
	BIOS protection ON	SW1-1, on	
Recovery mode	Normal ⁽¹⁾	SW1-2, off ⁽¹⁾	If the BIOS upgrade failed, refer to the README.TXT file that came with the BIOS upgrade.
	Recovery mode	SW1-2, on	
Password clear	Normal ⁽¹⁾	SW1-3, off ⁽¹⁾	If you forget the password, set this switch to the Password Clear (ON) position and then restart the server. Refer to Chapter 2 for more information.
	Password clear	SW1-3, on	
CMOS clear	Normal ⁽¹⁾	SW1-4, off ⁽¹⁾	This switch is set to Normal (OFF) at the factory.
	CMOS clear	SW1-4, on	

(1) Factory default setting

ON = switch up; OFF = switch down



DEC01637-6

DIGITAL Server 5220

Figure 5-14. Main Logic Board Switch Locations

Processor Module Switch Settings

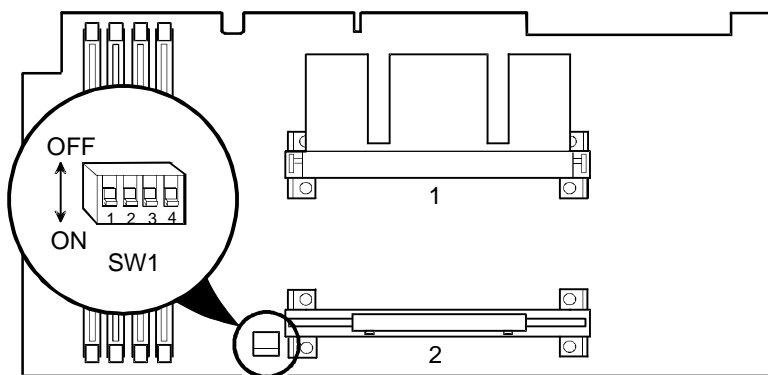
The following table lists the switch settings of various processor speeds and does not indicate processor availability. The switches are set correctly for the processor that came with the server. You only need to change the processor switch settings, that is SW1, should you upgrade to another processor. Figure 5-15 shows the switch locations.



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.

Processor Speed	SW1-1	SW1-2	SW1-3	SW1-4
350 MHz	OFF	OFF	ON	ON
400 MHz	ON	ON	OFF	ON
450 MHz	OFF	ON	OFF	ON

ON = switch down; OFF = switch up



DEC01638-2

DIGITAL Server 5220

Figure 5-15. Processor Module Switch Locations

Installing Additional Memory

The server has at least 64 MB of memory. Adding more memory enables the server to run larger, more complicated software and run it more quickly. Registered SDRAM DIMMS are available in 64 MB, 128 MB and 256 MB sizes to expand the server memory up to 1GB with the 350 MHz processor.

Server memory is installed using the four DIMM sockets located on the processor module, as shown in Figure 5-16. All four DIMM sockets accept single- or dual-sided DIMMS.

When adding memory, make sure you reference the memory configuration table and follow the memory expansion guidelines.



CAUTION: DIMMs must be ordered separately. Only install DIMMs supported by Digital Equipment Corporation. DIGITAL does not support server performance, product warranty, or service calls resulting from installing non-qualified DIMMs.

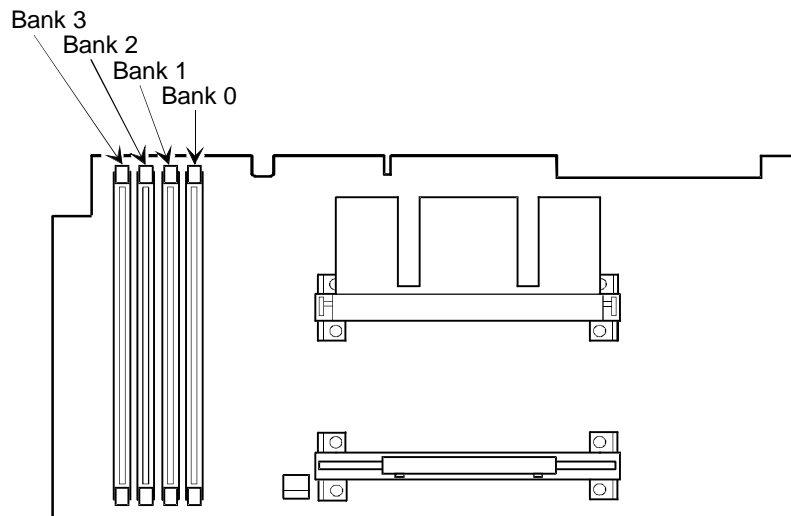
Server DIMM Requirements

- Supported DIMMs: 168-pin registered SDRAM with ECC.
- DIMMs should have an access time of 10 ns or faster.
- Supported densities: DIMMs are available in 64 MB, 128 MB, and 256 MB of ECC protected memory.
- Maximum memory: 1 GB.

Memory Configuration Guidelines

The memory configuration guidelines for the DIGITAL Server 5220 Series are as follows:

- Each DIMM socket on the processor module accommodates one DIMM.
- Install DIMMs starting with Bank 0. See Figure 5-16 for Bank socket locations.
- DIMM capacities can be mixed.
- Use only registered SDRAM DIMMs supported by Digital Equipment Corporation.



DEC01638-6

Figure 5-16. DIMM Socket Locations

Memory Configurations

The following table lists examples of memory configurations and the mixing of memory sizes.

Bank 0	Bank 1	Bank 2	Bank 3	Total Memory
64 MB				64 MB ⁽¹⁾
64 MB	64 MB			128 MB
64 MB	64 MB	64 MB		192 MB
64 MB	64 MB	64 MB	64 MB	256 MB
128 MB				128 MB
128 MB	64 MB			192 MB
128 MB	128 MB			256 MB
128 MB	128 MB	64 MB		320 MB
128 MB	128 MB	128 MB		384 MB
128 MB	128 MB	128 MB	64 MB	448 MB
128 MB	128 MB	128 MB	128 MB	512 MB
256 MB				256 MB
256 MB	64 MB			320 MB
256 MB	128 MB			384 MB
256 MB	256 MB			512 MB
256 MB	256 MB	64 MB		576 MB
256 MB	256 MB	128 MB		640 MB
256 MB	256 MB	128 MB	64 MB	704 MB
256 MB	256 MB	256 MB		768 MB
256 MB	256 MB	256 MB	64 MB	832 MB
256 MB	256 MB	256 MB	128 MB	896 MB
256 MB	256 MB	256 MB	256 MB	1 GB

⁽¹⁾ Standard 64 MB offering

Table does not list all possible configurations

Memory Troubleshooting

The DIGITAL Server's Power-On Self Test (POST) can detect memory errors when it boots. The error can be isolated to a single DIMM on the processor module.

The memory error message format is:

```
<Type of error>:    <Location>
```

This indicates that an error occurred while reading the memory configuration. The problem is either the DIMM or the processor module. In both cases, the server halts when this error occurs.

Where:

```
<Correctable Error>:    <Jxx xxMB SDRAM DIMM>
```

If the error is correctable when the server boots, the BIOS displays the following:

```
Press <F1> to resume
```

Press the <F1> key to continue booting the server. The memory error is automatically corrected.

```
<Uncorrectable Error>:    <Jxx xxMB SDRAM DIMM>
```

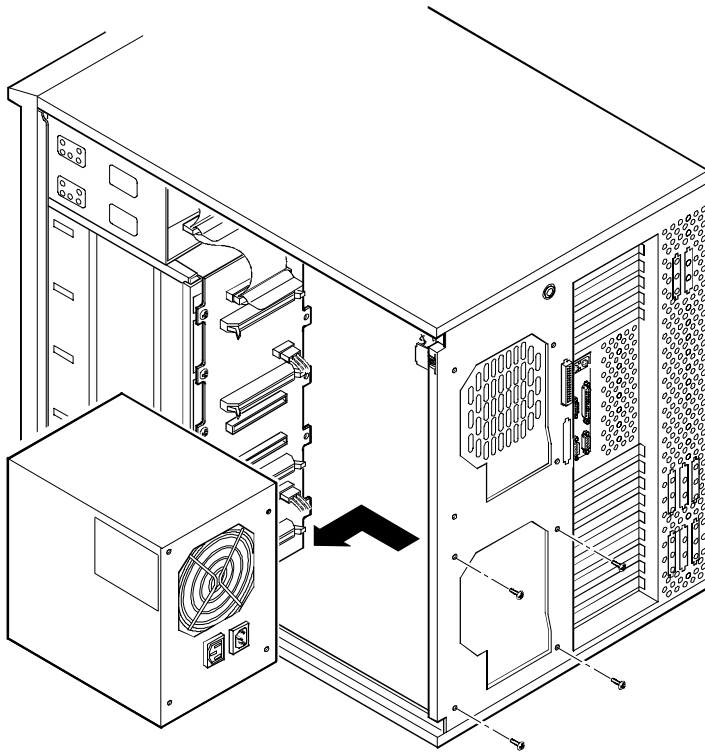
If the error is uncorrectable, the server halts after the memory test.

```
<Configuration Error>:    <Jxx xxMB SDRAM DIMM>
```

If an uncorrectable error occurs, the server halts after the memory test and the faulty DIMM must be replaced immediately.

Removing and Replacing the Power Supply

1. Turn off the server.
2. Remove the ac power cord and monitor cables, if applicable.
3. Unlock and remove the right side panel.
4. Disconnect the wire harness connectors from the power supply.
5. Remove the four screws from the rear of the chassis.
6. Remove the power supply.
7. Replace the power supply by performing the removal steps in reverse order.



DEC01726

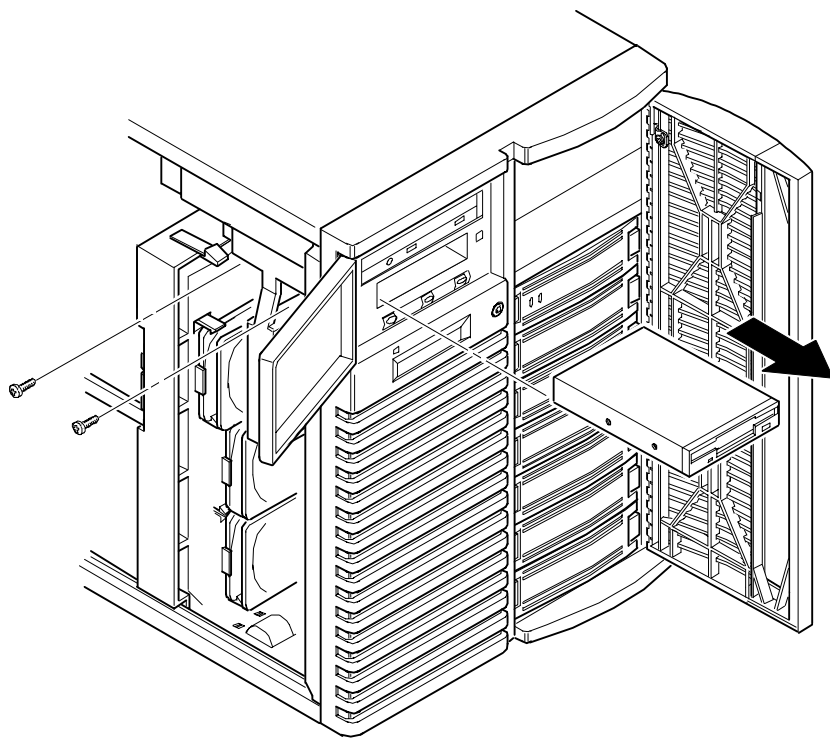
Figure 5-17. Removing and Replacing the Power Supply

DIGITAL Server 5220

Removing and Replacing the Diskette Drive

1. Turn off the server.
2. Unlock and remove the left side panel.
3. Open the door.
4. Disconnect the power and data cables from the drive.
5. Remove the two screws from the drive bay.
6. Slide the drive out from the front of the drive bay.
7. Replace the diskette drive by performing the removal steps in reverse order.

FRU Replacement



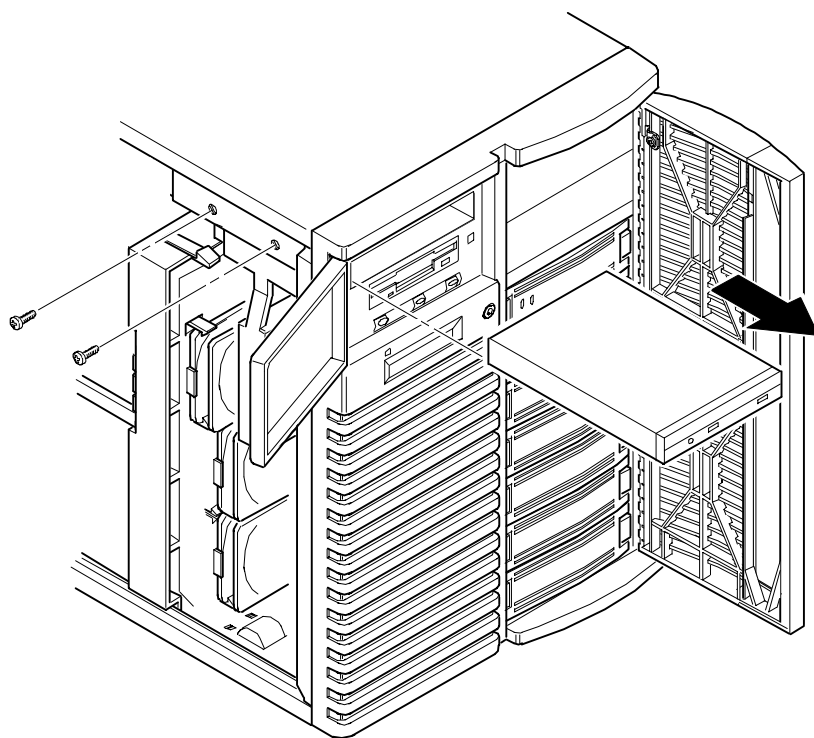
DIGITAL Server 5220

DEC01077-2

Figure 5-18. Removing and Replacing the Diskette Drive

Removing and Replacing the CD-ROM Drive

1. Turn off the server.
2. Unlock and the remove left side panel.
3. Open the door.
4. Disconnect the power and data cables from the CD-ROM drive.
5. Remove the two screws from the drive bay.
6. Slide the drive out from the drive bay by applying pressure at the rear of the CD-ROM drive.
7. Remove the right side bracket from the right side of the CD-ROM drive.
8. Set jumpers on the new CD-ROM drive identical to those on the removed CD-ROM drive.
9. Replace the CD-ROM drive by performing the removal steps in reverse order.



DEC01077-3

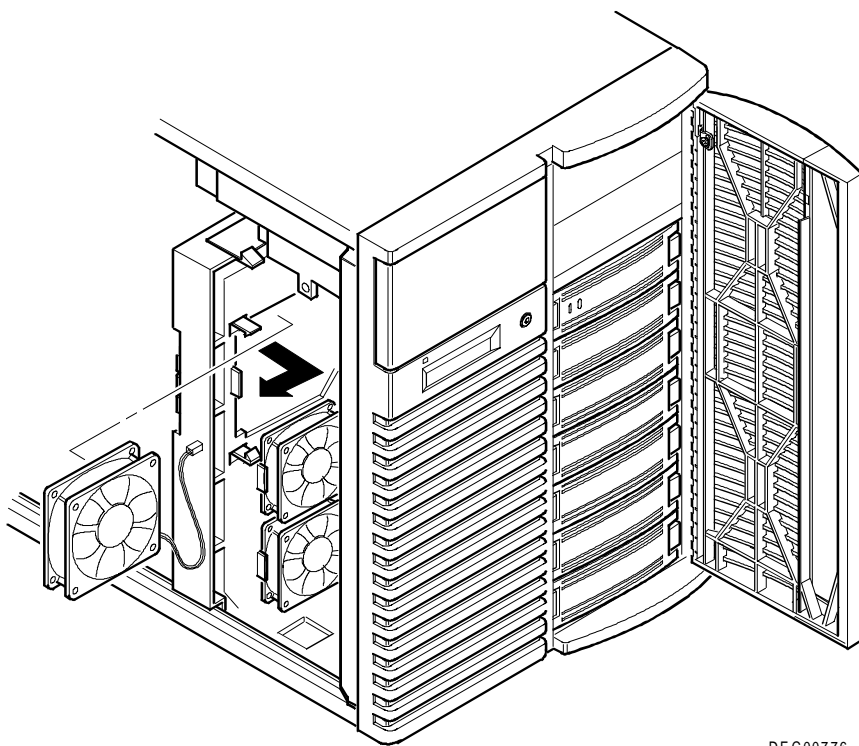
Figure 5-19. Removing and Replacing the CD-ROM Drive

DIGITAL Server 5220

Removing and Replacing a Cooling Fan

The following procedure can be used to remove primary cooling fan 1, secondary cooling fan 4, and primary cooling fan 3.

1. Turn off the server.
2. Unlock and remove the left side panel.
3. Disconnect the fan cable from the main logic board.
4. Release the fan from the plastic tabs.
5. Remove the fan from the chassis.
6. Replace the fan by performing the removal steps in reverse order.



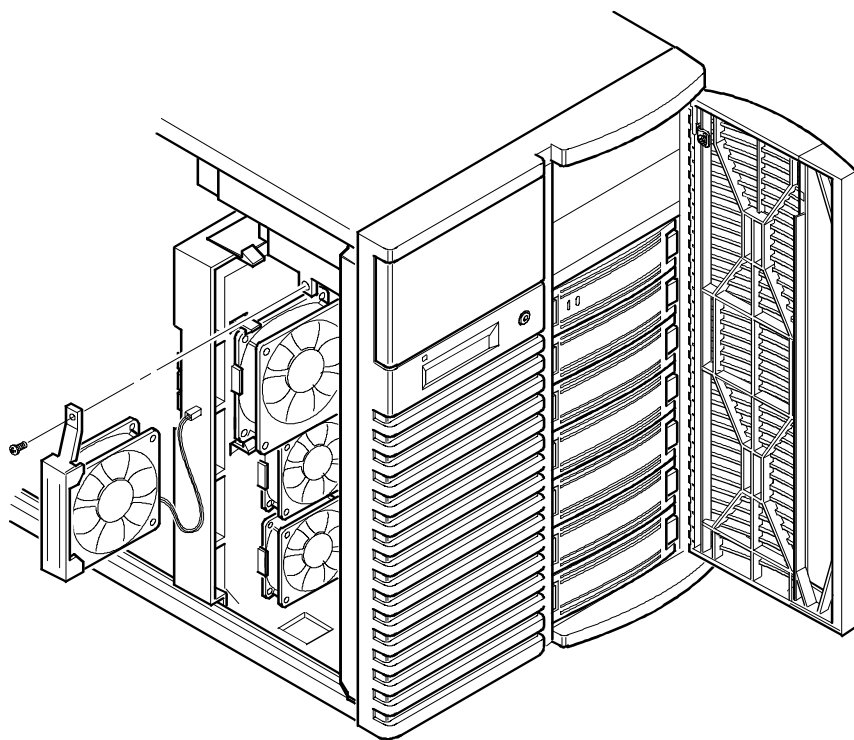
DEC00776

DIGITAL Server 5220

Figure 5-20. Removing and Replacing a Cooling Fan

Removing and Replacing the Secondary Cooling Fan 2

1. Turn off the server.
2. Unlock and remove the left side panel.
3. Disconnect the fan cable from the main logic board.
4. Remove the screw.
5. Remove the fan from the chassis.
6. Remove the fan from the bracket.
7. Replace the fan by performing the removal steps in reverse order.



DEC00777

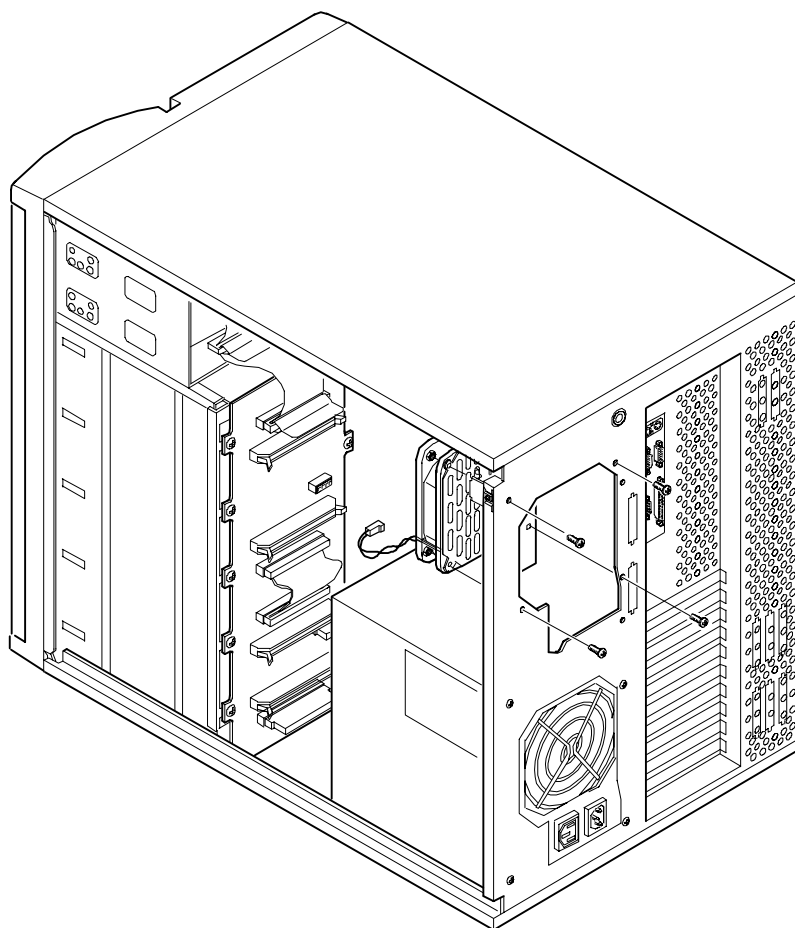
Figure 5-21. Removing and Replacing the Secondary Cooling Fan 2

DIGITAL Server 5220

Removing and Replacing Cooling Fan 5

1. Turn off the server.
2. Unlock and remove the left and right side panel.
3. Disconnect the fan cable from the main logic board.
4. Remove the four screws securing the fan and brace to the chassis.
5. Remove the fan and brace from the chassis.
6. Remove the four screws securing the fan to the bracket.
7. Replace the fan and bracket by performing the removal steps in reverse order.

FRU Replacement



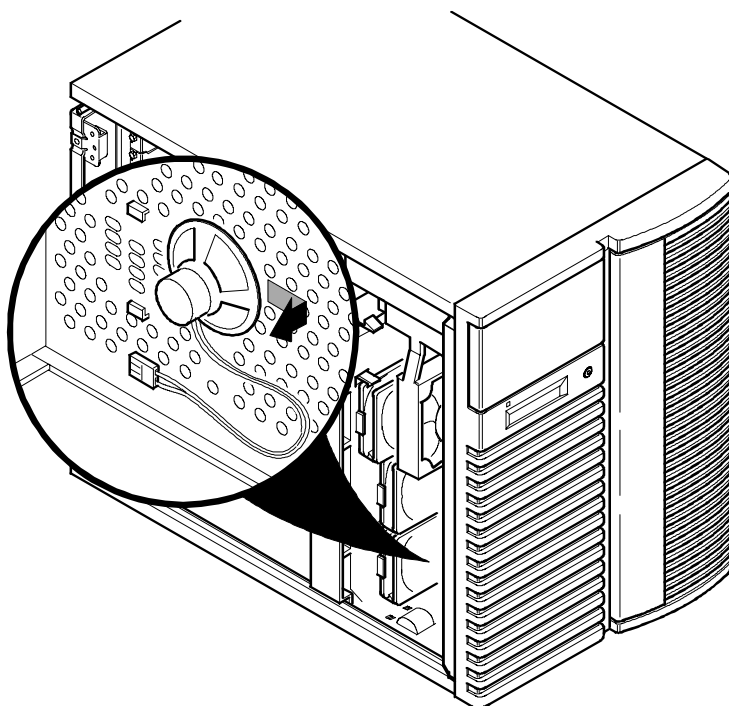
DIGITAL Server 5220

DEC01078

Figure 5-22. Removing and Replacing Cooling Fan 5

Removing and Replacing the Speaker

1. Turn off the server.
2. Unlock and remove the left side panel.
3. Disconnect the speaker cable from the main logic board.
4. Remove the speaker from the chassis.
5. Replace the speaker by performing the removal steps in reverse order.



DEC00778

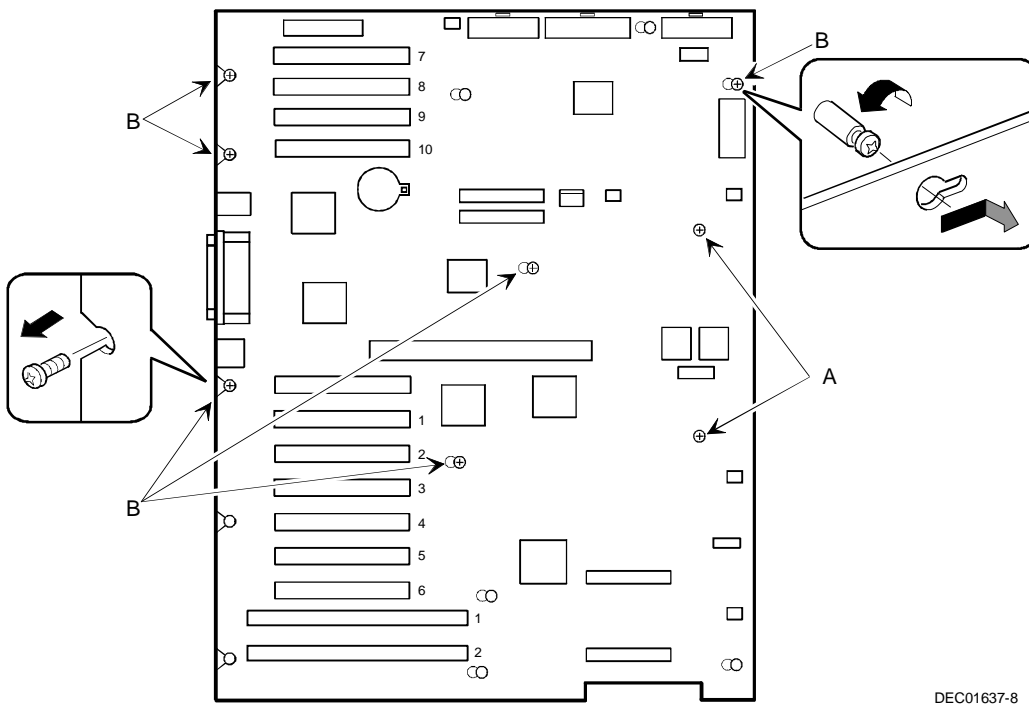
Figure 5-23. Removing and Replacing the Speaker

DIGITAL Server 5220

Removing and Replacing the Main Logic Board

1. Turn off the server.
2. Disconnect all external cables from the I/O expansion modules located at the rear of server.
3. Unlock and remove the left side panel.
4. Disconnect all cables from the main logic board.
5. Record all ISA and PCI slot assignments before removing the expansion boards.
6. Remove the expansion boards, processor module, and video/Ethernet daughter card.
7. Remove the screws securing the main logic board to the chassis (A, Figure 5-24).
8. Loosen the standoff screws (B, Figure 5-24).
9. Slide the main logic board to the right to release it from the standoffs.
10. Remove the main logic board from the chassis.
11. Configure switch SW1 on the new main logic board.
12. If the new main logic board does not have a battery/RTC, remove the battery/RTC from the old main logic board and replace it on the new main logic board.
13. Align the main logic board over the seven standoff screws and then slide it to the left.
14. Reinstall and tighten the screws removed in step 7.
15. Tighten the standoff screws loosened in step 8.
16. Using the side panel label as a reference, reconnect all cables to the main logic board.
17. Using information recorded in step 5, reinstall the expansion boards, processor module, and video/Ethernet daughter card to their original configuration.

18. Reconnect all external and internal cable connections.
19. Reinstall and lock the left side panel.
20. Turn on the server.
21. Run the BIOS Setup utility to configure the server and restore the system management information.



DIGITAL Server 5220

Figure 5-24. Removing and Replacing the Main Logic Board

Replacing the Real Time Clock (RTC) Battery

The server's battery runs the server clock and retains any setup information when it is turned off. If the server ever fails to retain the correct date, time, or configuration settings when it is turned on, you need to replace the server's RTC battery. Also, make sure you replace the battery with either a DIGITAL part number 12-41474-05, Toshiba (P/N CR2032), or equivalent 3 V dc Lithium battery.



WARNING: There is a danger of battery explosion if a lithium battery is incorrectly replaced. To prevent damage to the server, be sure the + side faces up when installing a new battery.

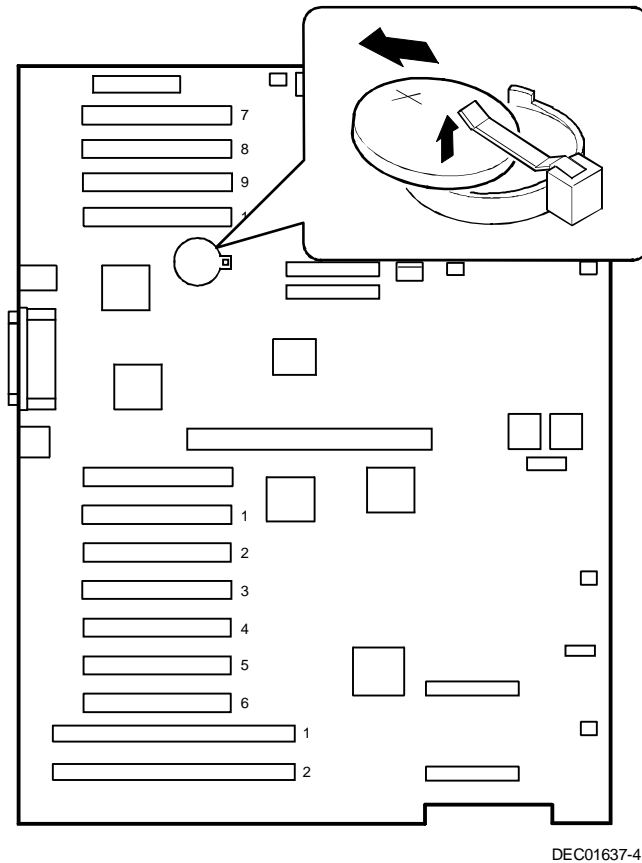
Depending on your locality, the server's battery might be considered hazardous waste. Make sure you follow any state or local statute to properly dispose of the old battery.

To replace the battery/RTC, perform the following:

1. If you have not already done so, record server configuration settings using the BIOS Setup utility.
2. Turn off the server.
3. Disconnect external devices (if any), ac power, and monitor power.
4. Unlock and remove the left side panel.
5. Lift the retaining clip slightly and push on the battery from the side to slide it out (see Figure 5-25).
6. Install the new battery/RTC (Figure 5-25). When installing the new battery, make sure the "+" side faces up.
7. Replace and lock the left side panel.
8. Connect external devices and restore power.

9. Restore power, reboot and then run the BIOS Setup utility to configure the server.

Refer to Chapter 2, "Server Software and Utilities," for information on using the BIOS Setup utility.

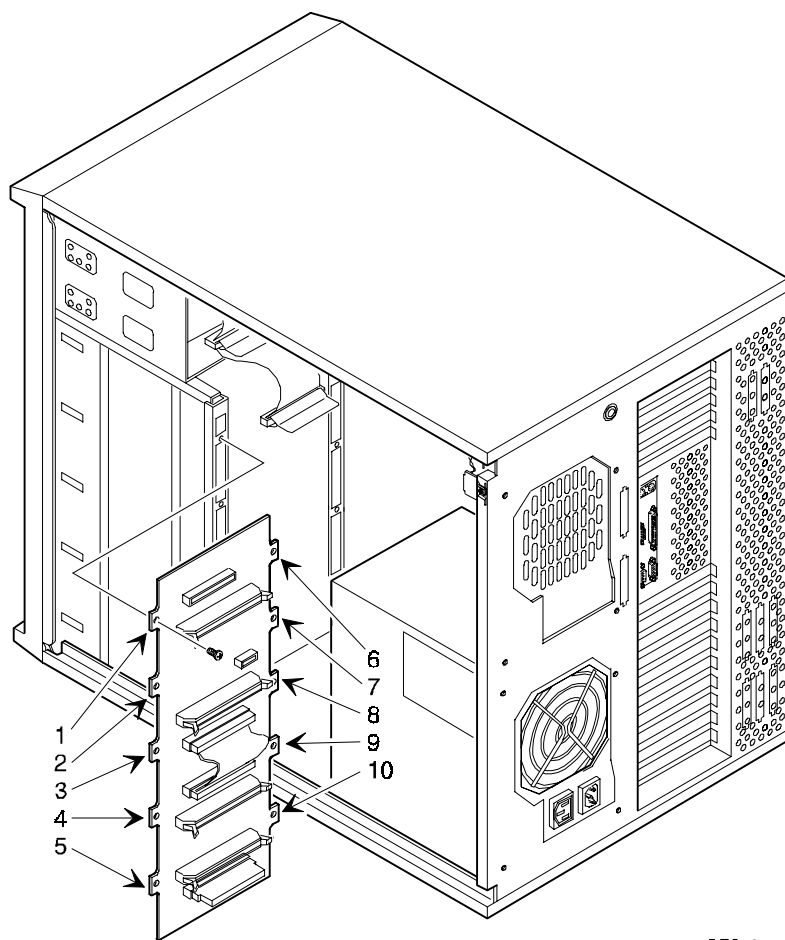


DIGITAL Server 5220

Figure 5-25. Replacing the Server Battery/RTC

Removing and Replacing the Storage Backplane

1. Turn off the server.
2. Unlock and remove the right side panel.
3. Record all cable configuration information.
4. Disconnect all cables and terminators.
5. Before removing hot swap drives, record how they are configured.
6. Remove all devices connected to the storage backplane.
7. Remove the ten screws.
8. Remove the storage backplane from the chassis.
9. Configure the J181 jumpers located on new storage backplane so they are identical to settings on storage backplane being replaced. Also configure jumper cables and terminators as they were previously configured on the storage backplane being replaced.
10. Install the new storage backplane into the chassis.
11. Reinstall and tighten the ten screws securing the storage backplane in chassis.
12. Using the configuration information recorded in step 5, replace the hot swap drives.
13. Using the cabling information recorded in step 3, reconnect the cables and terminators.
14. Replace and lock the right side panel.



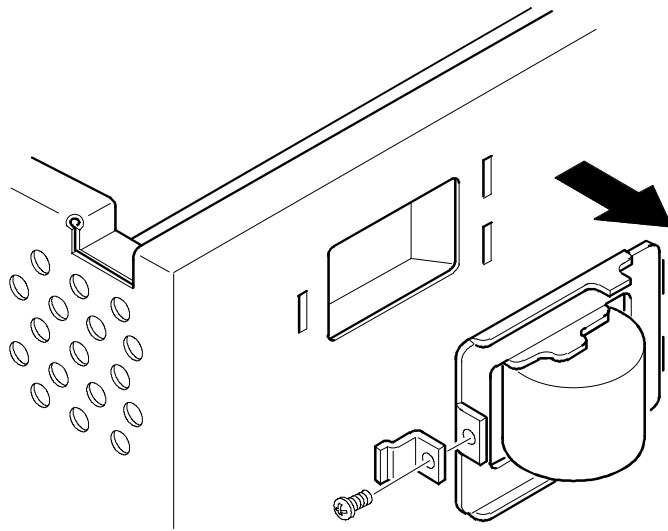
DEC01079

Figure 5-26. Removing and Replacing the Storage Backplane

DIGITAL Server 5220

Removing and Replacing a Caster

1. Turn off the server.
2. Carefully lay the server on its side.
Note that the right and left casters are different.
3. If removing the left- or right-front caster, release the server brake.
Otherwise, proceed to step 4.
4. Remove the screw.
5. Release the caster from metal tab.
6. Remove the caster from the chassis.
7. Replace the caster by performing the removal steps in reverse order.



DEC00779

Figure 5-27. Removing and Replacing a Caster

DIGITAL Server 5220

Device Mapping **6**

Introduction

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

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 BIOS Setup utility.



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.

Device Mapping

Processor Memory Address Map

Address Range	Function	Size
00000 to 9FFFF	Main memory	640 KB
A0000 to BFFFF	PCI/ISA video buffer memory	128 KB
C0000 to C7FFF	Video memory BIOS	32 KB
C8000 to DFFFF	PCI/ISA expansion board BIOS and buffer memory	96 KB
E0000 to EFFFF	ISA adapter RAM	64 KB
F0000 to FFFFF	System BIOS memory	64 KB

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

Device Mapping

PCI Configuration Space Address Map

PCI Bus No.	Device No. (Address No.)	Device
0	07h (AD18)	PIIX4
0	0Dh (AD24)	PCI slot 2
0	0Eh (AD25)	PCI slot 1
0	0Fh (AD26)	Ethernet controller
0	10h (AD27)	PPB 0
0	11h (AD28)	PPB 1
0	12h (AD29)	PCI VGA controller
1	08h (S0SAD24)	PCI slot 10
1	09h (S0SAD25)	PCI slot 9
1	0Ah (S0SAD26)	PCI slot 7
1	0Bh (S0SAD27)	PCI slot 8
2	08h (S1SAD24)	PCI slot 3
2	09h (S1SAD25)	PCI slot 4
2	0Ah (S1SAD26)	PCI slot 5
2	0Bh (S1SAD27)	PCI slot 6
2	0Eh (S1SAD30)	SCSI controller (Symbios 896)

Upgrade Procedure **7**

This chapter describes the procedure to upgrade a DIGITAL Server 5200 to a DIGITAL Server 5220 (350 MHz model) or a 5225 (400 MHz model). The table below compares model 5200 series servers with the upgrade model 5220/5225 series servers. This chapter also provides general guidelines to consider before upgrading the server. Refer to Appendix B for the options supported on these upgraded servers.

Model 5200 and Model 5220 Comparison Chart

Feature	DIGITAL Server 5200	DIGITAL Server 5220 Upgrade
Processor	Pentium II - 266 MHz, 300 MHz, and 333 MHz (512 KB L2 cache)	Pentium II - 350MHz (model 5220) and 400 MHz (model 5225), 512 KB L2 cache
Memory	ECC/EDO DIMMs 1GB maximum	Registered PC100 SDRAM DIMMs 1GB maximum
Graphics	On-board PCI S3 Trio SVGA	Integrated PCI S3 Trio 64 V2/GX SVGA (dedicated PCI slot)
Networking	DIGITAL 21143 Controller	DIGITAL 21143-TD Controller
SCSI Interface	Two PCI Ultra-wide, Adaptec 7880 controllers; two single channels	PCI Fast Ultra-wide Symbios 896 controller, dual channel. Support for Ultra2 devices on external channel.
RAID controller	Mylex DAC960	Mylex DAC960
CD-ROM drive	SCSI	IDE 32X ATAPI CD-ROM
Tape drive (optional)	SCSI	SCSI Adapter card

continued

Upgrade Procedure

Feature	DIGITAL Server 5200	DIGITAL Server 5220 Upgrade
Slots	6 PCI, 5 EISA	9 PCI, 1 PCI/ISA, 1 ISA
USB ports	No	Yes (2)
DIGITAL RSM Support (EISA card)	Yes	Not available
Certified Operating Systems		
Windows NT Server	V4.x	V4.x/5.x
Novell NetWare	V3.x/4.x	V4.x only
IBM OS/2 Warp	V3.x	V4.0
SCO UNIX Open Server	V3.2.x	V5.0.4, 5.0.4c, 5.0.5
Banyan VINES	-	V7.0
SCO UNIXWARE	V3.x	V2.1.2, 7.0

Upgrade Procedure

The following section describes the procedure that should be followed to install the upgrade.

1. Before the scheduled upgrade, ensure that the customer has backed up the system and recorded all configuration information.
2. Check the voltage selection switch and plug in the power cord.



CAUTION: Make sure the voltage selection switch on the back of the new server is set to match the power source before plugging in the power cord, or you may damage the server.

3. Install any additional processor. (Refer to Chapter 5, FRU Replacement.)
4. Install memory. The DIGITAL Server 5220 requires at least 64 MB and can accommodate up to 1 GB of *Registered* SDRAM memory. **NOTE:** You cannot use ECC/EDO DIMMs installed in a DIGITAL Server 5200.
5. Install any expansion boards. The DIGITAL Server 5220 has PCI and ISA slots only; EISA cards are not supported.

6. Move or install disk drives. The DIGITAL Server 5220 has an integrated Symbios SCSI controller.



CAUTION: For the various operating systems, refer to the instructions that follow. Also before installing the operating system, check for O/S specific instructions in the README files on the Quick Launch CD-ROM, or the system may hang.

- A. *SCO UNIX Open Server, Banyan VINES, and SCO UNIXWARE:* Ensure that there is a good backup of your original system. Perform a fresh O/S install on the new system and restore data from the backup tape.
- B. *Windows NT:* Before moving disk drives to the new system, load the Symbios SCSI driver on the hard drive. Move the drives and boot the new system. Once operational, disable the Adaptec driver.
- C. *Novell NetWare 4.11:* Move the drives and boot the new system to DOS. Run Install and load the Symbios SCSI driver. Remove the Adaptec driver and restart the system.
- D. *IBM OS/2 Warp:* Operating System versions are not supported across these platforms, so a tape backup of the old system is required. Install the new O/S on the new system and restore from tape the needed data.

Upgrade Procedure

7. Power on the system and run AMI diagnostics to verify the hardware upgrade. **NOTE: The hardware upgrade is complete.**
8. After the hardware installation is completed, the customer may install the software on the new system.
9. Refer to the operating system manuals, the *Installation Guide* (ER-J2BWW-IM), or the web page (<http://www.windows.digital.com>) for driver and operating system installation.
10. At this time, the customer should call their software service provider to update their license with the new system serial number. If desired, the customer can continue to use the old system; in which case, the customer will need to buy a new software license for the new system.

Troubleshooting Guidelines

If the server does not boot properly after installing upgrade, check the following items:

- Check all the configuration information that the customer recorded from the previous system.
- Verify that all cables are seated properly.
- Verify that all cards, boards, and modules are seated properly.
- Check the processor speed settings.
- Use the Troubleshooting information in Chapter 4 to identify the problem.
- Create and run diagnostic diskettes by using the Quick Launch CD-ROM. AMI Diagnostic software contains an advanced set of diagnostic utilities for identifying and correcting problems when upgrading the server.

Block Diagram **A**

Main Logic Board

This appendix describes the DIGITAL Server 5220 Main Logic Board (MLB) block diagram, shown in Figure A-1. The MLB integrates the Dual Pentium II processors with both ISA and PCI system peripheral devices. The MLB provides the following functions:

- Connector for a dual Pentium II CPU/Memory module with 350 MHz or 400 MHz processors, the BX chipset, and registered SDRAM DIMMs up to 1GB.
- BIOS ROM
- System I/O for PC-compatible serial (2), parallel, keyboard, USB (2), and serial mouse ports
- Diskette drive connector

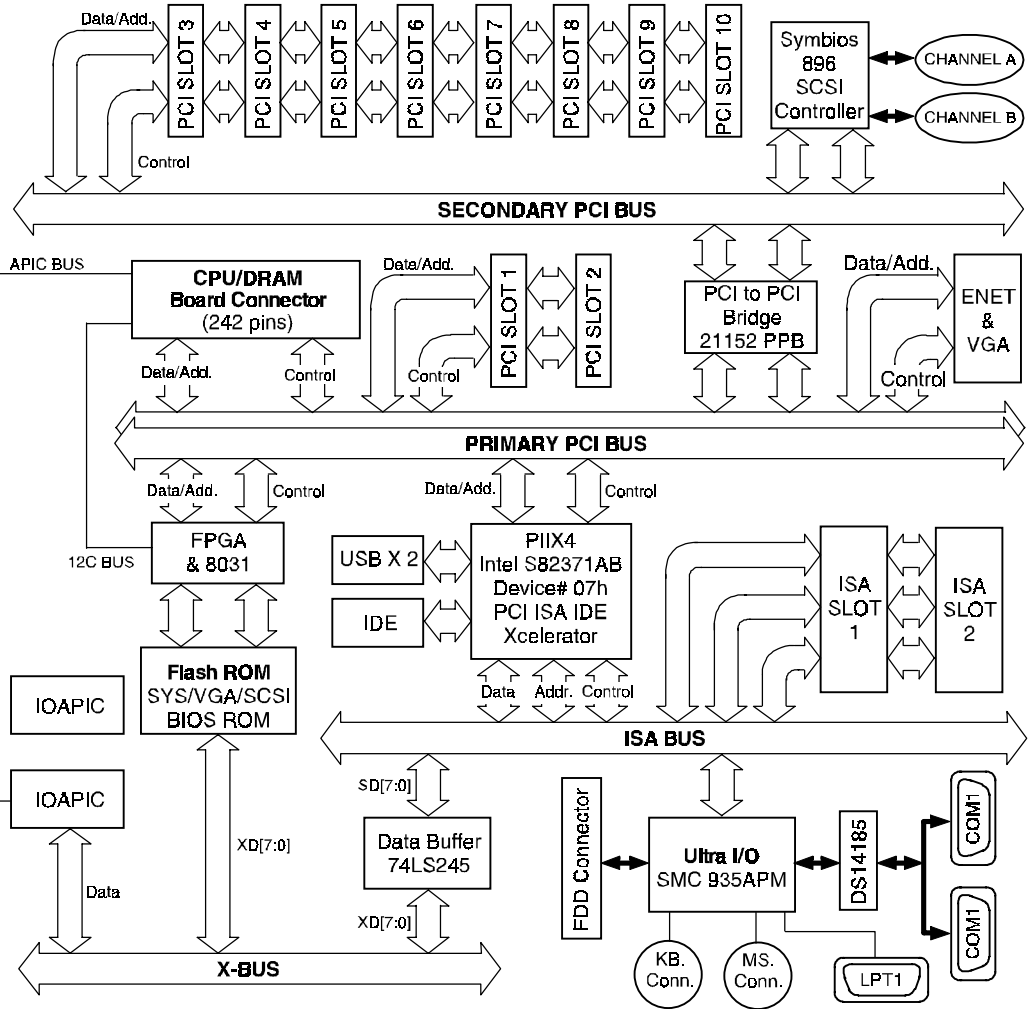
DIGITAL Server 5220

Block Diagram

- Primary IDE connector for the IDE CD-ROM and a secondary IDE connector for optional IDE devices, such as an IDE tape drive
- SCSI Interface: Channel A with wide Ultra SCSI connection to the storage backplane; Channel B with Ultra2 SCSI capability for an optional external expansion box
- Eight dedicated PCI expansion slots and one shared PCI/ISA expansion slot
- One dedicated ISA expansion slot
- A proprietary slot for the combination Video/Ethernet controller
- System management to monitor fans, voltages, and temperatures.

The sections that follow provide a brief overview of the MLB block diagram.

Block Diagram



DIGITAL Server 5220

DEC01730

Figure A-1. Main Logic Board Block Diagram

Block Diagram

CPU/Memory Connector

The CPU/Memory connector is a 242-pin connector for the CPU/Memory board to provide address/data and control line access to the Primary PCI bus. Through this connector, the CPU also has access to the Input/Output Advanced Programmable Interrupt Controllers on the APIC bus. In addition, the I²C bus interfaces the CPU to the 8031 system management subsystem, which monitors fan failures, voltages, and temperatures.

PCI ISA IDE Xcelerator (PIIX4)

The PCI ISA IDE Xcelerator serves as the bridge from the Primary PCI bus to the ISA bus. Control and data/address lines from the Primary PCI bus convert to control, data, and address lines on the ISA bus and vice versa.

The PIIX4 provides a Fast IDE interface for IDE devices, such as the CD-ROM. This chip also provides the PCI/ISA master/slave interface. It has an 8 X 32 bit buffer for bus master IDE PCI burst transfers at rates up to 22 Mbytes per second. It contains two 8237 DMA controllers for fast type F DMA and compatible DMA transfers.

The PIIX4 is also the controller for the Universal Serial Bus (USB). It is a host/sub controller that moves data between the main system memory and devices on the serial bus.

It also provides a system timer/counter, programmable clock, refresh request, interrupt controller, X-bus peripheral support, PCI system error reporting, and system power management for hardware and software events.

BIOS ROM

The BIOS ROM stores the system BIOS in 512KB of flash memory. The flash memory allows the BIOS to be upgraded from a diskette or a CD-ROM, such as Quick Launch.

Block Diagram

System I/O

The System I/O controls the system input and output functions for the serial interface, the parallel interface, the diskette controller, the keyboard, and the mouse.

Ultra I/O Controller

The system input and output functions are controlled by the Ultra I/O controller, SMC 37C935APM. This controller supports two serial UARTs, one parallel port, and the diskette controller. It provides a buffer for the serial ports and EPP/ECP modes for the parallel port. It also provides the keyboard/mouse ports and the real time clock (RTC).

Serial Interface

The Serial interface ports (COM1 and COM2) are implemented on the main logic board and are accessible through the rear panel 9-pin D-subminiature connectors. These connectors are functionally compatible with RS-232C standards. The table below lists the serial interface pin assignments.

DIGITAL Server 5220

Block Diagram

Serial Interface Pin Assignments

Pin Number	Function
1	Carrier Detect
2	Receive Data
3	Transmit Data
4	Data Terminal Ready
5	Signal Ground
6	Data Set Ready
7	Request to Send
8	Clear to Send
9	Ring Indicator

Parallel Interface

The parallel interface is implemented on the main logic board and is accessible through the rear panel 25-pin f D-sub connector. This LPT port is an *AT* and *Centronics* compatible bi-directional parallel port. The user can select the printer port to be set to either a PS/2 type bi-directional parallel port compatible mode or extended parallel port (EPP/ECP) bi-directional mode. The table below lists the parallel interface pin assignments. L denotes low true logic.

Parallel Interface Pin Assignments

Pin Number	Function
1	Strobe L
2	Data Bit 0
3	Data Bit 1
4	Data Bit 2
5	Data Bit 3
6	Data Bit 4
7	Data Bit 5
8	Data Bit 6
9	Data Bit 7
10	Acknowledge L
11	Busy L
12	Paper End
13	Select
14	Auto Feed L
15	Error L
16	Initialize L
17	Select In L
18-25	Ground



Diskette Controller

The SMC 37C935APM has an integrated diskette controller capable of supporting two diskette drives interfacing to the main logic board through a daisy-chained ribbon cable. Data transfer rates for a 3.5 inch diskette drive include 720 KB, 1.44 MB, and 2.88 MB. Data transfer rates for a 5.25 inch diskette drive include 360 KB and 1.2 MB.

Block Diagram

Keyboard/Mouse Controller

The SMC 37C935APM also has an integrated keyboard/mouse controller programmed to be IBM PC/AT compatible. The controller can drive DECpc supported keyboards and a PS/2-type mouse. The keyboard and mouse ports are both 6-pin mini-DIN, PS/2 type connectors. The table below lists both the keyboard interface pin assignments and the mouse interface pin assignments.

Keyboard/Mouse Connector Pin Assignments

Pin Number	Function
1	Data
2	Reserved
3	Ground
4	+5V dc
5	Clock
6	Reserved

SCSI Interface

The main logic board includes the PCI SCSI interface through a SYMBIOS SYSC896 controller. This is a dual channel, wide Ultra2 (80 MB/s) controller that allows increased internal SCSI connectivity and increased cable length with low voltage differential (LVD) signaling for external SCSI devices. The chip has a local memory bus for storage of the BIOS ROM in flash memory. The chip allows either single-ended or LVD transfers and supports external high-voltage differential transceivers.

SCSI Controller

The PCI SCSI controller (SYMC896) interfaces to the Secondary PCI bus to provide support for the SCSI connectors on the main logic board. The SCSI controller supports internal Ultra wide SCSI single-ended transactions and external Ultra2 SCSI transactions.

SCSI Connectors

SCSI connector Channel A interfaces to the storage backplane and an optional SCSI tape drive. SCSI connector Channel B provides an external connection to the system box and can accommodate Ultra2 (LVD) devices in an expansion box. Both connectors have termination on the MLB.

IDE Interface

The main logic board includes the standard IDE interface, connecting to a bootable 32X speed CD-ROM. The PCI IDE interface is controlled by the PCI ISA IDE Xcelerator (PIIX4). The Primary IDE connector goes to the CD-ROM. The Secondary IDE connector is available for other IDE options, such as an IDE tape drive.

Display Interface

Super Video Graphics Array

The Super Video Graphic Array (SVGA) Trio64 V2 family video controller, provided on the combo Video/Ethernet plug-in module. It uses an S3 VGA graphic user interface (GUI) accelerator and is 100% register-level compatible with the IBM VGA. The SVGA provides:

- Advanced architecture using pipelining, multiple FIFO, and a read-ahead cache
- Hardware acceleration of 2-D graphics
- Direct connectivity to 32-bit local bus
- Full hardware and BIOS support for VESA Display Power Management (DPMS) protocol to provide standby, suspend, and off power-saving features
- Fast linear addressing by the CPU for up to 2 MBytes of display memory (256K x 32, 100 MHz, 7 ns DRAM)

Block Diagram

The table below lists the SVGA connector pin assignments.

SVGA Connector Pin Assignments

Pin Number	Function
1	Red Video
2	Green Video
3	Blue Video
4	Monitor ID Bit 2 (not used)
5	Ground
6	Red Return (ground)
7	Green Return (ground)
8	Blue Return (ground)
9	+5V supply (optional)
10	Sync Return (ground)
11	Monitor ID Bit 0 (not used)
12	Data from Display
13	Horizontal Sync
14	Vertical Sync (VCLK)
15	DDC2 Clock

Ethernet Interface

The combo Video/Ethernet plug-in module also provides a PCI Fast Ethernet LAN controller with a PCI clock speed up to 33MHz. It uses a 21143-Td single-chip Ethernet controller for the PCI bus. It has a 10Base-T transceiver that supports full-duplex operation on an 10/100Mb/s port. It has a powerful on-chip DMA with intelligent arbitration to prevent underflow or overflow of data, using two large (256 byte) independent receive and transmit FIFO buffers.

Network Interface Pin Assignments

Pin Number	Function
1	Transmitter High
2	Transmitter Low
3	Receiver High
6	Receiver Low
Shield	Ground
Others	No connection

DIGITAL Server 5220

Peripheral Component Interconnect (PCI) Bus

The PCI bus provides three physical address spaces – two concurrent Primary PCI buses and a Secondary PCI bus, providing enhanced decoding for:

- 32-bit memory
- 32-bit I/O
- 256 byte-per-agent configuration space.

The Primary PCI bus interfaces to PCI slots 1 and 2. The Secondary PCI bus interfaces to PCI slots 3 through 6. The buses communicate between each other through a PCI-to-PCI bridge (PPB). The PCI bus supports 8-bit, 16-bit, and 32-bit data transfers at a bus clock speed of 30 or 33 MHz depending on the CPU speed. This allows 32-bit data transfers at 120 MB per second.

Block Diagram

PCI Bus Expansion

The MLB supports nine PCI slots, including a shared PCI/ISA slot. Full bus mastering is supported on all nine PCI slots, allowing any PCI master peer-to-peer access to any PCI slave.

PCI-to-PCI Bridge (PPB)

The 31152 chip on the MLB provides the PCI-to-PCI bridge between the Primary PCI bus and the Secondary PCI bus. It provides concurrent primary and secondary bus operations to isolate traffic. It implements delayed transactions for all PCI configuration, I/O, and memory read commands up to three transactions simultaneously in each direction. It also allows 72 bytes of read data buffering in each direction. The PPB also provides VGA addressing and palette support for video graphics. And it has an ISA-awareness mode for legacy option support.

ISA Bus

The ISA bus supports two ISA bus slots, including one shared PCI/ISA slot. ISA bus mastering is supported on both ISA slots. The ISA bus operates at 8.33 MHz.

System Management

The 8031 subsystem, shown in Figure A-1, provides system management resources on an inter-integrated circuit bus (I²C bus). The 8031 subsystem detects such items as fan failure, out-of-voltage range, and excessive temperature, include the temperature of the two processors. A Watchdog timer monitors the dc power and turns off the system power if needed. The 8031 has an external SRAM, so the resources can be accessed, detected, or changed by software. A management software package, such as ServerWORKS Manager, can be used to manage these system resources.

Supported Options List **B**

This appendix describes the options that have been tested and certified on the DIGITAL Server 5220 and 5225 models. The table below lists their part number and description.

Supported Options List

Part Number	Description
	Memory
FR-SDSMA-AA	64MB (1X16MB) SDRAM DIMM
FR-SDSMA-AB	128MB (1X16MB) SDRAM DIMM
FR-SDSMA-AC	256MB (1X16MB) SDRAM DIMM
	SCSI Disk Drives – 7200 RPM
FR-CGCBA-CA	18 GB Ultra Wide Drive Carrier (white SBB)
FR-DECBA-CA	4GB Ultra-2 Drive Carrier (white SBB)
FR-DFCBA-CA	9GB Ultra-2 Drive Carrier (white SBB)
	SCSI Disk Drives – 10,000 RPM
FR-CECCA-CA	4 GB Ultra Drive Carrier (white SBB)
FR-DFCCA-CA	9 GB Ultra-2 SCSI HDD (white SBB)
	Diskette Drive
FR-PCXRJ-AD	3.5" 1.44MB Diskette Drive

continued

Supported Options List

Part Number	Description
Tape Drives	
FR-PCXAT-AJ	Sony 7000 4/8 GB DAT (SCSI)
FR-PCXAT-EA	AIT Sony 25/50 GB 5.25"
FR-PCXAT-AK	DAT Sony 12/24 GB 5.25"
IDE CD-ROM	
FR-PCXRN-AQ	32X Atapi Toshiba
SCSI Host Adapters	
FR-PCTAZ-DF	1 Channel 2940UW
FR-PCTAZ-FB	1 Channel 2944 Differential SCSI controller
FR-PCTAZ-EC	2-Channel 3940 Adaptec
RAID Controllers	
FR-PCTAR-UB	Battery Backup – Mylex
FR-PCTAR-GA	1 Channel Raid – Mylex PD
FR-PCTAR-GB	2 Channel Raid – Mylex PD
FR-PCTAR-GC	3 Channel Raid – Mylex PD
Video Cards	
FR-PCXAG-BG	Matrox Millennium II (4 Mb)
FR-PCCAM-CC	Matrox Millennium II (4 Mb upgrade)
Storage Expansion	
FR-BA356-PA	Storage Expansion Cabinet with Ultra support (pedestal)
FR-BN37A-02	2 Meter VHDCI external cable for RAID
FR-BN38C-02	2 Meter 68HD to VHDCI cable from SCSI to BA356
FR-BN37A-05	5 Meter VHDCI external cable for RAID
FR-BN38C-05	5 Meter 68HD to VHDCI cable from SCSI to BA356

continued

Supported Options List

Part Number	Description
Cabling	
FR-PCXAR-WG	Internal SCSI cable, 580mm, SCSI-3, 68-pin HD IDC to 68-pin HD panel mount (Suggested use - to extended storage backplane channels externally)
FR-PCXAR-WJ	External SCSI 68-pin fault bus supported terminator (Suggested use - with RAID using SSB's)
Modems	
FR-PCXFA-AA	56KB US/Can Modem, Internal
FR-PCXFA-AB	56KBS Modem, External
Network Adapters	
FR-DE500-BA	Digital PCI Fast Ethernet 10/100
FR-PCXDN-BC	SMC Epic 10/100 PCI Fast Ethernet NIC
FR-PCXTN-AD	IBM PCI Token Ring NIC
FDDI	
FR-DEFPA-AB	FDDI PCI- MM SAS
FR-DEFPA-DB	FDDI PCI- MM DAS
FR-DEFPA-UB	FDDI PCI- UTP SAS

continued



Supported Options List

Part Number	Description
	NT Cluster
FR-CK310-RF	RAID 310 Windows NT Cluster Kit
FR-CK356-UP	BA356 UW Windows NT Cluster Kit, Pedestal
FR-CK450-RP	RA450 Windows NT Cluster Kit, Pedestal
FR-CK300-UP	RA3000 Cluster Kit, Pedestal
FR-CK700-UP	RA7000 Windows NT 4.0 Cluster Kit, Pedestal
	External Storage
FR-SWXRA-Z1	RAID Array 310 Subsystem (legacy white box, blue drives supported)
DS-SWXRA-W0	RAID Array 450 Subsystem, office enclosure (blue box, blue drives)
DS-SWXRA-GA	RAID Array 3000 Subsystem, one HSZ22 controller, pedestal, 120V
DS-SWXRA-GC	RAID Array 3000 Subsystem, one HSZ22 controller, pedestal, 230V
DS-SWXRA-HA	RAID Array 7000 with dual HSZ70 controllers (blue box, blue drives)
DS-SWXRA-HC	RAID Array 7000 with single HSZ70 controller (blue box, blue drives)
	Other
FR-PCXLN-BB	Mouse 2 button (Frost White)
FR-PCXLA-KA	Windows 95 Keyboard (Frost White)

Service Notes

C

DIGITAL Server 5220

Service Notes

Service Notes

DIGITAL Server 5220

Service Notes