DIGITAL Personal Workstation

System Reference

Part Number: ER-K3BWW-UA. A01

Digital Equipment Corporation

November 1997

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FCC Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

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

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- 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

The user may find the following booklet prepared by the Federal Communications Commission helpful: How to Identify and Resolve Radio-TV Interference Problems. This booklet is available from the U.S. Government Printing Office, Washington, D.C., 20402. Stock No. 004-00398-5.

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

Canadian DOC Notice

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.

VCCI Notice

This equipment is in the 2nd Class category (information equipment to be used in a residential area or an adjacent area thereto) and conforms to the standards set by the Voluntary Control Council For Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in such residential area.

When used near a radio or TV receiver, it may become the cause of radio interference.

Read the instructions for correct handling.

German Ergonomic Notice

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

Safety Requirements

This equipment meets or exceeds requirements for safety in the U.S. (UL 1950), Canada (CSA C22.2 No. 950), and Europe (EN 60950/IEC 950) with Nordic requirements.

WARNING: There is a danger of battery explosion if a lithium battery is incorrectly replaced. To prevent damage to your computer, be sure the + side faces up when installing a new battery. Also, be sure you replace the battery with either a DIGITAL (P/N 12-41474-05), Toshiba (P/N CR2032), or equivalent 3 V dc lithium battery.

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

ADVARSEL: Der er fare for, at et lithiumbatteri eksploderer, hvis det udskiftes ukorrekt. Undgå, at beskadige din computer - HUSK, at + siden skal vende opad, når du installerer et nyt batteri. Du skal udskifte batteriet med enten et DIGITAL (delnummer 12-41474-05), Toshiba (delnummer CR2032), eller tilsvarende 3 V jævnstrøms lithiumbatteri.

Afhængig af dit lokalområde, er det muligt, at din computers batteri betragtes som farligt affald. Husk, at følge evt. miljølove og lokale bestemmelser, når du kasserer det gamle batteri.

VAROITUS: Litiumpatterit voivat räjähtää, jos ne asennetaan väärin. Estääksesi tietokoneesi vaurioitumisen varmista, että patteria asentaessasi sen positiivinen (+) puoli on ylöspäin. Tarkista myös, että käyttämäsi uusi patteri on joko DIGITAL (osa no. 12-41474-05), Toshiba (osa no. CR2032) tai vastaavanlainen 3 voltin tasavirtalitiumpatteri.

Asuinpaikastasi riippuen tietokoneesi patteria voidaan pitää ongelmajätteenä. Pidä huoli, että hävität vanhan patterin voimassa olevien lakien ja asetusten mukaisesti.

VARNING! Det kan förekomma en batteriexplosion om ett litium-jonbatteri byts ut på felaktigt sätt. Förhindra att datorn skadas genom att se till att plussidan (+) är uppåtvänd när du sätter i ett nytt batteri. Det gamla batteriet får endast bytas ut mot ett DIGITAL-batteri (artikelnummer 12-41474-05), ett Toshiba-batteri (artikelnummer CR2032) eller ett motsvarande litiumbatteri på 3 volt likström.

Datorbatterier anses vara miljöfarligt avfall i många länder. Du måste följa alla lokala bestämmelser när du avyttrar ett gammalt batteri.

Laser Safety Notices

All CD-ROM drives included in DIGITAL Personal Workstations 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 operation 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.

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Introduction

This guide describes how to operate, configure, and upgrade your Digital Personal Workstation (SN-K3Bxx-xx). The information presented will help to familiarize you with all aspects of your workstation and provide a reference tool for questions you might have in the future.

Related Material

A *Quick Setup Guide* is available as a supplement to this *System Reference*. This guide describes how to initially set up your workstation.

A *Digital PC Systems Solutions* manual is available to help you troubleshoot your workstation should it fail to operate after initial set up or after installing optional devices.

A *System Software* manual provides information on the operating system, utilities, and device drivers that came with your workstation. Your workstation also came with a CD-ROM disk that can be used to restore your system software. Refer to the CD-INFO.TXT file on the CD-ROM disk for installation and configuration information.

A *Warranty and Service Information* booklet is supplied with your workstation. This booklet provides warranty information and a list of phone numbers for technical support.

README files come with the factory installed software and on the supplied CD-ROM disk. This information can help you set up, configure, and operate your workstation. DIGITAL recommends that you read this information first.

Windows NT Workstation documentation is provided as an on-line help file and in printed form.

Latest Product Information and Updates

You can access product information and download the latest BIOS, device drivers, and software updates using the Internet at:

http://www.workstation.digital.com

Once accessed, go to the "Firmware and Drivers" section.

DIGITAL Personal Workstation

Your DIGITAL Personal Workstation features:

- Short tower enclosure with 300 W power supply

- Single or dual Pentium® II processor with MMX Slot 1 configurations

- 512 KB level 2 cache

- Up to 512 MB of workstation memory, via four DIMM sockets, using 128 MB DIMMs (when 256MB DRAM is available)

- On most models, integrated Permedia P2 graphics/video accelerator with 4 MB of SGRAM (upgradeable to 8 MB)

- Slot for Optional Accelerated Graphics Port (AGP) expansion board

- Integrated 16-bit stereo-quality audio

- Integrated SCSI controller

- Integrated Digital 21143 PCI Ethernet controller (10/100Base-TX support)
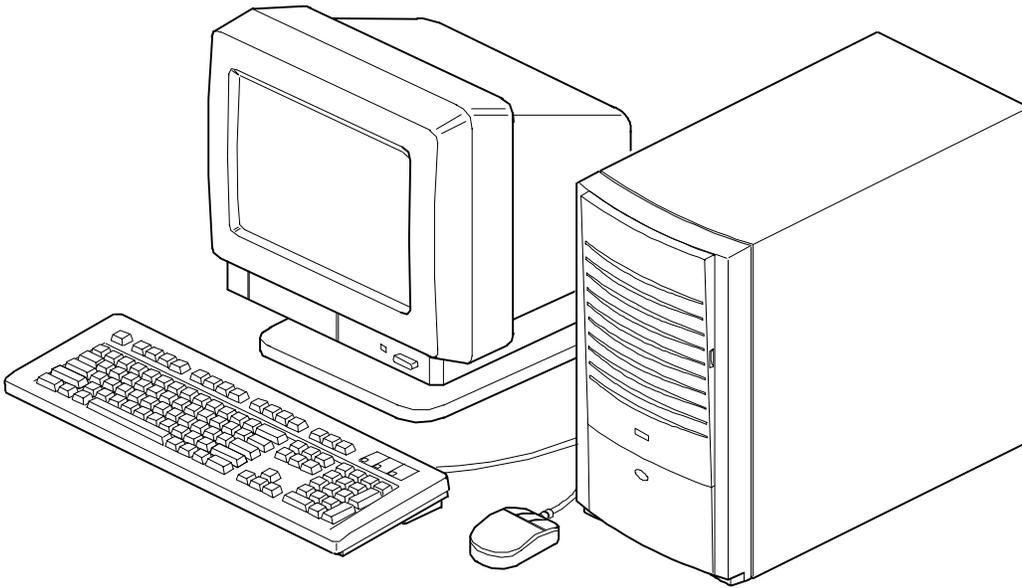
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Typical DIGITAL Personal Workstation

NOTE: Note that your monitor, keyboard, and mouse might look different.

Audience

This guide is written specifically for anyone responsible for configuring and expanding a DIGITAL Personal Workstation.

Organization

This guide contains the following:

- Chapter 1: *Beyond Quick Setup*— This chapter describes your workstation's front and rear panel components, indicators, and connectors. This chapter also explains how to physically secure your workstation to a desk or table, connect optional external devices (such as headphones, microphone, printer, etc.), use your workstation's Windows enhanced keyboard, how to remove and replace the front bezel door, and create a comfortable working environment.

- Chapter 2: *Using the BIOS Setup Utility*—This chapter provides task-based information on how to configure your workstation using the BIOS Setup utility.

- Chapter 3: *Inside Your Workstation*—This chapter provides internal workstation component descriptions and locations as well as how to remove the main logic board, replace the battery, and upgrade to a higher-performance processor.

- Chapter 4: *Workstation Expansion*—This chapter explains how to install video memory on your workstation's main logic board. This chapter also describes how to install additional workstation memory on the Pentium® II processor module.

- Chapter 5: *Adding Expansion Boards*—This chapter explains how to install ISA and PCI expansion boards.

- Chapter 6: *Adding Mass Storage Devices*—This chapter explains how to install and connect optional mass storage devices.

- Appendix A: *Technical Specifications*—This appendix lists vital workstation operating and performance specifications. Also included is information about your workstation's jumper and switch settings.

- Appendix B: *Device Mapping*—This appendix contains tables listing the main logic board's memory map, I/O address map, interrupt map, and DMA map.

Conventions

Convention Example	Description
Quick Setup	Italics are typically used for titles, comments, and references to other sections of this document or other documents.
`c:\windows>`	Monospaced text indicates information that your workstation or software displays. For example, a directory path or error message.
`SCU.BAT`	Monospaced text can also indicate a command that you need to enter to run an application or utility.
[Enter]	Square brackets surrounding text represents a keyboard key.
[Ctrl]+[Alt]+[Del]	A plus sign indicates that the keys shown should be pressed at the same time.

Special Notices

Four kinds of special notices are used in this *System Reference* guide to emphasize specific information.

WARNING: indicates the presence of a hazard that can cause personal injury if the hazard is not avoided.

CAUTION: indicates the presence of a hazard that might cause damage to hardware or that might corrupt software.

SHOCK OR STATIC SENSITIVE: indicates the presence of a hazard that might cause personal injury due to a shock or static discharge damage to hardware.

NOTES: are used to provide additional information.

Beyond Quick Setup *1*

Introduction

This chapter describes your workstation's front and rear panel components, indicators, and connectors. This chapter also explains how to physically secure your workstation to a desk or table, connect optional external devices (such as headphones, microphone, printer, etc.), use your workstation's Windows enhanced keyboard, how to remove and replace the front bezel door, and create a comfortable working environment.

Front Panel Controls and Indicators

Figure Legend	Control or Indicator	Function
A	Headphone jack	This jack enables you to connect standard stereo headphones to your workstation.
B	Microphone jack	This jack enables you to connect a standard microphone to your workstation.
C	On/off switch	Turns your workstation's power on and off.
D	Power LED	Lights when your workstation is turned on.
E	Reset switch[1]	Resets your workstation and causes POST to run.
F	Diskette eject button	Releases a 3½-inch diskette from the diskette drive.
G	Drive bays	Enables you to add additional mass storage device(s) to your workstation.
H	System activity LED	This LED is dual colored: Green represents hard drive activity Yellow represents network activity Orange represents combined hard drive and network activity.
I	Diskette activity LED	Lights when the diskette drive is in use.
J	Front bezel door	Restricts access to the front panel drive bays.
K	CD-ROM volume dial	This dial enables you to control the volume of the CD-ROM headphone audio output from your CD-ROM drive. From the front of your workstation, by turning the dial to left, volume is decreased, and increases as it is turned to the right.
L	CD-ROM activity light	This LED lights during power up and when accessing the CD-ROM disk.
M	CD-ROM eject button	Pressing this button opens and closes the CD-ROM drive tray cavity so you can insert or remove CD-ROM disks from the drive.

(1) DIGITAL designed the reset button so it does not protrude significantly from the front bezel. This design prevents accidentally resetting the workstation. To reset your workstation, use a device such as a pen or pencil to push the reset button.
Your CD-ROM drive might look different than the CD-ROM drive depicted.
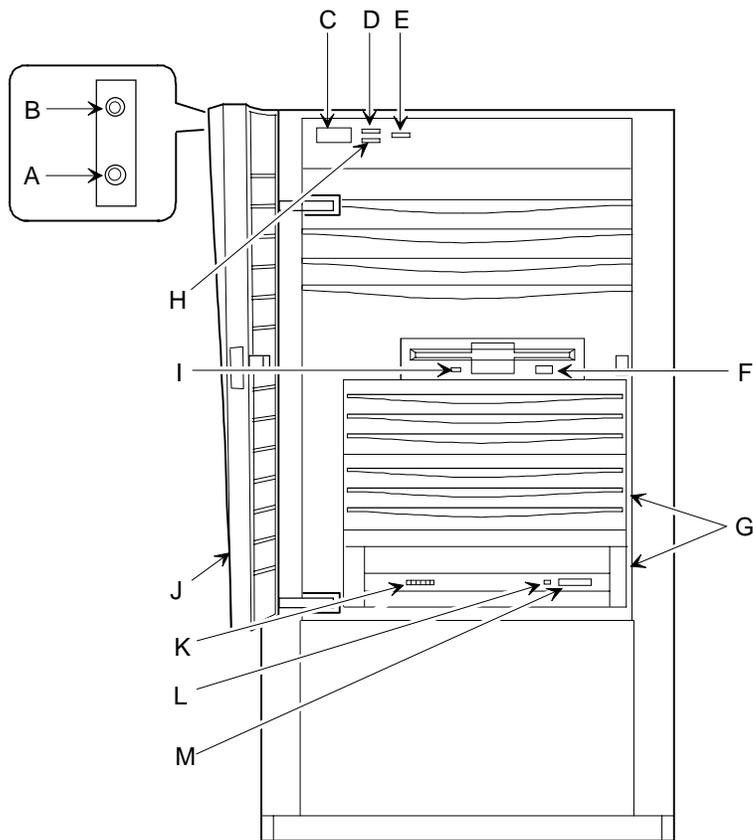
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Figure 1-1. Front Panel Controls and Indicators

Rear Panel Connectors and Voltage Select Switch

Figure Legend	Connector or Switch	Function
A	Optional AGP port connector	Enables you to connect a high-resolution monitor to your workstation.
B	Video port connector	Enables you to connect a high-resolution monitor to your workstation.
C	Keyboard connector	Enables you to connect a Windows enhanced keyboard.
D	Mouse connector	Enables you to connect a PS/2 style mouse.
E	USB ports	Enables you to connect Universal Serial Bus (USB) devices.
F	Serial port connector 1	Enables you to connect a serial device.
G	Serial port connector 2	Enables you to connect a serial device.
H	Parallel port connector	Enables you to connect a standard, Enhanced Parallel Port (EPP), or Enhanced Capabilities Port (ECP) parallel printer.
I	10Base-T port connector (RJ45)	Enables you to connect to a 10/100Base-T (Twisted-Pair) network.
J	Expansion board slots	Enables you to install additional ISA and PCI expansion boards.
K	MIDI/joystick port connector	Enables you to connect a MIDI/joystick device to your workstation.
L	Chassis lockdown	Enables you to physically anchor your workstation to a fixed location.
M	Speaker out	This jack enables you to connect a set of speakers to your workstation.
N	Line in (microphone)	This jack enables you to connect an audio input device like a microphone to your workstation.

Figure Legend	Connector or Switch	Function
O	ac line connector	Enables you to connect your workstation to an ac power source.
P	Voltage select switch	Enables you to select 115 V ac input power or 230 V ac input power.

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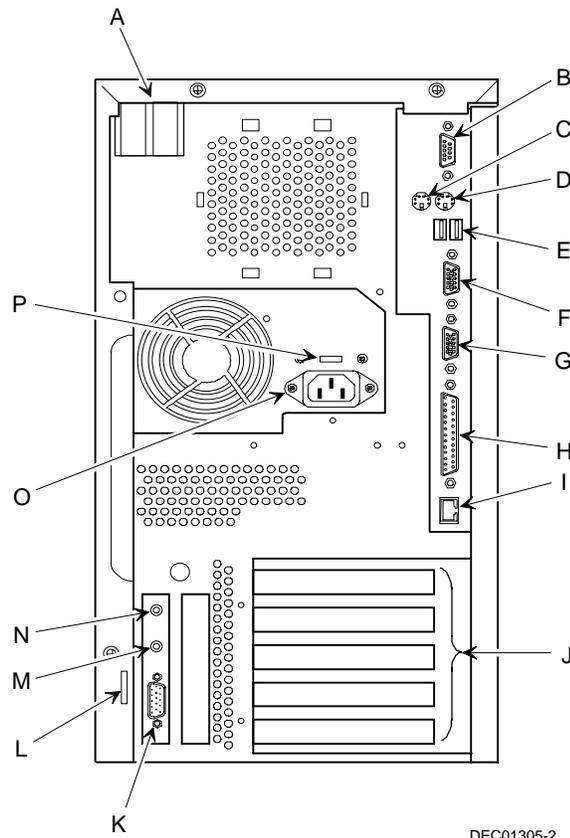
Figure 1-2. Rear Panel Connectors and Voltage Select Switch

Removing your Workstation's Outside Cover

1. Turn off power to all external devices connected to your workstation.

2. Turn your workstation off.

3. Unplug your workstation and monitor power cord from the wall outlet.

4. For workstations without a chassis lock, go to step 4a. For workstations with a chassis lock, go to step 4b.

   a. Release the outside cover by loosening the rear-panel thumbscrews.

   b. Unlock the outside cover by inserting the key and turning it counter clockwise. Loosen the other two rear-panel thumbscrews.

5. Slide the outside cover backwards and then carefully lift it away from the chassis.

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

   - Before touching any circuit board or component, touch the metal frame of your workstation to discharge any static electricity.

   - Keep circuit boards and components away from non-conductors.
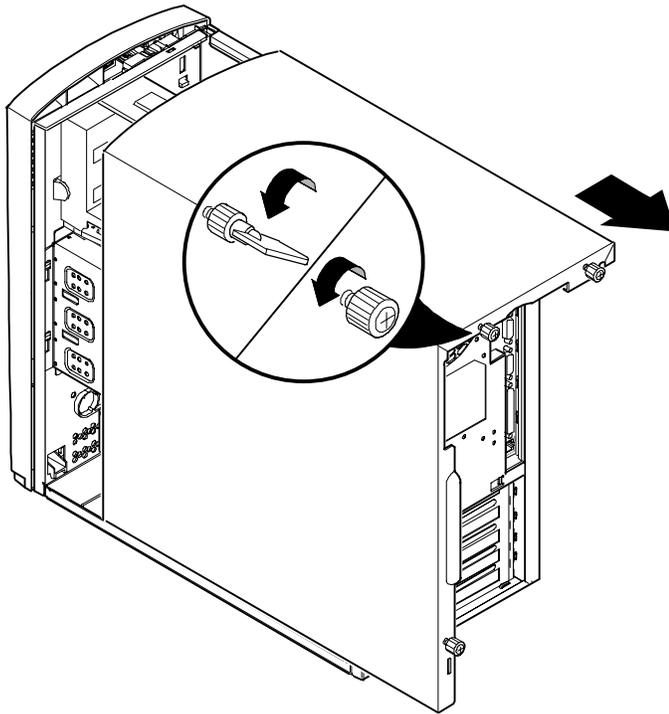
DEC01300-2

Figure 1-3. Removing the Outside Cover

SecureBOX

Your workstation features SecureBOX circuitry that detects the removal of the workstation cover to improve asset management of remote networked clients (see Figure 1-4). If the workstation cover is removed, SecureBOX circuitry will log the event with system management software. SecureBOX features are implemented within the workstation hardware and BIOS design for use with ClientWORKS and/or other system management software.
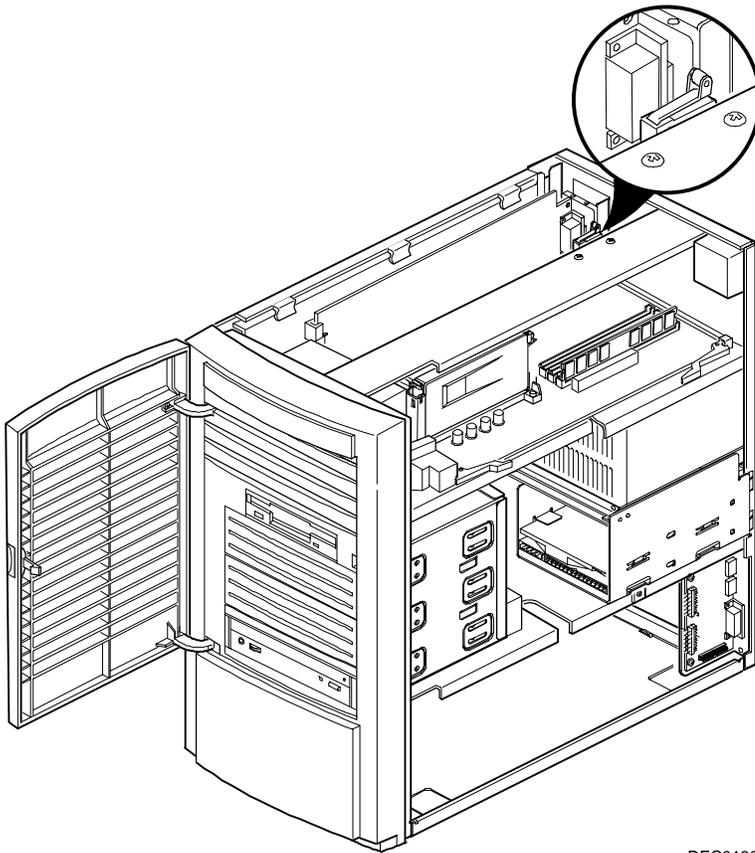
DEC01306

Figure 1-4. SecureBOX Microswitch Location

Replacing your Workstation's Outside Cover

To replace the outside cover:

1. Replace the outside cover by sliding it onto the chassis.

2. For workstations without a chassis lock, go to step 2a. For workstations with a chassis lock, go to step 2b.

    a. Secure the outside cover to the chassis using the rear panel thumbscrews.

    b. Secure the outside cover to the chassis by inserting the key and turning it clockwise. Tighten the other two rear-panel thumbscrews.
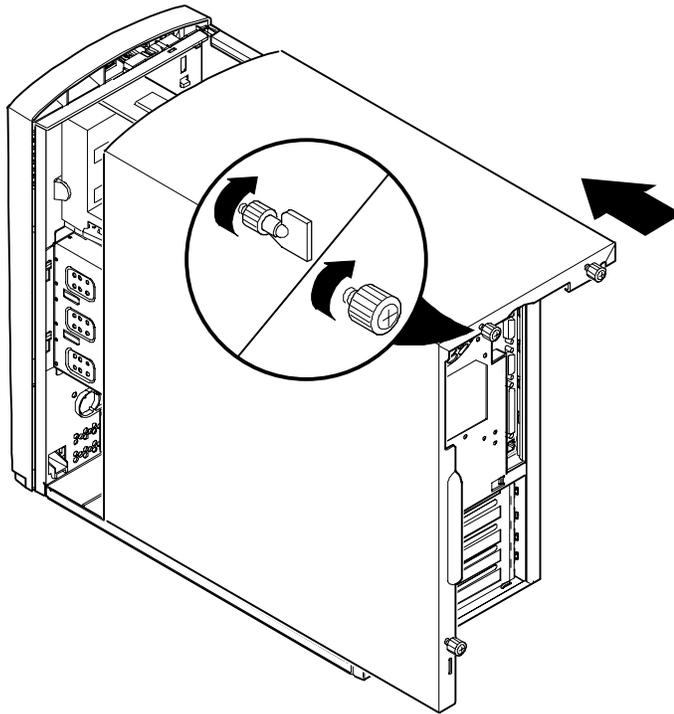
DEC01300-3

Figure 1-5. Replacing the Outside Cover

Connecting Speakers

If your workstation came with integrated audio capabilities and you purchased speakers, perform the following instructions to connect them:

1. Unpack the speakers.

2. Plug the slave speaker cable into the master speaker "Speaker Output" (A, Figure 1-6).

3. Connect the loose cable to the master speaker "Audio Input" (B, Figure 1-6) and to the adapter card "Speaker Out" (C, Figure 1-6).

4. Connect the ac-to-dc adapter cord to the master speaker (D, Figure 1-6).

5. Plug the speaker ac-to-dc into a power outlet.

> **NOTE:** This diagram is only representative of typical speaker systems. Your actual speakers and how they connect might vary depending upon the make and model. Refer to the documentation that came with your speakers for more information.
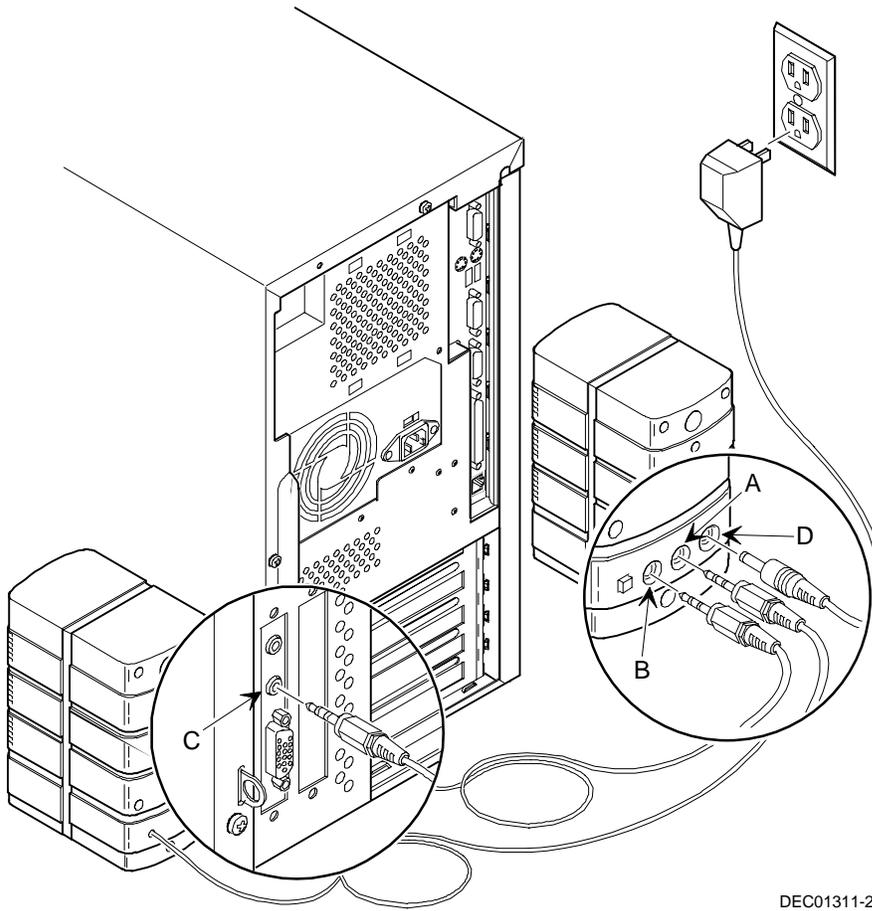
DEC01311-2

Figure 1-6. Connecting Speakers

Connecting Headphones

If your workstation came with integrated audio capabilities and you purchased headphones, perform the following instructions to connect them:

1. Unpack the headphones.

2. Connect the headphones cable into the connector at the left/front of your workstation.
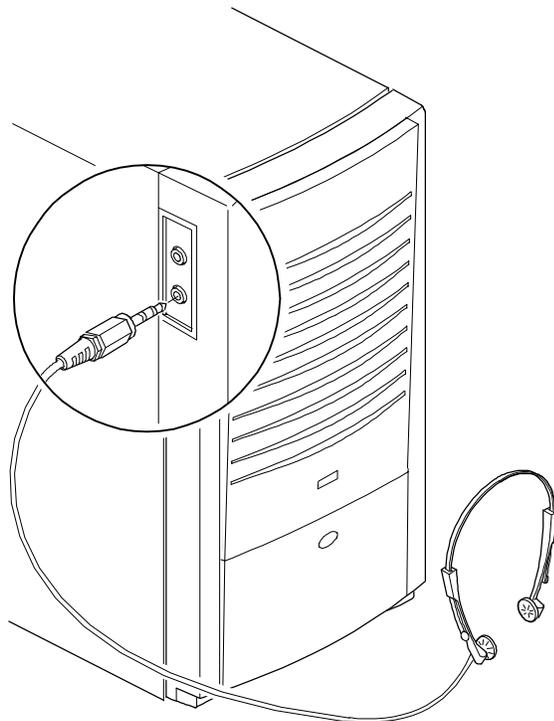
DEC00941-2

Figure 1-7. Connecting Headphones

Connecting a Microphone

If your workstation came with integrated audio capabilities and you purchased a microphone, perform the following instructions to connect it:

1. Unpack the microphone and assemble the base.

2. Connect the microphone cable into the connector at the left/front of your workstation.
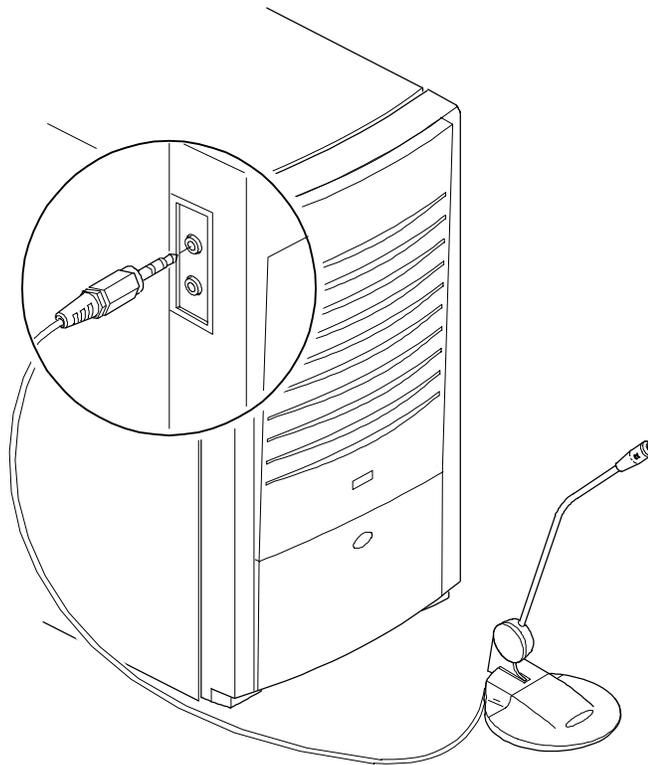
DEC00941-3

Figure 1-8. Connecting a Microphone

Connecting a MIDI/Joystick Device

If your workstation came with integrated audio capabilities and you purchased a MIDI/joystick device, perform the following instructions to connect it:

1. Unpack the MIDI/joystick device.

2. Connect the MIDI/joystick device cable into the MIDI port connector on the back of the workstation.
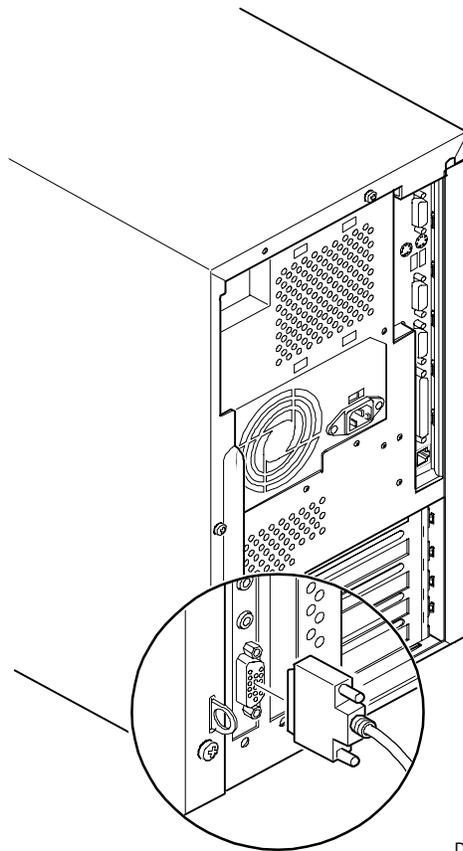
DEC01311-3

Figure 1-9. Connecting a MIDI/Joystick Device

Connecting a Local Printer

Perform the following steps to connect a local printer to your workstation:

1. Look over your printer documentation and perform any pre-installation instructions before attempting to connect it to your workstation.

2. Make sure your printer and workstation are turned off.

3. Plug the printer cable into the appropriate printer port (the parallel port for a parallel printer and a serial port for a serial printer).

4. Turn on your workstation and then turn on your printer.

5. Configure your printer for operation with your workstation.

    Refer to your Windows NT Workstation on-line help and printed documentation for instructions on installing your printer's device driver.
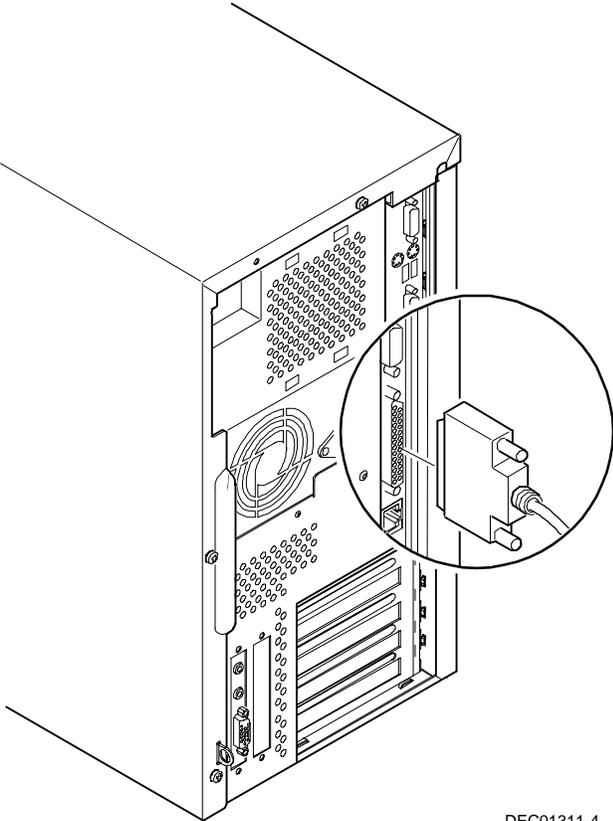
DEC01311-4

Figure 1-10. Connecting a Printer

Connecting a Universal Serial Bus (USB) Device

USB simplifies connectivity requirements for plug and play external devices by consolidating ports and eliminating the need to open the workstation to plug in expansion boards.

Refer to your manufacturer's documentation for installation instructions.

NOTE: Windows NT Version 3.51 and Windows NT Version 4.0 do not support Plug & Play. This means that USB devices have to be manually configured and set up as they are added to your workstation.

If you purchased a USB device for your workstation, perform the following instructions to connect it:

1. Unpack the USB device.

2. Connect the USB device cable into one of the USB port connectors at the rear of your workstation.

NOTE: Since USB devices are not yet generally available at the time of this guide's printing, the USB ports have been disabled in the workstation BIOS. If you have a USB device, you will need to upgrade your BIOS for USB support. As USB devices become available at your local workstation retail stores, the BIOS upgrade will be available. Refer to "Flash Utility" in chapter 2 for information on how to flash your BIOS. Check with your DIGITAL support representative for the availability of this BIOS. Refer to "Service" on-line help for the DIGITAL support phone number for your location.
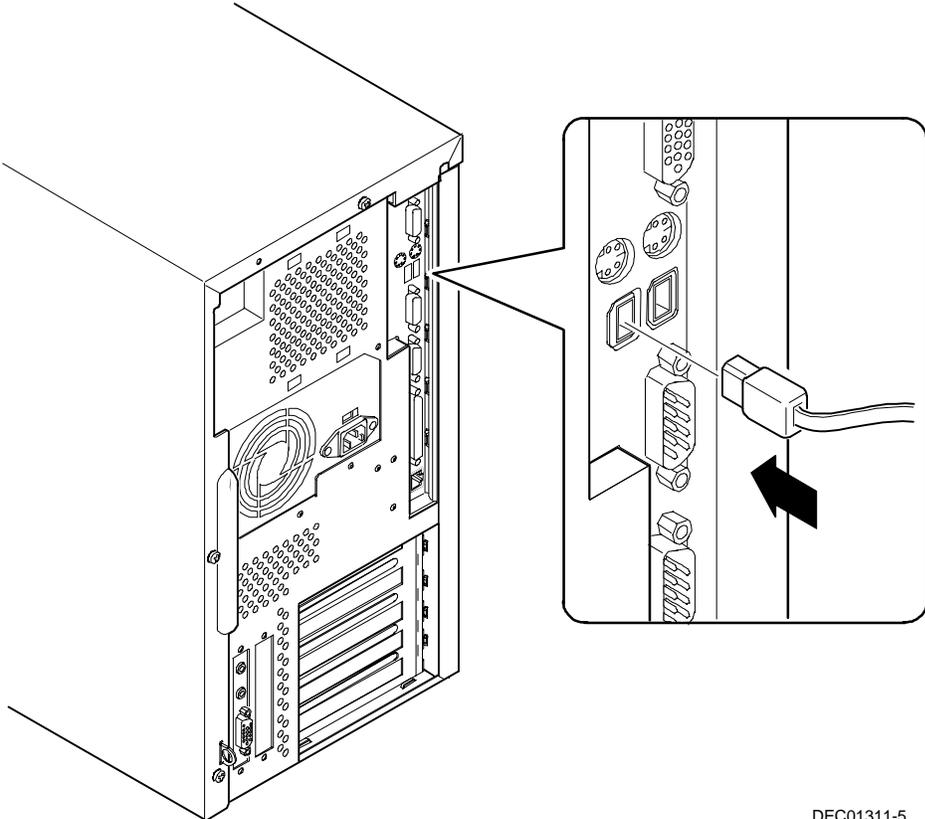
DEC01311-5

Figure 1-11. Connecting a USB Device

Your Workstation's Windows Enhanced Keyboard

Your workstation comes equipped with a 104-key Windows enhanced keyboard that enables you to communicate with your workstation by entering data or commands. Note that some European language keyboards have different key layouts.

The right and left Windows (A and B, Figure 1-12) keys bring up the Start menu much like pointing and clicking the left mouse button on the Start button. These keys can be used at any time you are in the Windows NT Workstation shell and do not affect or change the current mouse position. Both keys can be used to modify other keys. The operating system controls the functionality of the Windows keys and only shell applications should implement these keys.
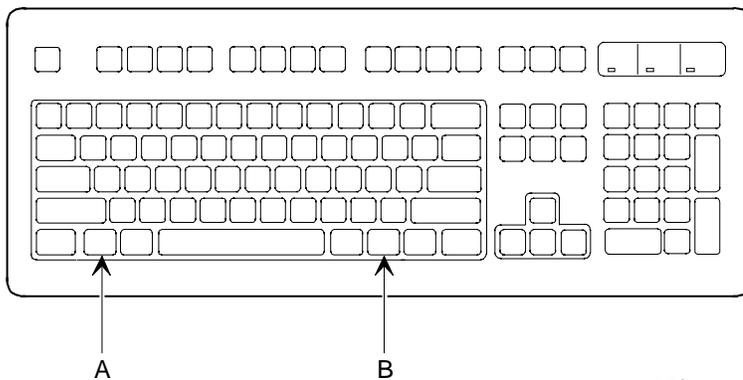
DEC00986-2

Figure 1-12. Windows Enhanced Keyboard

Removing the Front Bezel Door

The front bezel door has been designed so that the door assembly can be removed if you prefer not to have a front bezel door on your workstation. You can use the following procedures to replace the door assembly should the door break in some way.

1. Open the front bezel door so that the door is open 90 degrees.

2. With one hand near the top hinge area (top inside edge of the door), apply pressure to the top of the top hinge assembly.

3. With your other hand on the outside of the top of the door, apply pressure on the top-front of the door, rotating the top of the door frame clockwise towards the center of the workstation.

4. Once the top hinge has cleared, lift the door from the bottom hinge point.

5. If you are not replacing the door and wish not to have a door on your workstation, safely store the front door to ensure it will not get broken.
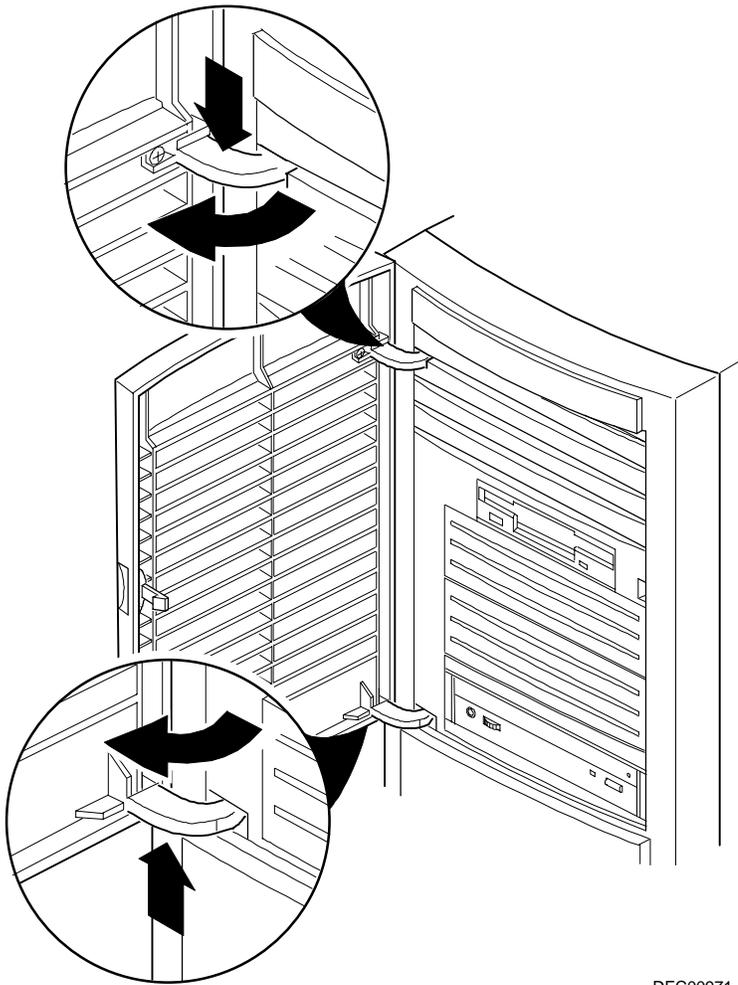
DEC00971

Figure 1-13. Removing the Front Bezel Door

Replacing the Front Bezel Door

To replace the front bezel door:

1. Insert the door into the front bezel doorway so that the bottom hinge is in the lower hinge point and the door is perpendicular to the door frame and the top of the door is angled near the top-right corner of the door frame.

2. With one hand near the top hinge area (top inside edge of the door), apply pressure to the top of the door assembly.

3. With your other hand inside the top of the door frame (inside top-left of the door way), apply pressure while lifting up on the bezel door casement.

4. While applying an opposing pressure to the two surfaces, gently rotate the top of the door counter clockwise into the door frame. The top hinge should snap into the hinge point hole in the top of the door frame.
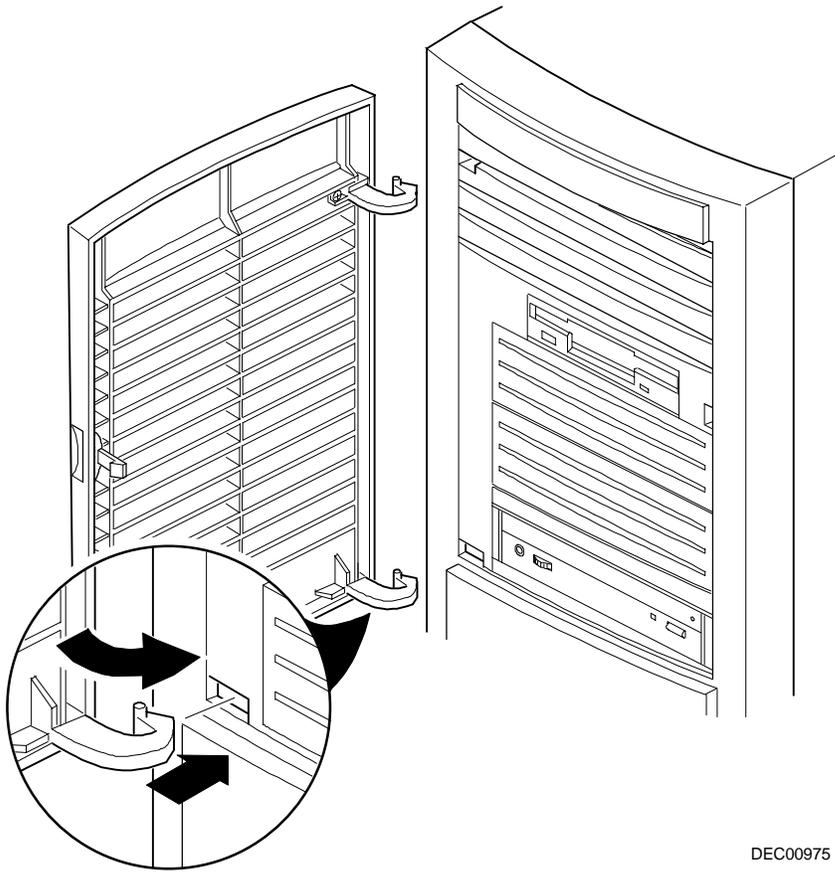
DEC00975

Figure 1-14. Replacing the Front Bezel Door

Creating a Comfortable Working Environment

Under circumstances of poor posture or poor setup, certain recent scientific articles suggest that injuries may occur. Other articles suggest that there is no cause and effect. Because the safety of our users is a great concern, it is important to take these precautions:

- Be comfortable in your work space.

- Change your posture frequently.

- Proceed according to the recommendations in the following table and figure.

Adjust	So . . .
Chair	Feet are flat on the floor.
	Legs are vertical forming a right angle to the floor.
	Your weight is off your thighs and they are horizontal. Keep the back of your knees away from the seat so you do not compress the area behind them, which could restrict the blood flow.
	Your upper body is erect and your lower back is supported with a backrest.
Keyboard or mouse	Your wrists are straight and do not bend more than 15 degrees. They may be supported when resting but not on sharp edges. Type comfortably, with no more key pressure than needed to feel the contact point.
	Upper arms are straight down at your sides, elbows are close to your sides and support your arm weight. Forearms are at a 70 degree to 90 degree angle.
	If you use a mouse, rest your hand on the mouse so your wrist is not on the work surface. Operate the mouse close to your body's centerline.

continued

Adjust	So . . .
Head	Avoid neck strain. Your head should incline downward, but no more than 15 to 20 degrees.
Monitor	No higher than the level of your eyes and at the correct distance for your vision.
	Avoid eye fatigue, which can be caused by glare, image quality, uncomfortable furniture, eye height, and uncorrected vision. If you cannot focus to read at different distances, you may need special glasses. Relax your eyes periodically by looking at distant objects.
Work breaks	Take periodic work breaks. Morning, lunch, and afternoon breaks during the 8-hour workday meet most recommendations. Take advantage of work breaks to move around and do other activities.
Lighting	Avoid direct lighting or sunlight on the screen, which causes glare and reflections. Place lighting behind or to the side of your work area, and distribute the lighting evenly on your work area.
	Your workstation monitor's screen has an antiglare treatment to reduce glare. Adjust the brightness and contrast controls as needed.
Noise	Keep background noise at a minimum. Background noise above 65 dBA is tiring. Sound-absorbing materials (curtains, carpeting, and acoustic tile) can help reduce background noise.
Temperature	20 to 23 degrees C (68 to 74 degrees F).
Humidity	30% to 70%.
Ventilation	Provide adequate air ventilation to avoid fatigue and to operate the equipment.
Space between set ups	> 70 cm (28 in.) center to center, preferably > 152 cm (60 in.).

IMPORTANT: If you experience pain or discomfort during use of your workstation, take a rest break and review the instructions for proper ergonomic setup and use. If the pain or discomfort continues after resuming use of your workstation, discontinue use and report the condition to your job supervisor or physician.
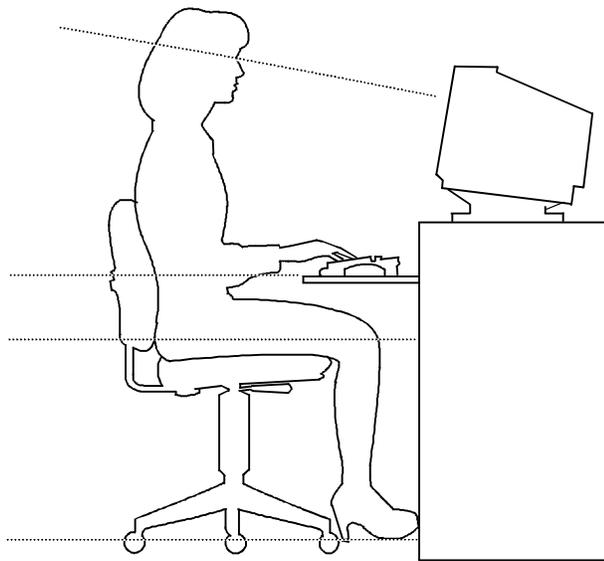
DEC00454

Figure 1-15. Creating a Comfortable Working Environment

Using the BIOS Setup Utility 2

What is the BIOS Setup Utility?

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

You should use the BIOS Setup utility if you experience problems with your hard disk (IDE only) or if you need to reconfigure or expand your workstation.

This chapter provides information on how to configure your workstation using the BIOS Setup utility.

CAUTION: Your workstation was set up for normal operation at the factory and will operate properly without additional configuring.

It is important for you to read carefully and understand this chapter before attempting to modify your workstation's factory settings. Changing some settings might cause your workstation to operate improperly.

Here are some instances when you might wish to change your workstation's initial setup. You might need to:

- Change time and date

- Alter your workstation's security level

- Change the boot options

- Reconfigure power management

- Set up your keyboard for your comfort and use

Additionally, you will need to change your workstation's initial setup after:

- Upgrading hardware (such as adding a new IDE hard disk drive)

- Reconfiguring your mouse, COM, or LPT ports

> **NOTE:** If you do change BIOS settings, make sure you record the new settings and keep this information in a safe place. Should you ever have to reset the settings, such as when you replace your battery, you can use this information to reconfigure your workstation's BIOS.

The remainder of this chapter 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, perform the following steps:

1. Turn on your workstation 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 your monitor screen and any on-line help pop-up screens to configure your workstation.

Helpful Hints

When using the BIOS Setup utility consider:

- Several keyboard keys are assigned to help you 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 reveals several helpful options:

  - Select "Exit Saving Changes" to save all Setup values and exit Setup.
  - Select "Exit Discarding Changes" to exit Setup without recording any changes.

    NOTE: Answer the Warning message carefully.

  - Select "Load Setup Defaults" to set all setup options to their factory default values.

– Select "Discarding Changes" to restore all setup values from the last session.

– Select "Save Changes" to save all setup selections without exiting Setup.

Changing Your Workstation's Configuration

The following sections provide detailed information on changing your workstation's factory configuration. Before changing any setting, make sure you fully read and understand the information provided and view any on-line help for a selected setting.

Changing Time and Date

There may be instances when it will be necessary, such as daylight savings or if you move to a different time zone, to change the date and/or time that is resident in your workstation's BIOS. The following directions show you how this is done.

1. Reboot the workstation and enter Setup.

2. In the Main menu, using the cursor keys and [Tab], select (highlight) the System Time or System Date field you want to change.

3. Use [+] or [-] to change the field to the desired value.

   You can also enter the desired date and time.

4. Save Changes and Exit Setup and allow your workstation to reboot.

Setting Up Security

△ **CAUTION:** Security of your workstation is paramount when using it for important information. Make sure you safeguard this process from the very beginning of your setup and installation process. Also, remember that passwords work both ways. They might keep unwanted or unauthorized personnel out of your workstation, but if the password is lost or forgotten, you too are locked out. Switches on the main logic board of your workstation clear all passwords. Make sure the workstation chassis is secured at all times. This same process can be used should you lose or forget the workstation passwords.

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

Refer to Appendix A, "Technical Specification," for information on clearing passwords.

Setting Supervisor and User Passwords

Your workstation has two password levels that can be set to prevent unauthorized access to workstation files or to the BIOS Setup utility. If a supervisor password is set, the workstation asks you to enter a password before accessing the BIOS Setup utility.

If "Password On Boot" is enabled, and both the supervisor and user passwords are entered, you need to enter either the supervisor or user password to use the workstation.   Password on boot limits who accesses the workstation and at what level of functionality you receive.

Additionally, if after selecting [F2] during the boot sequence, the user password is entered instead of the supervisor password, the Main, Boot, Advanced, and Power menus in the BIOS Setup utility are rendered inaccessible.

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

Supervisor's Passwords

Perform the following steps to set a supervisor password:

1. Reboot the workstation and enter Setup.

2. Highlight the "Security" menu.

3. Highlight "Set Supervisor Password" and press [Enter].

4. Type in a eight (8) digit alpha-numeric supervisor password and then press [Enter].

5. Retype your password as instructed and press [Enter]. (Notice that "Supervisor Password Is" field now indicates Enabled.)

User's Passwords

Perform the following steps to set a user's password (if desired):

1. Highlight "Set User Password" and press [Enter].

2. Type in a eight (8) digit alpha-numeric user password and then press [Enter].

3. To confirm, retype your 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 workstation so changes immediately take effect.

By accessing the system with the User's Password, the following occurs:

- Part of the "Main" menu is inaccessible.

- Part of the "Boot" menu is inaccessible.

- Part of the "Advanced" menu is inaccessible.

- Part of the "Power" menu is inaccessible.

- Part of the "Exit" menu is inaccessible.

- Part of the "Main" menu is inaccessible.

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

> *If you forget your password, refer to Appendix A "Technical Specifications" for information on resetting your password.*

Enabling Password On Boot

When "Password On Boot" is enabled, a screen appears after POST. The screen asks you to enter your supervisor or user password to allow your workstation to finish the boot sequence.

Perform the following steps to set "Password On Boot":

1. Reboot the workstation and enter Setup.

2. Highlight the "Security" menu.

3. Highlight "Password On Boot."

4. Press the [+] key. (Pressing the [+] key again reverses your action.)

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

Eliminating User and Supervisor Passwords

To eliminate your workstation's password(s), follow the directions given below:

1. Reboot the workstation and enter Setup.

2. Enter the supervisor password and press [Enter].

3. Do you wish to eliminate the User Password or the Supervisor Password?

   Select Password choice, User or Supervisor Password and press [Enter]. A
   Blue dialog box will appear on screen.

4. Enter current Password and hit [Enter] four 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
   workstation so changes immediately take effect.

BIOS Update Protection

Your workstation offers improved security features that protect against unauthorized
flash BIOS firmware changes. SecureBIOS features are implemented within the
workstation hardware and BIOS design for use with ClientWORKS and/or other
workstation software.

To enable the BIOS update feature:

1. Reboot the computer and enter Setup.

2. Highlight the "Main" menu.

3. Highlight the "Boot options" menu.

4. Highlight the "BIOS Update".

5. Press the [+] key to enable SecureBIOS (pressing the [+] key again, returns
   your computer to normal).

6. Press [Esc] twice ,then [Enter], twice to save and to reboot the computer so changes immediately take effect.

> **NOTE:** Before flashing the BIOS, you must set the BIOS update entry to "Enable". Follow the steps above to do this, using the BIOS Setup utility. Each time you flash the BIOS, the BIOS Update entry will automatically reset to "disabled."

Other Security Options

These options can provide further security for your workstation under certain conditions.

> **CAUTION:** Consider your security needs carefully before using the following option. While this option is enabled, the contents of the hard disk drive cannot be backed up to diskettes and the workstation cannot be booted from a diskette drive.

- 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 workstation from accessing a diskette.

- *Custom Sign On Banner* – When enabled, allows a custom banner to be displayed every time you turn your workstation on.

- *Diskette Access* – While enabled, this option prevents the workstation from accessing a diskette.

- *Client Operations* – Found in the "Advanced" menu, this feature is enabled if your Power Management selections put your workstation into the "System Standby" or "System Suspend" modes. This feature disables your keyboard and mouse; you can reactivate them after entering a password.

Remote Network Wake-up

Your workstation features remote network wake-up technology that allows easy system management of networked client workstations, even if the system power switch is turned off. Utilizing Magic Packet software, developed by AMD, the system hardware design provides standby power to the integrated network interface controller. The controller can then power on the system when it receives an authorized network wake-up signal.

Additional system security is provided by a SecureON feature that provides greater system protection against unauthorized network intrusion. The system BIOS settings enable either wake-up modes or allow bypass of client password protection by the system administrator.

To set the Remote Network Wake-up feature:

1. Reboot the computer and enter Setup.

2. Highlight the "Advanced" menu.

3. Highlight "Remote Network Wake-up."

4. Press the [+] key to select one of the available options.

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

> **NOTE:** This setting defaults to "Disabled." Changing the feature to "Magic Packet" provides basic wake-up capabilities allowing the system to be powered up remotely. Selecting "SecureON" increases security by requiring a password for access to the network.

For more information, refer to your ClientWORKS and/or System Software documentation.

Setting Power Management Options

This section describes how to select and set your workstation's Power Management parameters using the BIOS Setup utility.

CAUTION: Windows NT Workstation does not support Power Management. Your workstation BIOS has Power Management features but if you are using Windows NT Workstation, current versions of Windows NT Workstation will override the BIOS and Power Management features will not work. Should future versions of Windows NT Workstation support Power Management, the following features should then be available.

Customizing "Max. Perf. And Max. Power Sav."

NOTE: None of the power management features available in the BIOS Setup utility apply if the "Power Savings" field is set to Disabled.

To initialize the power management features:

1. Reboot the workstation and enter Setup.

2. Highlight the "Power" menu.

3. Highlight "Power Savings."

4. Press the [+] key to select one of the available choices.

   NOTE: "Power Savings" defaults to "Customized". This in turn, defaults "Auto Standby Time-out" and "Auto Suspend Time-out" to "OFF". You can highlight these two fields and select a desired setting.

5. Choose other Power Management options as desired.

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

Configuring for New Disk Drives

These sections describe how to configure new disk drives in the BIOS Setup utility.

Diskette Drive Configuration

Diskette drives need to be configured from within the BIOS Setup utility once the new diskette drive is installed.

To configure a newly installed diskette drive, proceed as follows:

1. Reboot the workstation and enter Setup.

2. Highlight the Main menu.

3. Highlight "Diskette A" or "Diskette B" (depending upon how you connected the diskette drive to your workstation).

4. Press the [+] key to sequence through the available options.

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

SCSI Hard Disk Drive Configuration

Your workstation comes with SCSI hard disk drives that have been set up and configured at the factory. However, your workstation also supports IDE hard disk drives should you choose to install and use them.

Refer to "SCSI Guidelines" in Chapter 6 for information about setting up and configuring your workstation to use both SCSI and IDE hard disk drives.

IDE Hard Disk Drive Configuration

Installing new ANSI-supported IDE hard disks is made easier by the "Autotype" drive detect mode available in the BIOS Setup utility.

Autotyping a Hard Disk

To Autotype a newly installed hard disk:

1. Reboot the workstation and enter Setup.

2. Highlight the "Main" menu.

3. Select an "IDE Adapter" field to assign the new hard disk and press [Enter].

4. Select "Auto" and press [Enter].

    The BIOS Setup utility searches the hard disk and fills in the disk parameters. If a parameter does not read correctly, follow the "Manually Defining a Hard Disk" procedure given later in this chapter.

5. Press [Esc] once and verify that the selected IDE Adapter field reads correctly for your hard disk.

    For example: IDE Adapter 0 Master (C: 835 MB). If the selected IDE Adapter field does not read correctly, follow the "Manually Defining a Hard Disk" procedure given later in this chapter.

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

Manually Defining a Hard Disk

If your hard disk was not recognized correctly by the Autotype mode in the BIOS Setup utility, or you wish to change your hard disk's definition, you can manually define your hard disk drive as follows:

1. Reboot the workstation and enter Setup.

2. Highlight the "Main" menu.

3. Select an "IDE Adapter" field to assign the new hard disk and press [Enter].

4. Select the type [USER] and then fill in the parameters.

5. Press [Esc] once and verify that the selected IDE Adapter field reads correctly for your hard disk. For example: IDE Adapter 0 Master (C: 835 MB).

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

Changing the Boot Sequence

It is sometimes necessary to change your workstation's boot sequence. For example, when connecting to a network. (Follow your network manual's instructions to determine the correct boot sequence.)

To change the boot sequence, proceed as follows:

1. Reboot the workstation and enter Setup.

2. Highlight the "Boot" menu.

3. Highlight "Boot-Device Priority" and hit [Enter].

    Diskette drive, Hard Disk, and CD-ROM Drive are displayed. The number shows the current ordering. For example, if CD-ROM Drive is 1 and Diskette Drive is 2, the workstation boots first from the CD-ROM drive. If it is empty, the workstation goes to the diskette drive and then finally to the hard disk drive.

4. Use the [↑] and [↓] arrows to locate the field you want to change. Then use the [+] to raise the order and [-] to lower it.

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

Speeding up the Boot Process

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

1. Reboot the workstation and enter Setup.

2. Highlight the Main menu.

3. Highlight "Boot Options" and then press [Enter].

4. Under the "Boot" Menu, select the item(s) you wish to change. Use the [+] or [-] keys to make your selection.

Field	Speed Up Boot Selection, Desired Setting, and Functional Description
Summary	Disable - disables Window's NT blue system summary screen during POST
Floppy check	Disable - disables the POST floppy test

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

Resetting Keyboard Features

Several parameters effecting keyboard performance can be altered from within the BIOS Setup utility. They are: "NumLock," "Key Click," "Keyboard Auto-Repeat Rate," and "Keyboard Auto-Repeat Delay."

- "NumLock" is factory set to "Auto" at boot which means that the number pad is on each time you boot. This is desirable, for example, if you primarily use spreadsheets or accounting software.

  If, however, you primarily use a word processor or desktop publishing program, you might wish to leave NumLock off at boot to avoid having to turn it off manually.

- "Key Click," when enabled, produces an audible "Click" whenever a key is pressed.

Most keys on the keyboard automatically repeat the character they represent if the keys are held down.

- "Keyboard Auto-Repeat Rate" sets the number of times per second a character repeats.

- "Keyboard Auto-Repeat Delay" sets the time that elapses before the character begins repeating.

Changing the Keyboard Features

To change the keyboard features:

1. Reboot the workstation and enter Setup.

2. Highlight the "Main" menu.

3. Highlight "Keyboard Features" and press [Enter].

If you wish to leave "NumLock" on, skip steps 4 and 5, otherwise:

4. Highlight "NumLock."

5. Press the [+] key to sequence through your options, select "Off."

If you wish to leave "Key Click" disabled, skip steps 6 and 7, otherwise:

6. Select "Key Click."

7. Press the [+] key to select `Enable`.

If you wish to leave the "Keyboard Auto-Repeat Rate" (the number of times per second a character repeats) the same, skip steps 8 and 9, otherwise:

8. Highlight "Keyboard Auto-Repeat Rate."

9. Press the [+] key to sequence through the available options.

If you wish to leave the "Keyboard Auto-Repeat Delay" (the time that elapses before the character begins repeating) the same, skip steps 10 and 11, otherwise:

10. Highlight "Keyboard Auto-Repeat Delay."

11. Press the [+] key to sequence through the available options.

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

Flash Utility

All workstations have BIOS software in a read-only, non-volatile memory (ROM) chip. This BIOS initializes hardware and boots the operating system when the workstation is turned on. The BIOS also provides access to other services such as keyboard and disk drives.

Your workstation comes equipped with flash memory. This means that you can restore your workstation's BIOS simply by running the flash utility. If necessary, you can also upgrade your workstation's BIOS to future releases by running the flash utility along with any flash BIOS update diskette.

Only use the flash utility to upgrade your workstation's BIOS if you are instructed to do so by an authorized DIGITAL support representative. Instructions on how to flash your BIOS, the flash utility, and BIOS updates are available from the workstation web page.

Refer to the "Preface" for additional access information.

Inside Your Workstation *3*

Introduction

This chapter shows the location of your workstation's internal components. Expansion information is also covered in this chapter along with illustrations detailing the main logic board and Pentium® II processor module .

Each workstation contains a main logic board and a Pentium® II processor module. The Main Logic Board (MLB) provides most of the chips and components as well as slots for adding optional expansion boards. The Pentium® II processor module contains sockets for adding memory and a second Pentium® II processor.

The chapter concludes with instructions on how to:

- Remove the main logic board

- Replace the battery

- Install a second Pentium® II processor (dual processor configuration)

- Install a Voltage Regulator Module (VRM)

Improving Workstation Performance

As your computing needs change, you can achieve improved workstation performance by:

- Installing additional workstation memory

- Adding a higher-performance video controller and/or more video memory

- Upgrading your hard disk drives

- Installing a higher performance main logic board design

Preparing Your Workstation for Expansion

Before you begin to expand your workstation, refer to Chapter 1, "Beyond Quick Setup," for instructions on preventing component damage from static electricity, disconnecting external devices, and removing the outside cover.

Your Workstation's Components and Connectors

The following sections show your workstation's main logic board, Pentium® II processor module, and adapter card component and connector locations. Use the information presented anytime you need to connect external devices, expand, or upgrade this workstation.

Workstation Components

Figure Legend	Component
A	Door assembly
B	Front access 5¼-inch drive bays
C	3½-inch diskette drive
D	Main Logic Board (MLB)
E	Pentium® II processor module
F	Power supply
G	Internal 3½-inch drive bay(s) (supports IDE, narrow, and wide SCSI hard disk drives)
H	CD-ROM drive
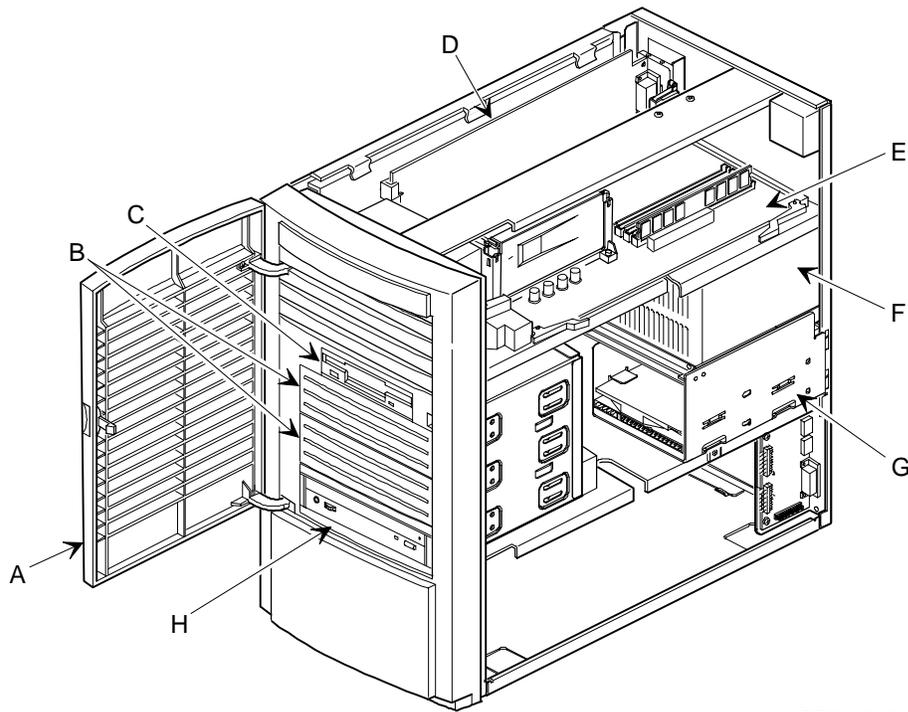
DEC01301-2

Figure 3-1. Workstation Components

Main Logic Board Components

Figure Legend	Component
A	Workstation battery
B	Video memory
C	Permedia P2 graphics/video accelerator
D	Dip switch
E	SCSI controller
F	Workstation flash BIOS
G	Super I/O controller
H	DIGITAL 21143 PCI Ethernet controller
I	Wave table
J	Crystal CS4237 audio controller
K	Intel PIIX4 ISA/IDE/USB controller
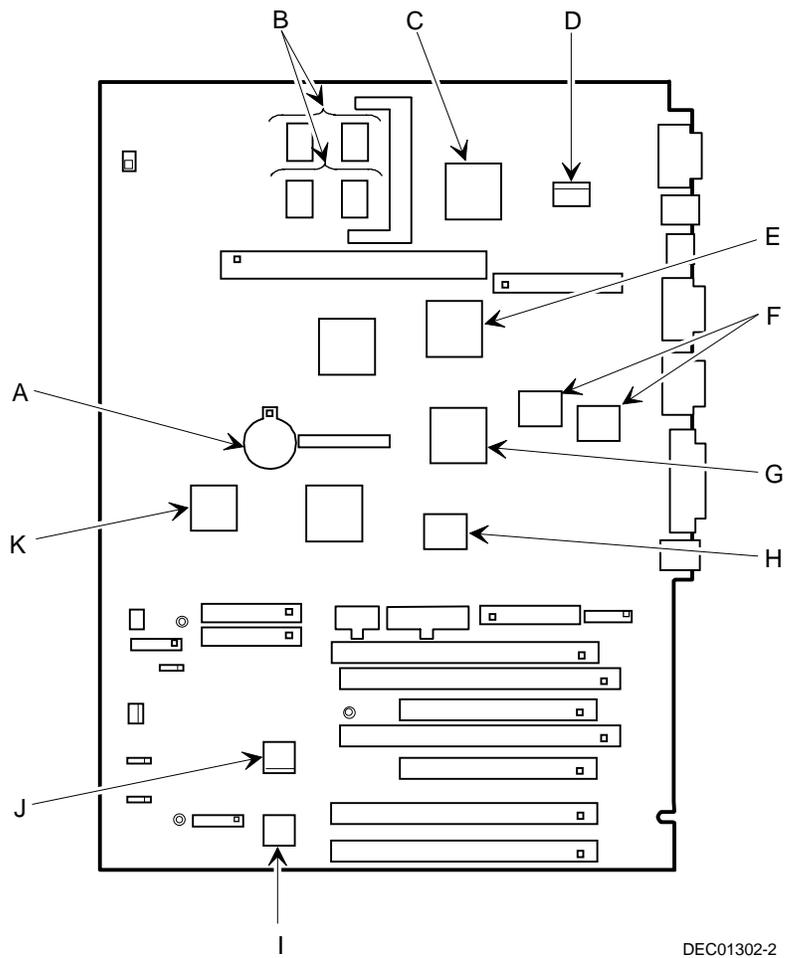
DEC01302-2

Figure 3-2. Main Logic Board Components

Main Logic Board Connectors (Rear Panel)

Figure Legend	Connector
A	Video port
B	Keyboard and mouse ports
C	Two USB ports
D	Two serial ports
E	Parallel port
F	10/100Base-T network port
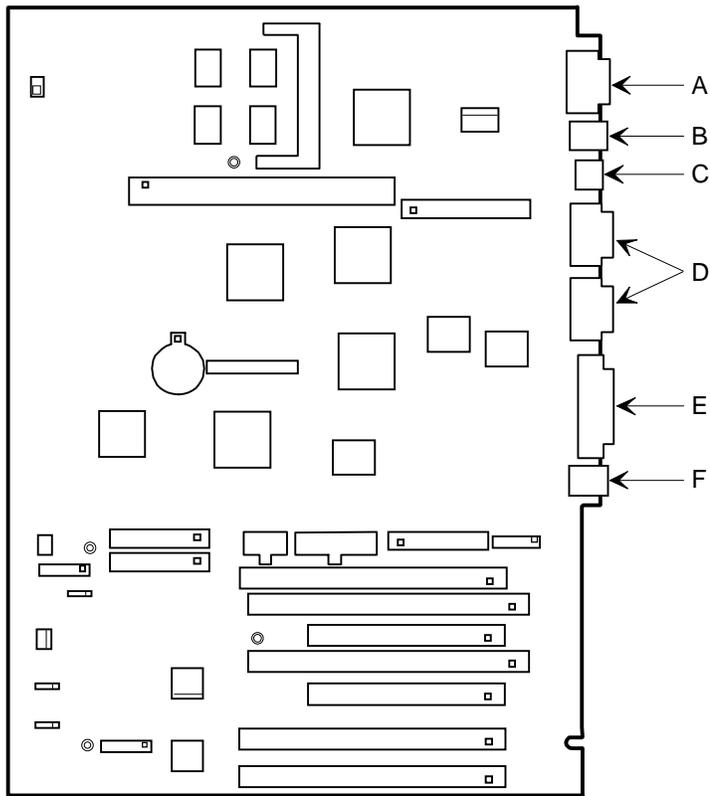
DEC01302-3

Figure 3-3. Main Logic Board Components (Rear Panel)

Main Logic Board Connectors

Figure Legend	Connector
A	Game port/MIDI
B	PCI slot 5
C	PCI slot 4
D	Shared PCI/ISA (slot 3)
E	Shared PCI/ISA (slot 2)
F	PCI slot 1
G	LAN AUI Ext
H	Diskette drive
I	Power connector (5 V dc)
J	Power connector (3.3 V dc)
K	Internal SCSI
L	Secure box connector"
M	SODIMM (video memory)
N	Processor module slot
O	Fan 1
P	Primary IDE drive
Q	Secondary IDE drive (recommended for an installed CD-ROM drive)
R	Fan 2
S	Front panel
T	SCSI LED
U	Audio rear panel connector
V	Fax/modem audio input connector (F/M IN)[1]
W	CD-ROM audio input connector (CD-IN)

(1)   This connector is used for Fax/Modems with speaker phone capabilities.

Short Tower Fax/Modem Audio Input Connector (F/M IN)

Item W, Figure 3-4	Description
Pin 1	Audio in (fax/modem)
Pin 2	Ground
Pin 3	Ground
Pin 4	Microphone in (fax/modem)
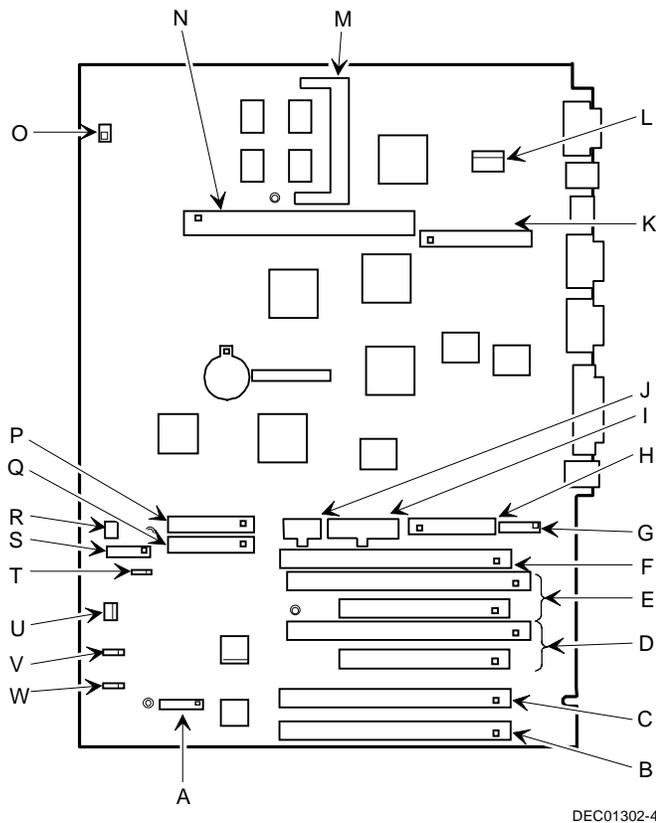
DEC01302-4

Figure 3-4. Main Logic Board Connectors

Pentium® II Processor Module Components and Connectors

Figure Legend	Component/Connector
A	2nd Pentium® II processor Slot 1 or terminator card
B	1st Pentium® II processor Slot 1
C	Intel 440LX PCI/memory controller
D	2nd VRM
E	1st VRM slot
F	Four 168-pin, DIMM, 64-bit SDRAM sockets
G	AGP connector
H	Dip switch for processor settings
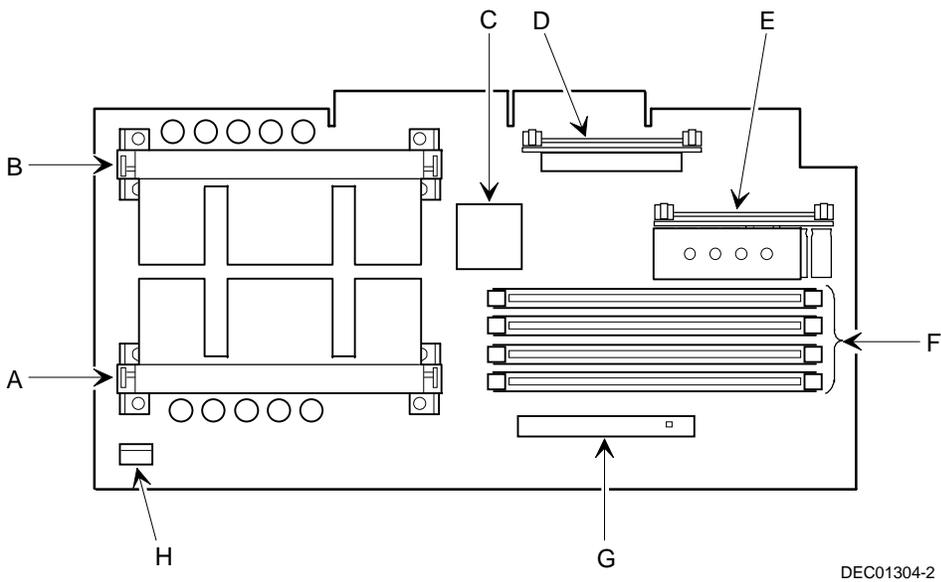
Figure 3-5. Pentium® II Processor Module Component Locations

DEC01304-2

Audio/MIDI/Joystick Adapter Card Connectors

Your DIGITAL Personal Workstation comes with an integrated Crystal sound chip and an audio/MIDI/joystick adapter card installed. This card enables you to connect a MIDI/joystick device and speakers to your workstation.

Figure Legend	Connector
A	Line in
B	Speaker out
C	MIDI port/joystick port

A
B
C
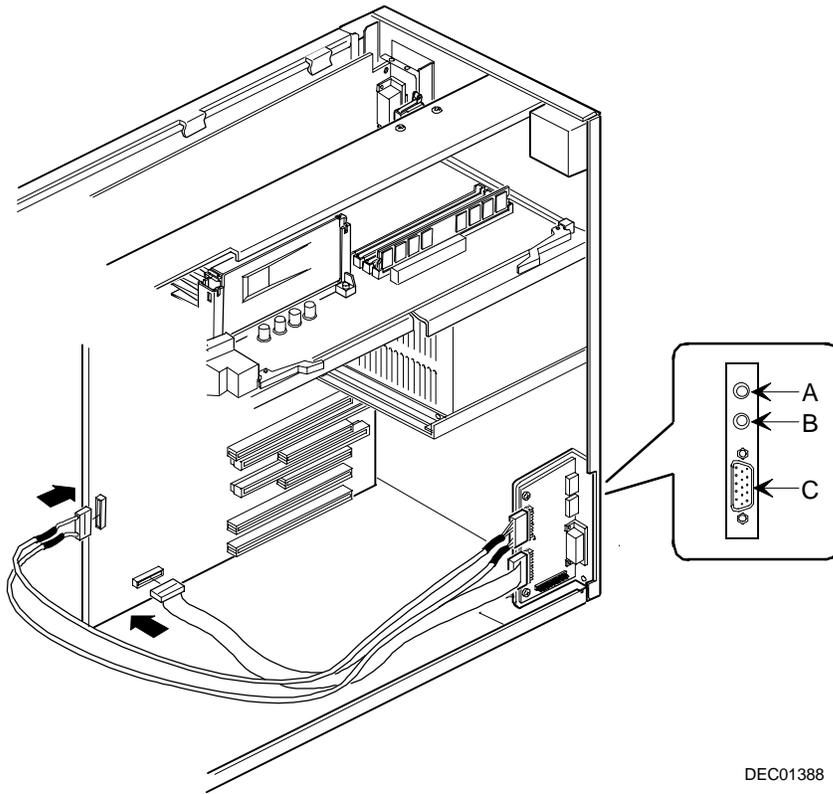
DEC01388

Figure 3-6. Audio/MIDI/Joystick Adapter Card Connectors

Removing the Main Logic Board

To remove the main logic board, follow these steps:

STATIC SENSITIVE: Static electricity collects on non-conductors such as paper, cloth, or plastic. A static discharge can be damaging even though you often cannot see or feel it. To prevent damage to the main logic board:

Touch the metal frame of your workstation to discharge any static electricity.

Keep the main logic board away from non-conductors.

1. Turn off your workstation and monitor.

2. Disconnect all external devices, ac power, and monitor power.

3. Remove the outside cover.

4. Disconnect all internal device cables and then tag them for identification.

5. Remove all expansion boards.

6. Remove the Pentium® II processor module.

   Refer to the next section "Installing a Higher Performance Processor" for information on removing the Pentium® II processor module.

7. Remove the four screws from the expansion board area of the main logic board.

8. Carefully slide the main logic board towards the top and out of the chassis.
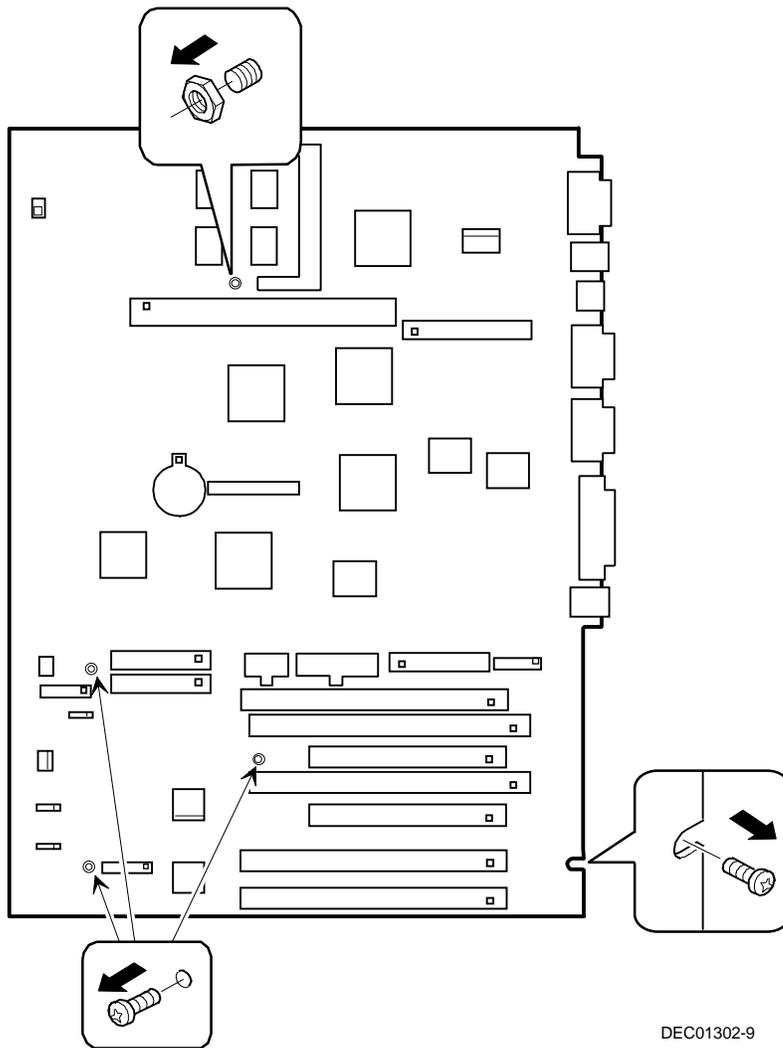
DEC01302-9

Figure 3-7. Removing the Main Logic Board

To replace the main logic board, follow these steps:

STATIC SENSITIVE: Static electricity collects on non-conductors such as paper, cloth, or plastic. A static discharge can be damaging even though you often cannot see or feel it. To prevent damage to the main logic board:

Touch the metal frame of your workstation to discharge any static electricity.

Keep the main logic board away from non-conductors.

1. Carefully install the main logic board into the chassis.

2. Install four screws to secure the main logic board to the chassis. The screw holes are located in the expansion board area of the MLB.

3. Replace the Pentium® II processor module.

   Refer to the next section "Installing a Higher Performance Processor" for information on replacing the Pentium® II processor module.

3. Replace all expansion boards.

4. Connect all internal device cables.

5. Replace the outside cover.

6. Connect all external devices, ac power, and monitor power.

Replacing the Lithium Battery

Your workstation comes with a Lithium 3 V dc wafer-style battery. If your workstation ever fails to retain the correct date, time, or configuration settings when it is turned on, you need to replace the installed device.

To replace the Lithium battery, perform the following:

1. Record the workstation configuration settings using the BIOS Setup utility.

2. Turn off your workstation and monitor.

3. Disconnect all external devices, ac power, and monitor power.

4. Remove the outside cover.

5. Remove the main logic board.

6. Do not pull on the clip. Push the battery out by applying side-ways pressure on the battery as indicated. It will slip out of the battery clip.

 WARNING: There is a danger of battery explosion if a lithium battery is incorrectly replaced. To prevent damage to your workstation, be sure the + side faces up when installing a new battery. Also, be sure you replace the battery with either a DIGITAL (P/N 12-41474-05), Toshiba (P/N CR2032), or equivalent 3 V dc lithium battery.

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

7. To install a new battery, slide the battery in from the side marked "PUSH", without pulling up on the clip. The battery will slide in.

8. Replace the main logic board.

9. Replace the outside cover.

10. Connect all external devices and restore power.

11. Run the BIOS Setup utility to reconfigure your workstation using recorded configuration settings from step 1.

   *Refer to Chapter 2, "Using the BIOS Setup Utility."*
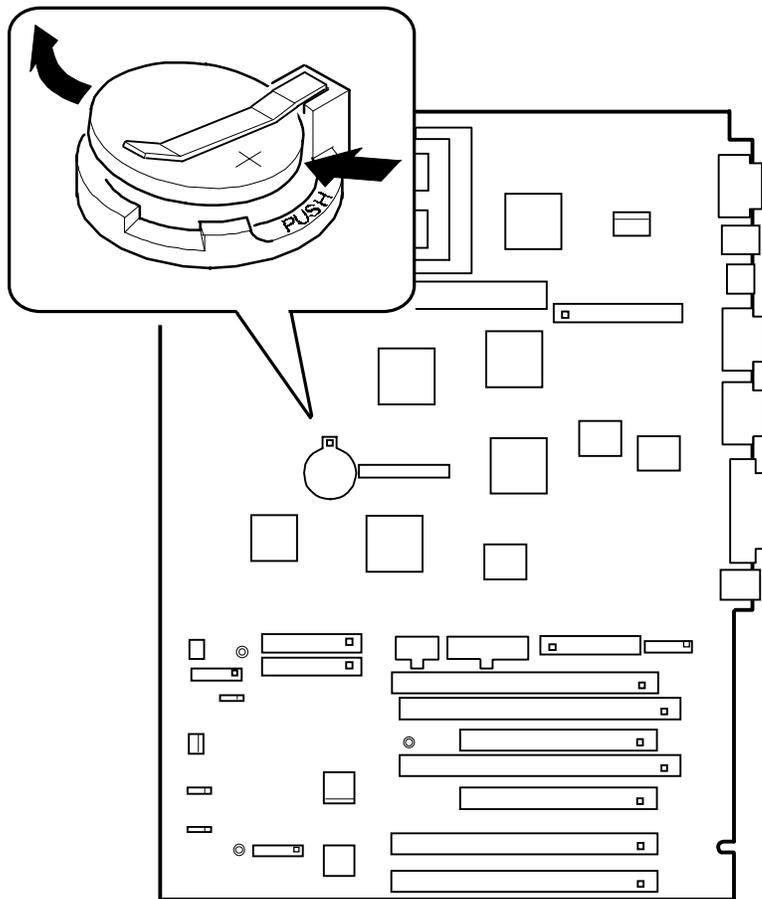
DEC01302-5

Figure 3-8. Replacing the Battery

Installing a Higher Performance Processor

Your workstation is equipped with either a single or dual Intel Pentium® II processor module installed in the appropriate Slot 1 socket on the main logic board. Total workstation performance is based upon your workstation main logic board design, speed and L2 cache of the processor module(s), amount of workstation memory, video controller type and amount of video memory, and performance characteristics of your hard disk drive.

If your workstation was purchased with a single Pentium® II processor and you wish to upgrade to a faster processor, or to a dual processor configuration, consider the following information prior to upgrading your workstation.

1. Your workstation main logic board contains:

   - An Intel 440LX memory and PCI controller

   - Switch selectable processor clock input frequencies up to 533 MHz
     (Refer to Appendix A for switch settings)

2. Single Pentium® II processor modules must be installed in the primary Slot 1 socket (Processor 1) and have a termination card installed in the second Slot 1 socket (Processor 2). The termination card must be removed prior to installing a second processor.

3. Pentium® II processor modules are available with 512 KB L2 cache memory. Dual processor configurations must have matching L2 caches.

4. A VRM must be installed for each Pentium® II processor installed in the Pentium® II processor module.

5. DIGITAL recommends that dual processor configurations use Pentium® II processors with identical stepping (manufacturing revision). Processors with different stepping might not function properly. Stepping information appears during the Power On Self Test (POST) for each processor.

6. Higher performance Pentium® II processors might require loading the latest BIOS firmware revision.

7. Upgrading from a single Pentium® II processor to dual Pentium® II processor configuration requires a reloading of the operating system.

> **NOTE:** Current versions of Windows 95 does not support dual processors. If you wish to upgrade your workstation to a dual processor configuration, you will also need to change operating systems. Microsoft Windows NT 3.51 and 4.0 support dual processors.

Contact your DIGITAL sales representative or reseller for future processor upgrades and BIOS revisions.

To upgrade from a single-processor configuration to a dual-processor configuration:

> **NOTE:** Instructions that accompany your Pentium® II processor Upgrade Kit supersede the directions provided below.

1. Turn off your workstation and monitor.

2. Disconnect all external devices, ac power, and monitor power.

3. Remove the outside cover.

> **STATIC SENSITIVE:** Static electricity collects on non-conductors such as paper, cloth, or plastic. A static discharge can be damaging even though you often cannot see or feel it. To prevent damage to the processor:
>
> •   Touch the metal frame of your workstation to discharge any static electricity.
>
> •   Keep the processor away from non-conductors.

4. Push out on the two plastic ejectors to release the Pentium® II processor module from the main logic board.
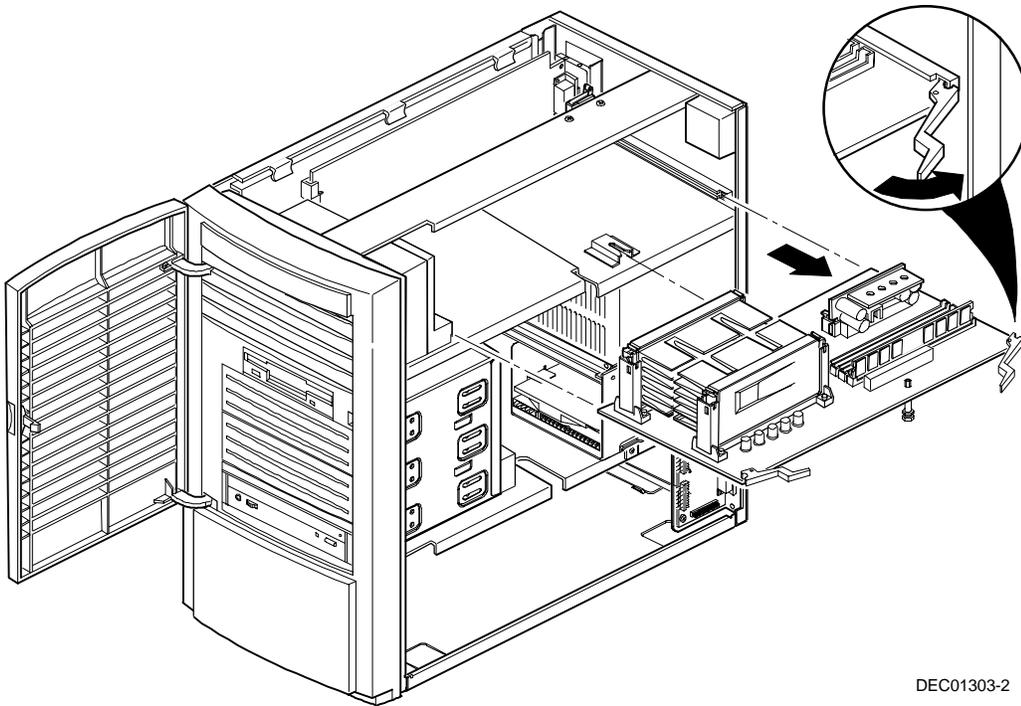
DEC01303-2

Figure 3-9. Removing the Pentium® II Processor Module

5. Remove the terminator card from the Pentium® II processor module (see Figure 3-10). Grasp the terminator by each end and pull up.
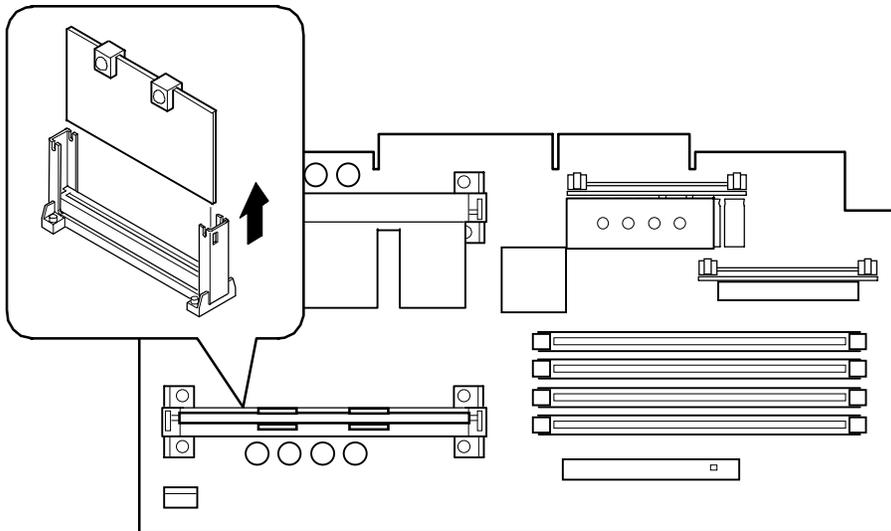
DEC01304-6

Figure 3-10.   Removing the Terminator Module

6. Remove the new Pentium® II processor from its shipping container.

7. Insert the new processor into this slot (see Figure 3-11).

8. Secure the new Pentium® II processor to its socket by pushing out on the two plastic tabs at each side.
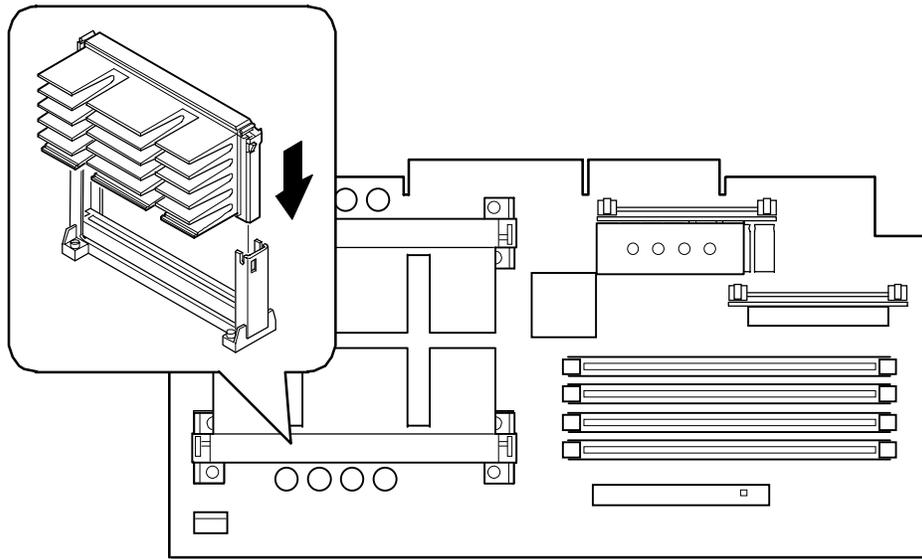
DEC01304-3

Figure 3-11. Installing the Second Pentium® II Processor

9. Remove the new VRM from its shipping container.

10. Install the second VRM into the empty VRM socket (see Figure 3-12).

> **NOTE**: A VRM must be installed for each Pentium® II processor installed in the Pentium® II processor module.
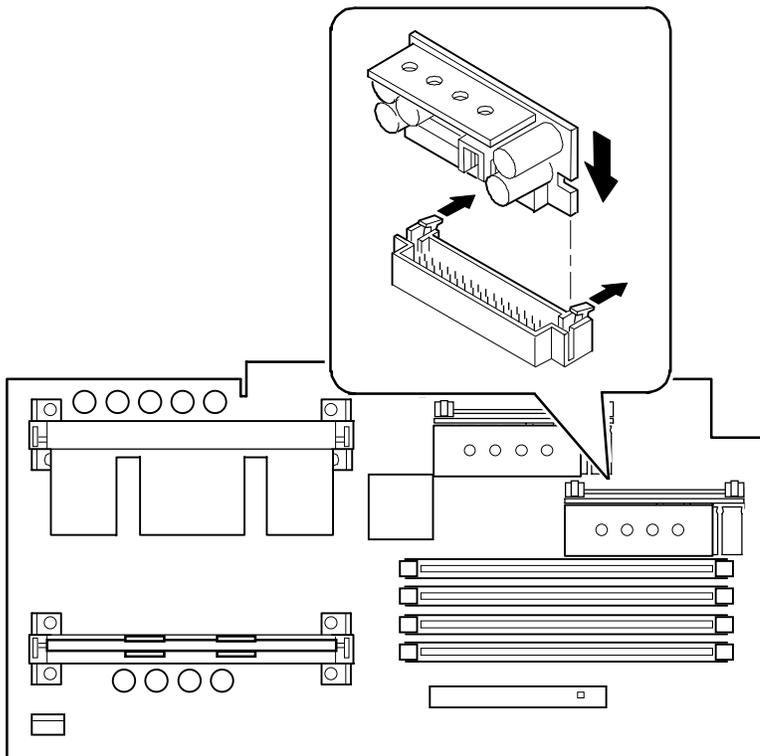
DEC01304-4

Figure 3-12.   Installing a VRM

11. Set all appropriate switch settings on the Pentium® II processor module.

    Refer to Appendix A, "Technical Specifications," for switch location settings with the "Processor Clock Speed Switch Settings" table.

12. Replace the Pentium® II processor module.
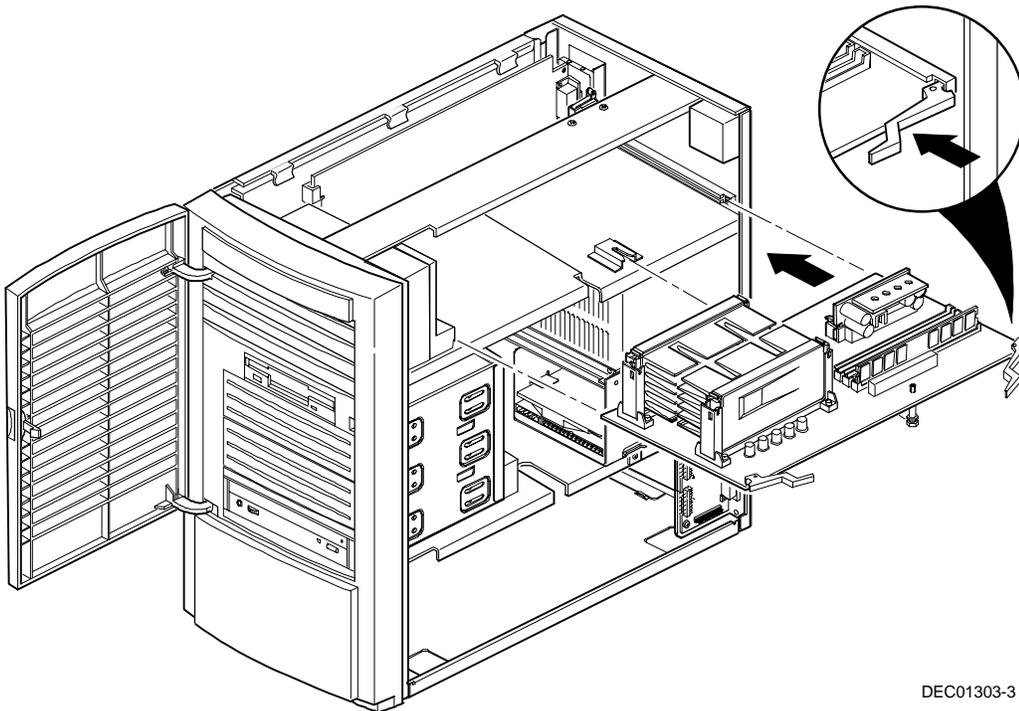
DEC01303-3

Figure 3-13. Replacing the Pentium® II Processor Module

13. Replace the outside cover.

14. Connect all external devices and restore power.

> **NOTE:** A restoration CD-ROM has been supplied with your processor upgrade kit. Use this CD-ROM to install an operating system and a diagnostics program that support a dual processor configuration.
>
> This CD-ROM also contains information on how to obtain a new workstation BIOS.

15. Turn on your workstation and insert the supplied restoration CD-ROM. Once inserted, run the setup program to load the operating system and any additional software.

Operating System Maintenance

After upgrading your processor, check the contents of your processor upgrade kit. Instructions may exist that will detail any changes that need to be made to your Windows NT Operating System, if applicable. If no instructions exist in the kit, then no modifications need to be made.

Memory Expansion 4

Introduction

This chapter provides detailed instructions on installing additional workstation memory on the installed Pentium® II processor module and video memory on the main logic board.

Refer to Chapter 1, "Beyond Quick Setup," information on removing and replacing your workstation's outside cover.

Installing Additional Workstation Memory

Your workstation supports 168-pin DIMM memory modules utilizing Synchronous Dynamic Random Access Memory (SDRAM) technology. SDRAMs operate at speeds of 66 MHz (or greater) over a local memory bus, which is much faster than SIMMs using ECC or EDO memory.

Your workstation came with at least 32 MB of workstation memory. Adding more memory enables your workstation to run larger, more complicated software and run it more quickly. DIMMs are available in 32 MB, 64 MB, and 128 MB memory module sizes to expand your workstation memory up to 512 MB. Contact your local DIGITAL sales representative for ordering information.

Workstation memory is installed using the four DIMM sockets located on the Pentium® II processor module as shown in Figure 4-1. All four DIMM sockets (J18, J19, J20, and J21) accept single or dual sided DIMMs.

When adding memory make sure you reference the memory configuration table and follow these memory expansion guidelines:

- Install 168-pin DIMMs using 83 MHz (or faster), 64-bit SDRAMs.

> **NOTE:** Install DIMMs supplied by Digital Equipment Corporation and qualified vendors. DIGITAL does not support computer performance, product warranty, or service calls resulting from installation of non-qualified DIMMs.
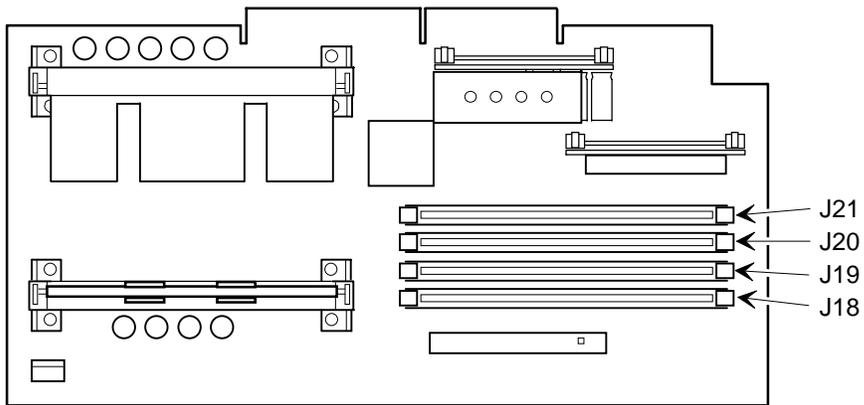
DEC01304-7

Figure 4-1. DIMM Socket Locations

Memory Configurations

Bank 0 (J18)	Bank 1 (J19)	Bank 2 (J20)	Bank 3 (J21)	Total Memory
32 MB				32 MB
64 MB				64 MB
64 MB	32 MB			96 MB
64 MB	64 MB			128 MB
64 MB	32 MB	32 MB		128 MB
64 MB	64 MB	64 MB		192 MB
64 MB	32 MB	32MB	32MB	160 MB
64 MB	64 MB	32 MB	32 MB	192 MB
64 MB	64 MB	64 MB	32 MB	224 MB
64 MB	64 MB	64 MB	64 MB	256 MB
128 MB				128 MB
128 MB	64 MB	32 MB		224 MB
128 MB	128 MB			256 MB
128 MB	128 MB	64 MB	32 MB	352 MB
128 MB	128 MB	128 MB		384 MB
128 MB	128 MB	128 MB	64MB	448 MB
128 MB	128 MB	128 MB	128 MB	512 MB

Table does not list all possible configurations

Installing a DIMM

To install a DIMM, perform the following:

1. Turn off your workstation and monitor.

2. Disconnect all external devices, ac power, and monitor power.

3. Remove the outside cover.

4. Align the notches on the DIMM with the key notches in the socket.

5. Insert the DIMM straight down into the socket as shown.

   Push down firmly on the DIMM until the two plastic clips snap into place.

6. Replace the outside cover.

7. Connect all external devices and restore power.

DEC01096

Figure 4-2. Installing a DIMM

Installing Video Memory

If your workstation came with an integrated Permedia P2 graphics/video accelerator, it includes 4 MB of SGRAM video memory on the main logic board. You can upgrade to 8 MB of video memory by installing an optional 4 MB SGRAM daughter card on the main logic board.

> **NOTE:** If your workstation came with a Permedia P2 graphics/video acceleration expansion board, refer to the documentation that came with the board for video memory upgrade procedures.

To install an optional video memory daughter card:

1. Turn off your workstation and monitor.

2. Disconnect all external devices, ac power, and monitor power.

3. Remove the outside cover.

4. Install the optional video memory daughter card.

> **CAUTION:** Make sure the daughter card connector is correctly aligned with the mating connector on the main logic board. Incorrect installation can cause faulty workstation operation.

5. Replace the outside cover.

6. Connect all external devices and restore power.

Memory Expansion
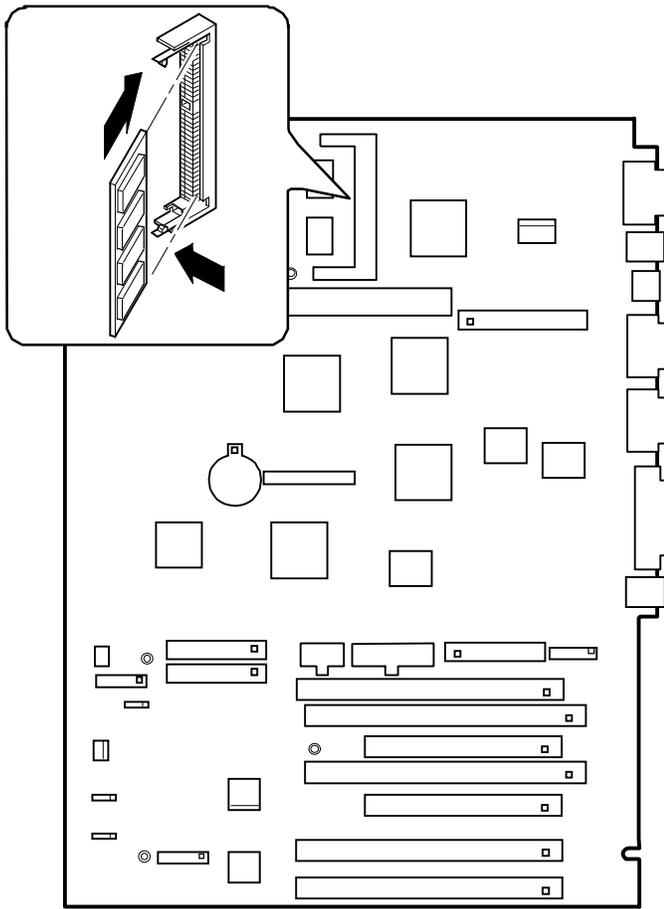
DEC01302-6

Figure 4-3. Video Memory Installation

Adding Expansion Boards 5

Introduction

All DIGITAL Personal Workstation expansion slots are located on the main logic board except for AGP. This chapter describes the location of these slots and provides detailed instructions on installing ISA and PCI expansion boards.

Plug and Play technology eliminates the process of manually configuring optional expansion boards for operation in your workstation. With Plug and Play, your workstation's BIOS, operating system, and hardware logic built into expansion boards work to automatically assign interrupt requests (IRQs), I/O and memory addresses, and DMA channels for optimum performance.

Expansion Slots

Your DIGITAL Personal Workstation main logic board contains five slots for installing:

- Two ISA expansion boards and three PCI expansion boards

  or

- Five PCI expansion boards (refer to the table)

    CAUTION: If applicable, your video expansion board should be installed in a primary PCI slot. Failure to do this can result in poor video performance or no video at all.

Expansion Slot Designation	Slot Type	Description	Rear Panel Slot Designation
PCI1	Primary - non shared	Supports half-length 32-bit PCI local bus expansion boards.	Slot 1
		Uses the 1st (top) expansion slot at the rear panel	
ISA1		Supports full-length industry standard 16-bit ISA expansion boards. Uses the 2nd from the top expansion slot at the rear of the panel.	Slot 2
		Designated as a shared slot with PCI2.	
PCI2	Primary - shared	Supports full-length industry standard 32-bit PCI local bus expansion boards.[1]	
		Uses the 3rd from the top expansion slot at the rear of the panel.	
		Designated as a shared slot with ISA1.	
ISA2		Supports full-length industry-standard 16-bit ISA expansion boards.[2]	Slot 3
		Uses the 4th from the top expansion slot at the rear of the panel.	
		Designated as a shared slot with PCI3	
PCI3	Secondary - shared	Supports full-length industry standard 32-bit PCI local bus expansion boards.[1]	
		Uses the 4th from the top expansion slot at the rear panel .	
		Designated as a shared slot with ISA2.	
PCI4	Secondary	Supports full-length industry 64-bit PCI local bus expansion boards.	Slot 4
		Uses the 5th from the top expansion slot at the rear of the panel.	

(1) Only one expansion board can reside in slots PCI2 or PCI3 and ISA1 or ISA2 at any one time. These slots have to share the second and third expansion openings at the rear panel, thus a maximum of five expansion boards can be supported at one time.

(2) PCI2 is recommended as the best slot for full-length optional video cards. This slot is recommended because of fewer obstructions and better clearance for the longer card.

continued

| Expansion Slot Designation	Slot Type	Description	Rear Panel Slot Designation
PCI5	Secondary	Supports full-length industry 64-bit PCI local bus expansion boards. Uses the 6th from the top expansion slot at the rear of the panel.	Slot 5
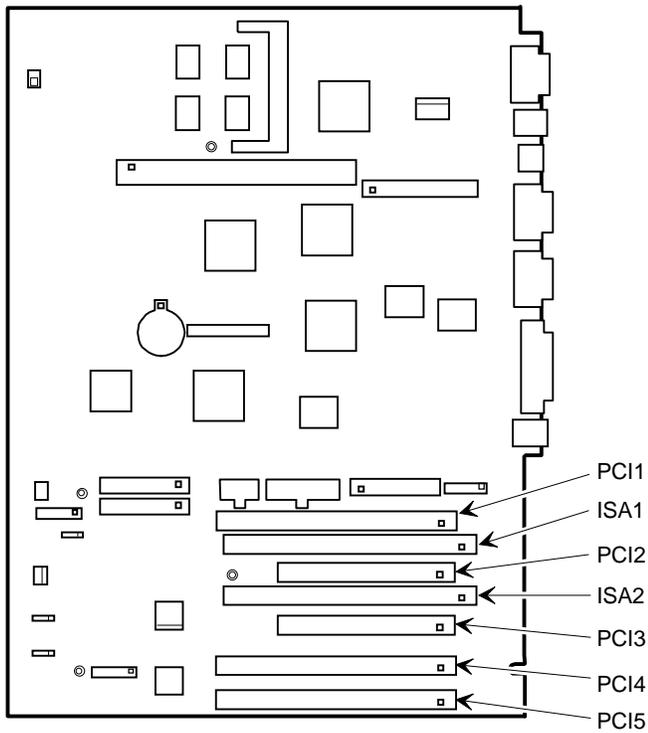
DEC01302-7

Figure 5-1. Expansion Board Slots

Installing Expansion Boards

To install an ISA or PCI local bus expansion board:

NOTE: Read and fully understand your optional expansion board's documentation before installing it.

Do not install non-Plug and Play expansion boards until you have run the ICU to determine what configuration the ICU recommends. Configure any jumpers on the expansion board and then install the expansion board.

1. Turn off your workstation and monitor.

2. Disconnect all external devices, ac power, and monitor power.

3. Remove the outside cover.

4. Remove rear audio adapter.

5. Unscrew the metal filler plate(s) from the selected expansion slot.

STATIC SENSITIVE: Static electricity collects on non-conductors such as paper, cloth, or plastic. A static discharge can be damaging even though you often cannot see or feel it. To prevent damage to an expansion board:

Touch the metal frame of your workstation to discharge any static electricity.

Keep all expansion boards away from non-conductors.
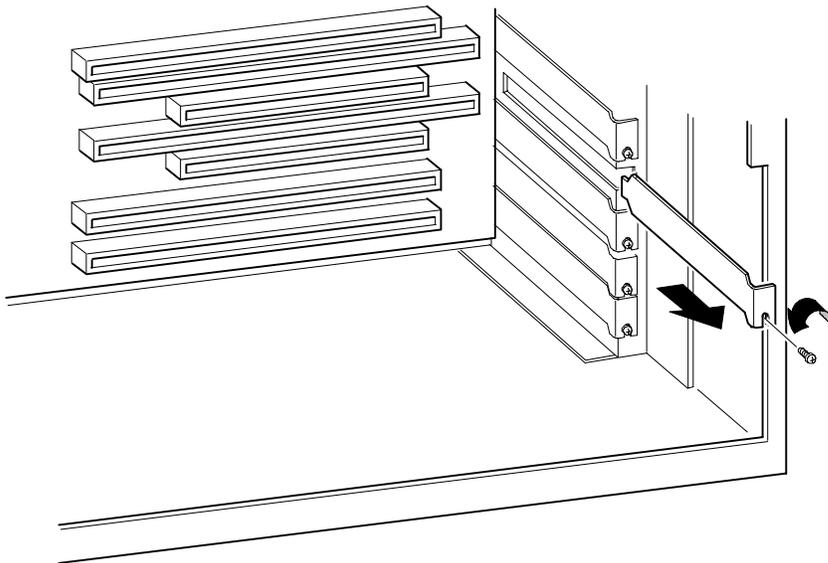
DEC01386-2

**Figure 5-2. Removing a Metal Filler Plate**

6. Insert the new expansion board into the socket.

    Push the expansion board firmly into place.

7. Secure the expansion board to the slot with the screw removed in step 5.

8. Replace the outside cover.

9. Connect all external devices and restore power.
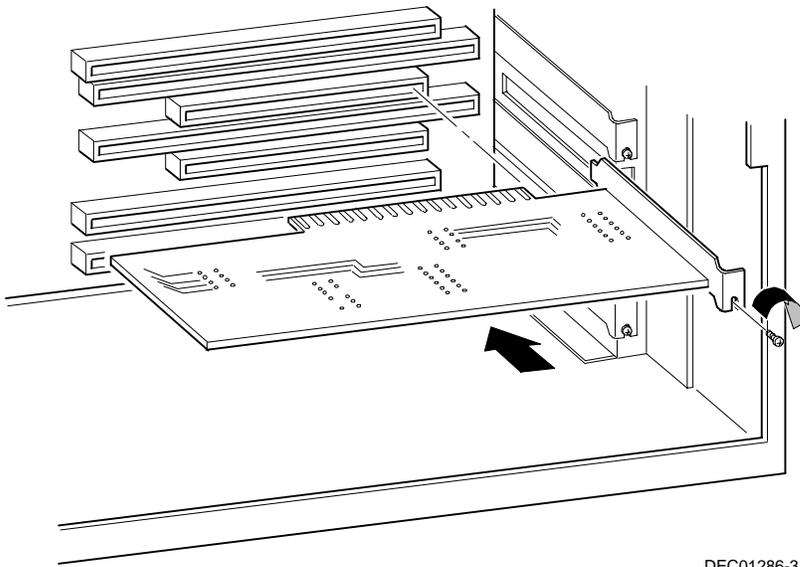
DEC01286-3

Figure 5-3. Installing an Expansion Board

Adding Mass Storage Devices *6*

Introduction

This chapter provides detailed information on installing mass storage devices, such as another hard disk drive, a tape drive, or another diskette drive. This chapter also describes how to connect diskette, IDE, and SCSI mass storage devices after installation. Note that these installation instructions are referenced as looking from the front of the workstation to the rear.

> **NOTE:** Your workstation's software supports hard disk drives utilizing Self-Monitoring Analysis Technology (S.M.A.R.T.). Using S.M.A.R.T. IDE devices helps you monitor disk drive operation and provides early detection of a potential disk failure.

Before adding mass storage devices to your workstation, review the following installation guidelines:

1. Refer to the manufacturer's instructions for your device to determine if switches or jumper settings need to be set or installed on the device. Set all switches and jumpers accordingly before installing the device.

2. Select an available drive bay and then install the device as instructed in the following sections of this manual.

3. Connect the device to an appropriate interface ribbon cable connector as described in the following sections. Also consider the following cabling guidelines:

   – Your workstation has two Enhanced IDE (EIDE) drive interface connections labeled "primary" and "secondary" located on the workstation's main logic board.

   – Each IDE drive interface connector supports a maximum of two IDE devices.

   – If only one IDE device is connected to the primary or secondary IDE interface, then the IDE device must be attached to the outermost ribbon cable connector.

   – When adding a second IDE hard disk drive to the primary IDE interface, configure the drive for "slave" operation.

   – ATAPI storage devices such as CD-ROM and tape backup drives must be connected to the secondary IDE interface. If the ATAPI drive is the only device installed on the secondary interface, configure the drive for "master" operation. If a hard disk drive is also connected to the secondary IDE interface, then configure the ATAPI drive for "slave" operation.

   NOTE: ATAPI storage devices might require installation of special device drivers. Refer to the manufacturer's instructions for more information.

   – The 3½-inch diskette drive installed in your workstation has its device ID set to 0.

4. Run the BIOS Setup utility to configure your workstation so it recognizes the newly installed mass storage devices.

    Also, depending on which operation system is installed on your workstation, you might be prompted to perform additional installation procedures for CD-ROM or tape backup devices.

5. Refer to your operating system documentation for information on formatting hard disk drives and/or creating disk partitions.

Installing Mass Storage Devices

All DIGITAL Personal Workstation contain six mass storage device bays:

*   The top device bay contains a factory installed 3½-inch diskette drive.

*   The second device bay contains a factory installed CD-ROM.

*   The third and fourth device bays can hold a 5¼-inch (1-inch or 1.6-inch half-height device. For example, a diskette, tape backup unit, or hard disk drive.

*   The internal device bay is not accessible from the front of any workstation and contains a factory installed, low-profile (1-inch high), 3½-inch hard disk drive. This device bay also has room to install a second low-profile (1-inch high), 3½-inch hard disk drive.

The following procedures and illustrations show a base DIGITAL Personal Workstation configuration. Your specific drive bay configurations and storage devices might vary.

> **NOTE:** After market hard disk drives should come with instructions, a manual, and an Installation Kit that should include mounting rails. Contact your "Peripheral Reseller" to determine if an Installation or Hard Disk Drive Mounting Kit is included with your hard disk drive.

Removing the Front Bezel

To install a device into the front bays, the front workstation bezel must be removed. The following procedures describe how to remove the front bezel.

1. Turn off your workstation and monitor.

2. Disconnect all external devices, ac power, and monitor power.

3. Remove the outside cover.

4. From the top of the workstation, looking down towards the bottom of the front of the chassis, you should see two tabs from the front bezel that hold the bezel in place and secure it to the chassis. Find both tabs (one on the left and one on the right).

5. By pushing on both of these tabs towards the center of the workstation, you can release the top of the bezel.

6. Gently pull the top of the bezel approximately an inch away from the top of the chassis.

7. Gently but firmly, pull up on the bezel to detach the bottom bezel mounts.

8. At this time you might want to remove the bezel door for your particular usage environment.

   Refer to "Removing the Front Bezel Door" in chapter 1 for directions on how to remove the front bezel door.
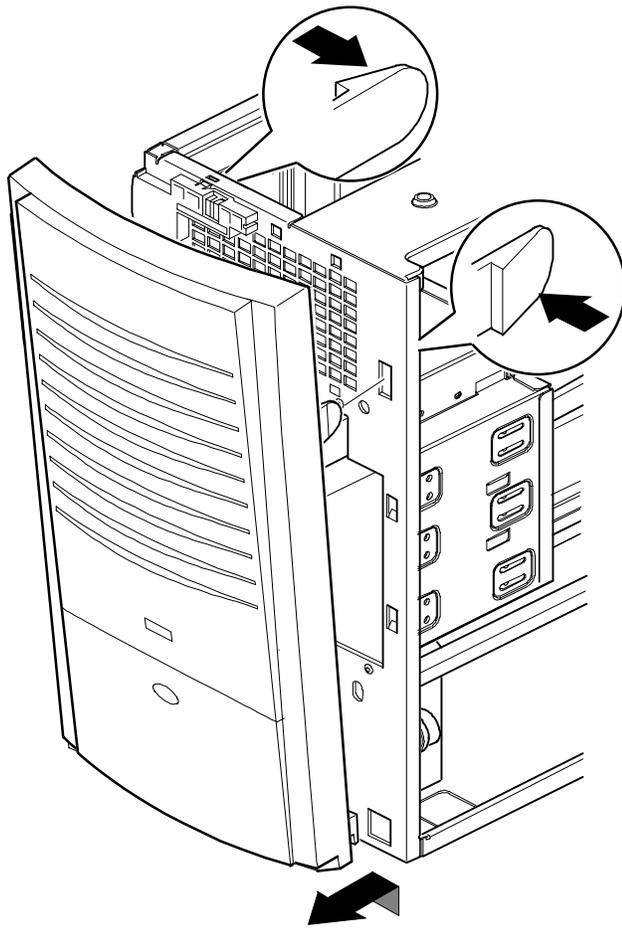
DEC00758-10

Figure 6-1. Removing the Front Bezel

Installing a 3½-Inch Device into a Front Device Bay

The following procedures describe how to install 3½-inch device into a front-access device bay.

> **NOTE:** Refer to the manufacturer's instructions for your device to determine if switches or jumper settings need to be set or installed on the device. Set all switch and jumper settings accordingly.

1. Turn off your workstation and monitor.

2. Disconnect all external devices, ac power, and monitor power.

3. Remove the outside cover.

4. Remove the front bezel (see Figure 6-1).

5. Remove the EMI shield filler plate.

6. Remove the drive rail from the inside of the chassis drive bay.

7. Install the brackets and drive rail onto the 3½-inch device (see Figure 6-2).
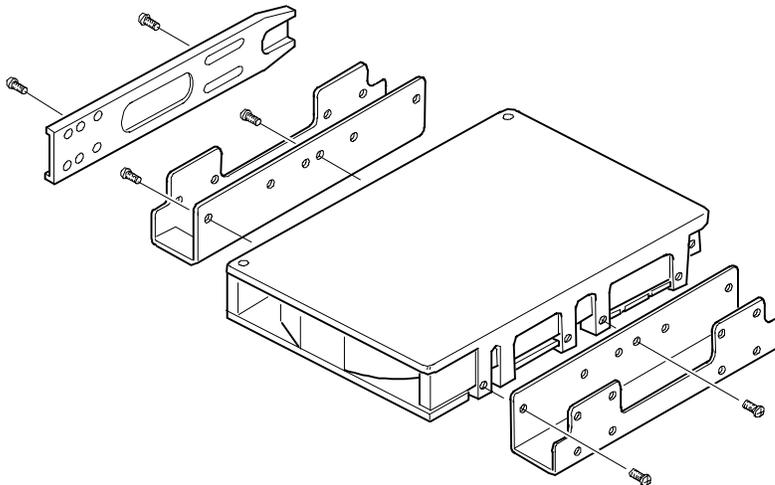
DEC00723

**Figure 6-2. Installing Drive Rail and 3½-Inch Device Brackets**

8. Carefully slide the 3½-inch device into the device bay.

    Secure the device using the supplied mounting screws.

9. Connect the power and data cables to the 3½-inch device.

    Refer to "Connecting Diskette and IDE Devices" later in this chapter.
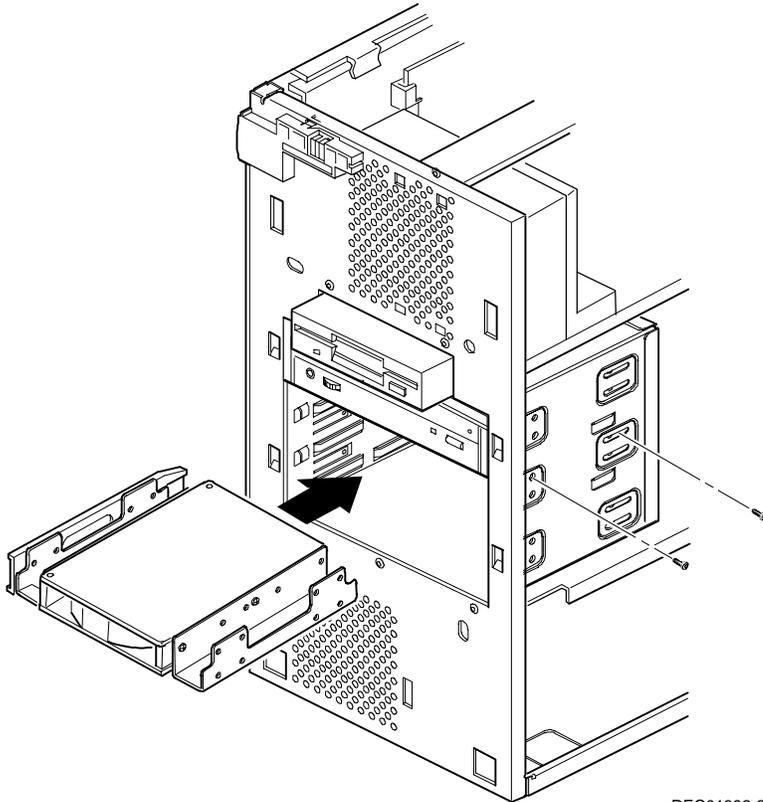
DEC01392-8

Figure 6-3. Installing a 3½-Inch Device

Installing a 5¼-Inch Device Into a Front Device Bay

The following procedures describe how to install 5¼-inch device into a front-access device bay.

> **NOTE:** Refer to the manufacturer's instructions for your device to determine if switches or jumper settings need to be set or installed on the device. Set all switch and jumper settings accordingly.

1. Turn off your workstation and monitor.

2. Disconnect all external devices, ac power, and monitor power.

3. Remove the outside cover

4. Remove the front bezel (see Figure 6-1).

5. If necessary, remove the filler panel from the front bezel.

6. Remove the EMI shield filler plate (if applicable).

7. Remove the drive rail from the inside of the chassis.

8. Using the supplied drive rail and mounting screws, install the 5¼-inch device into the appropriate device bay.

DEC01392-9
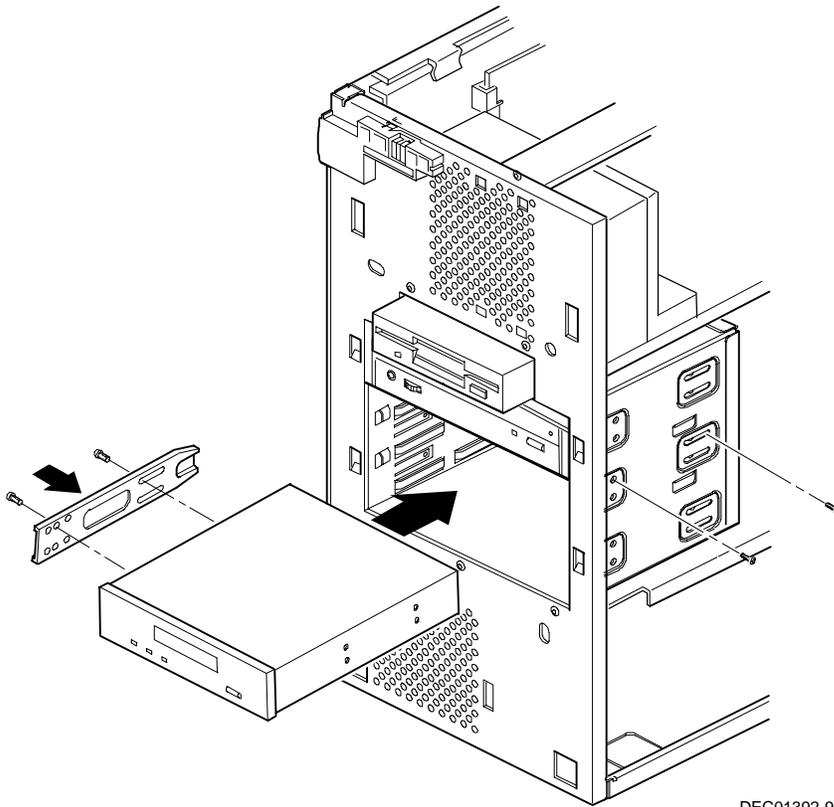
Figure 6-4. Installing 5¼-Inch Device

9. If necessary, replace the filler panel.

10. Connect power and data cables to 5¼-inch device.

   *Refer to "Connecting Diskette and IDE Devices" later in this chapter.*

Installing a 3½-Inch Device into the Internal Device Bay

The following procedures describe how to install a low profile, 1-inch high, 3½-inch mass storage device into the internal device bay.

NOTE: Refer to the manufacturer's instructions for your mass storage device to determine if switches or jumper settings need to be set or installed on the device. Set all switch or jumper settings accordingly.

1. Turn off your workstation and monitor.

2. Disconnect all external devices, ac power, and monitor power.

3. Remove the outside cover.

4. Disconnect the data and power cables from the installed hard disk drive.

   Refer to "Connecting Diskette and IDE Devices" later in this chapter.

5. Remove the two screws securing the device bay to the chassis.

6. Swing the device bay away from the chassis to gain access to the upper bay.
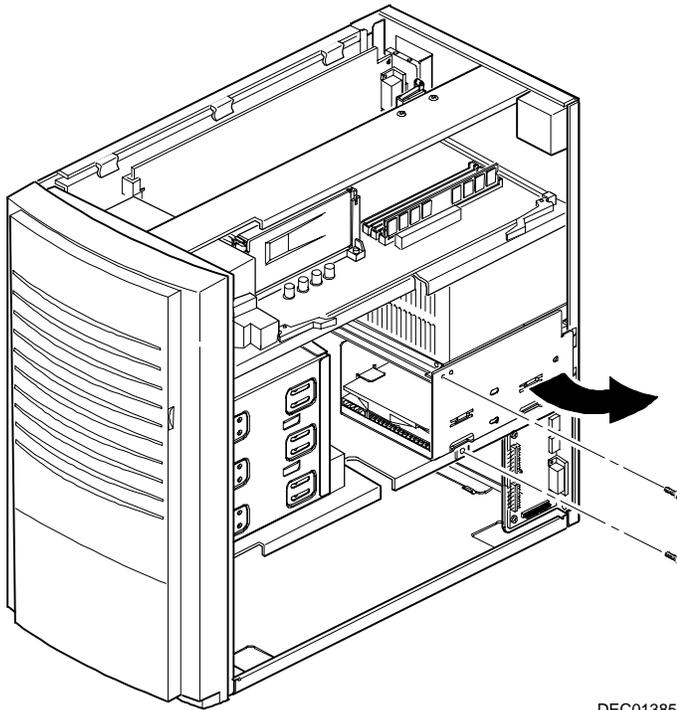
DEC01385

Figure 6-5. Accessing the Internal 3½-Inch Device Bay

7. Attach the 3½-inch device to the internal 3½-inch device bay.

   Secure the device using the supplied mounting screws.
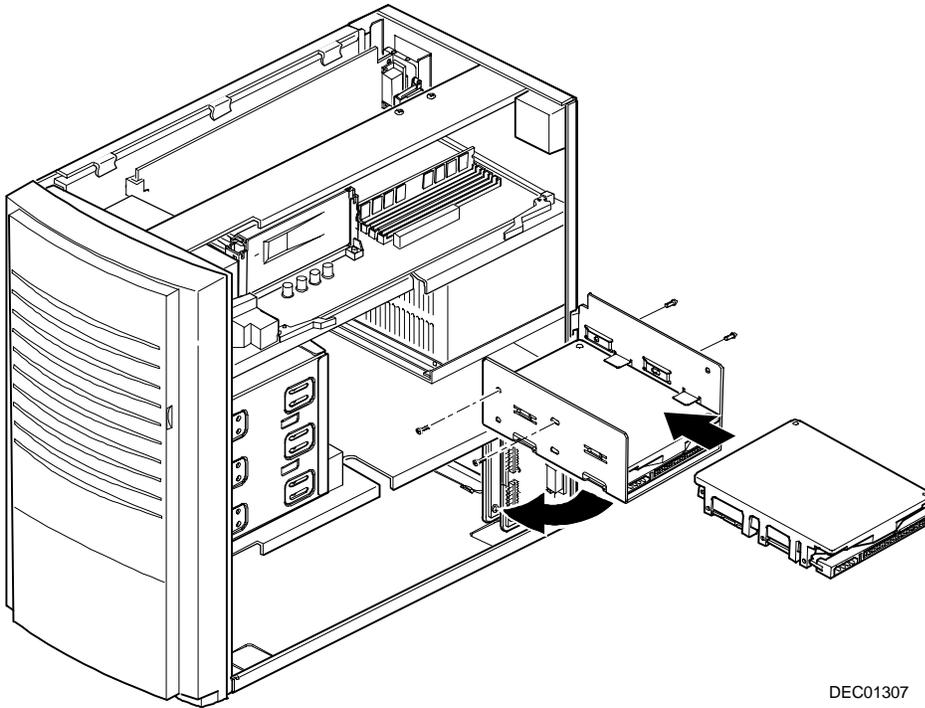
DEC01307

Figure 6-6. Attaching a 3½-Inch Device to the Internal 3½-inch Device Bay

8. Secure the internal 3½-inch device bay to the chassis using the screws
   removed in step 5.

9. Connect the power and data cables.

   Refer to "Connecting Diskette and IDE Devices" later in this chapter.

Connecting Diskette and IDE Devices

To connect a diskette or IDE device, perform the following:

1. Connect the supplied ribbon cable to the device as shown in Figure 6-7 and 6-8.

   NOTE: If only one IDE device is installed, make sure you use the ribbon cable connector furthest from the main logic board connector.

   Make sure the cable is connected with the correct orientation. Most cables and sockets are keyed so you cannot connect them backwards. If your cable or device is not keyed, you must connect pin 1 of the cable to pin 1 of the device's socket.

   Pin 1 of the cable is on the edge with the colored stripe. Pin 1 of the device's socket should be marked with a number or symbol at one end of the socket or with a number or symbol printed on the circuit board near one end of the socket. If necessary, refer to the device's documentation for pin 1 orientation.

2. Connect a power cable to the device.

3. Replace the outside cover.

4. Connect all external devices and restore power.

5. Run the BIOS Setup utility to configure your workstation.

   Refer to Chapter 2, "Using the BIOS Setup Utility."

Figure Legend	Diskette Drive Component
A	Power connection
B	Diskette drive
C	Diskette drive connections
D	Diskette drive connection
E	Power supply
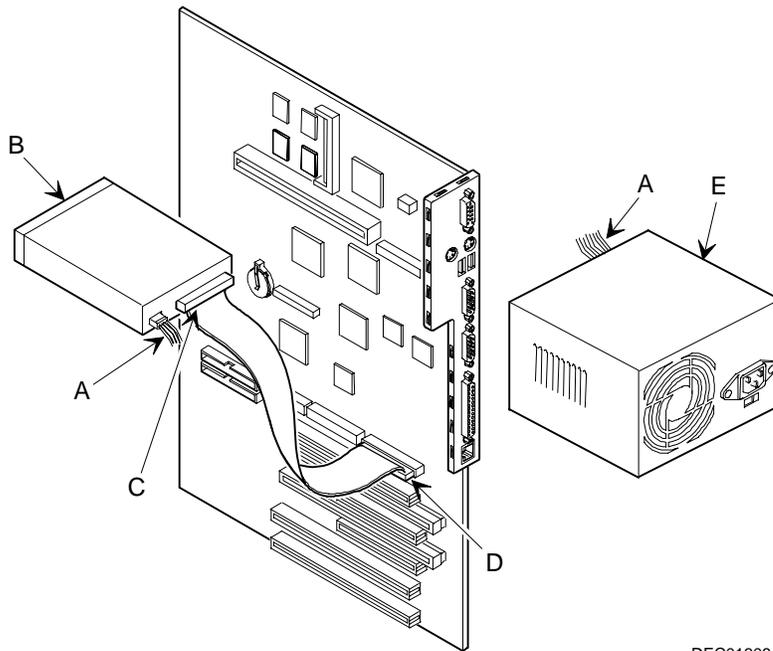
DEC01308

Figure 6-7. Diskette Device Data Cable Connections

Figure Legend	IDE Drive Component
A	IDE drive connection (primary)
B	Power connections
C	Power supply
D	Primary IDE hard disk drive
E	Primary IDE hard drive connection
F	IDE drive connection (secondary)
G	Secondary IDE hard disk drive connections
H[1]	CD-ROM drive

(1) The CD-ROM drive is connected to the secondary IDE port and configured as a master drive.
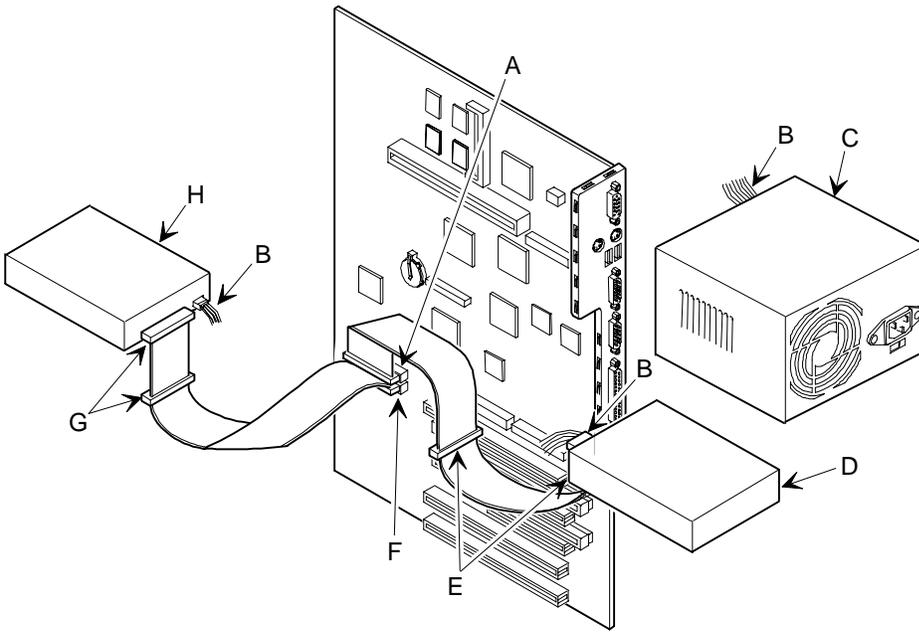
DEC01309

Figure 6-8. IDE Device Data Cable Connections

Connecting SCSI Devices

Your DIGITAL Personal Workstation comes with an ultra-wide SCSI controller integrated on the main logic board. Ultra-wide SCSI HDDs provide a performance advantage over EIDE HDDs. Your DIGITAL Personal Workstation supports up to five internal SCSI devices. Additional SCSI devices can be added to your workstation by using an optional SCSI adapter's external connector. The integrated SCSI controller supports up to 16 devices, however, they must be internal devices. If you wish to make some of these devices "external," you must purchase a PCI to SCSI add-in adapter.

Contact your DIGITAL sales representative for ordering such an adapter.

The SCSI controller supports industry-standard 16-bit, 68-pin Wide/Ultra-wide 68-pin SCSI devices. Ultra-wide SCSI devices support up to a 40-Mbps burst transfer rate. Your workstation has been supplied with a 68-pin wide SCSI ribbon cable installed at the factory. If you need a 50-pin narrow SCSI connection, use a 68-pin to 50-pin conversion cable .

Contact your DIGITAL sales representative for ordering information on SCSI cables and devices.

Your workstation configuration, SCSI controller, and all SCSI devices must work together for optimum performance. Use the following guidelines to configure your workstation and all SCSI devices.

- Fast and wide SCSI supports up to 16 devices.

- Each SCSI device attached to the SCSI controller (including the SCSI controller) must have a unique SCSI ID. SCSI controllers usually default to SCSI ID 7. Use SCSI ID 0 through 6 (narrow devices) and 0 through 15 (wide and ultra-wide devices) for the remaining SCSI devices. Hard disk drives should be configured to start with SCSI ID 0 and the lower ID numbers.

- Narrow devices on a wide cable count as two SCSI IDs. For example, if the narrow CD-ROM drive is SCSI ID 4, the SCSI ID 12 is no longer available. The narrow CD-ROM device counts as two devices on a 16-bit wide data path.

- Both ends of the SCSI bus must be properly terminated. Your SCSI controller comes with its SCSI terminators enabled. This properly terminates the SCSI controller (the first device in the SCSI bus). The supplied SCSI ribbon cable is equipped with an active SCSI terminator installed at the end of the cable (the last device in the SCSI bus).

- SCSI device drivers are required to operate your SCSI devices. These device drivers have been factory installed for your factory installed SCSI devices. You must install device drivers for the SCSI devices that you add.

  Refer to the supplied System Software Manual if you need more information about the factory installed SCSI device drivers.

- Run the SCSI configuration utility to change host adapter settings to fit your specific configuration. You can start the SCSI configuration utility by pressing [Alt] + [Q] at the prompt during workstation boot.

To connect SCSI devices, perform the following:

1. Connect the supplied ribbon cable to the appropriate device(s) as shown in Figure 6-9.

    Make sure the cable is connected with the correct orientation. Most cables and sockets are keyed so you cannot connect them backwards. If your cable or device is not keyed, you must connect pin 1 of the cable to pin 1 of the device's socket.

    Pin 1 of the cable is on the edge with the colored stripe. Pin 1 of the device's socket should be marked with an arrow at one end of the socket. If necessary, refer to the device's documentation for pin 1 orientation.

2. Connect a power cable to the device.

3. Replace the outside cover.

4. Connect all external devices and restore power.

5. If you want to fine tune some SCSI settings, you can use the SCSI configuration utility to configure your workstation by pressing [Alt] + [Q] when the BIOS banner appears during the boot process.

Figure Legend	Component
A	CD-ROM drive (or other SCSI device)
B	Power connection
C	Single-ended active terminator
D	SCSI connectors
E	SCSI hard disk drive
F	SCSI controller connector (68-pin)
G	Power supply
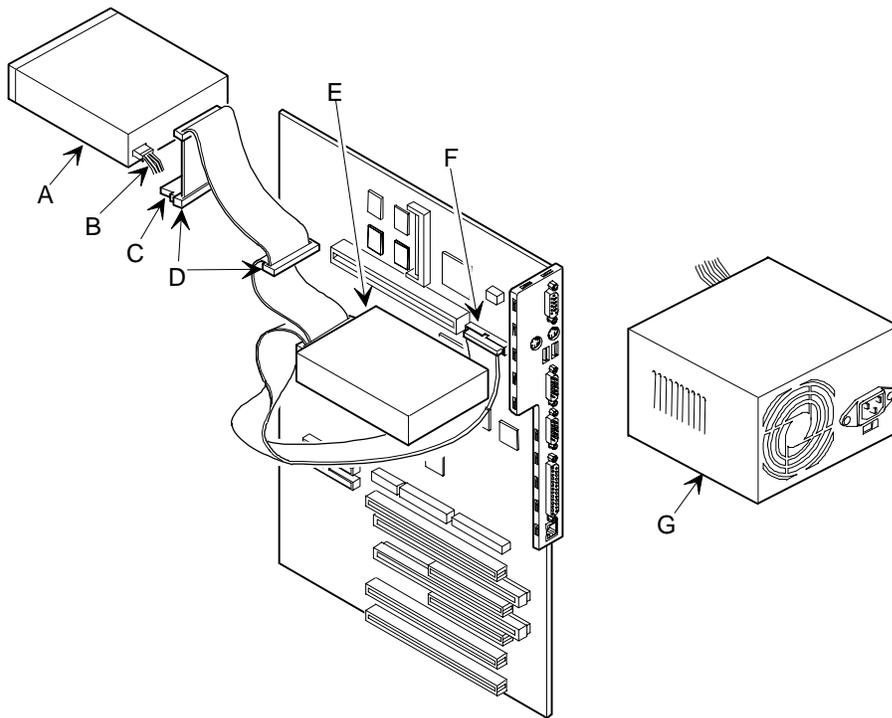
DEC01310

Figure 6-9. SCSI Device Data Cable Connections

Technical Specifications A
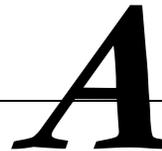
Introduction

This appendix provides information about the technical characteristics of the DIGITAL Personal Workstation.

- Workstation specifications
- ISA and PCI expansion slots
- Power supply and input power
- Nominal current requirements
- Power supply and power cord requirements
- Main logic board switch settings
- If you forget your password

Workstation Specifications

The following sections list your workstation's performance, dimensions, and environmental specifications.

Features

Feature	Specification		
Cache	32 KB	L1 I-cache	16 KB(1)
		L1 D-cache	16 KB(1)
	512 KB	L2 cache 512 KB	
Network	Single-chip controller for 32-bit PCI bus		
	Factory shipped with 10/100Base-T standard		
Audio	Crystal single-chip controller with 16-bit stereo audio		
SCSI	QLogic Ultra-wide SCSI controller		

(1) Located on the Pentium® II processor

Performance Specifications

Attributes	Specification
ISA clock	8.33 MHz
PCI clock	33 MHz
Data I/O	
ISA	8-bit and 16-bit
PCI	32-bit and 64-bit
Workstation memory	64 MB standard, expandable up to 512 MB, using 128 MB DIMMs
Workstation BIOS	4 Mb Flash ROM

Dimensions

Dimension	Specification
Width	215.9 mm (8.5 in.)
Depth	444.5 mm (17.5 in.)
Height	406.4 mm (16.0 in.)
Weight	15.2 kg (33.6 lb) (1)

(1) Your workstation's weight might vary depending upon your specific configuration.

Shipping/Packaging Dimensions

Dimension	Specification
Width	600.94 mm (23.66 in.)
Depth	508 mm (20 in.)
Height	415.54 mm (16.36 in.)
Weight	17.7 kg (39.02 lb)

Environmental Specifications

Attributes	Specification
Operating temperature	10 °C to 40 °C (50 °F to 104 °F)
Storage temperature	−40 °C to 66 °C (−40 °F to 150.8 °F)
Operating humidity (noncondensing)	10% to 90% relative humidity, maximum wet bulb 40 °C (104 °F)
Storage humidity (noncondensing)	10% to 95% relative humidity, maximum wet bulb 65 °C (149 °F)
Altitude Operating	3,048 m (10,000 ft) max., max temp = 22.5 °C (72.5 °F)
Nonoperating	12,192 m (40,000 ft) max., max temp = 21 °C ~ 23 °C (69.8 ~ 73.4 F
Shipping vibration	IAW Federal Standard 101, method 5019
Nonoperating shock	30 G, 25 ms halfsine

ISA Expansion Slots

The maximum available +5 V dc current allowable to any ISA expansion slot depends upon the following parameters:

- Power supply capacity

- The +5 V dc requirements of the main logic board

- The +5 V dc requirements of the peripherals

- The power demands of all other slots in use

PCI Local Bus Expansion Slots

Your workstation's main logic board contains five PCI local bus expansion slots. These slots support:

- Universal 5 V dc PCI expansion boards

- Standard power PCI expansion slots (up to 25 watts)

- Bus mastering

System Input Power Requirements

Rated Voltage Range	Maximum Range	Rated Input Current @ 300 W	Operating Frequency Range
100 V ac - 120 V ac	88 V ac - 135 V ac	4 A	47 Hz - 63 Hz
220 V ac - 240 V ac	176 V ac - 265 V ac	2 A	47 Hz - 63 Hz

Power Supply Requirements

All DIGITAL Personal Workstation power supplies provide six dc voltages: +12 V dc, −12 V dc, +5 V dc, -5 V dc, 5 VSB, and +3.3 V dc. These voltages are used by the various components within the workstation.

Current Requirements

This workstation's power supply provides the following maximum current requirements:

- Total power 300 W maximum

    − +3.3 V   0 A min, 33 A max.

    − +5 V   2.0 A min, 40 A max.

    − +12 V   0 A min, 12 A max.

    − -5 V   0 A min, 0.3 A max.

    − −12 V   0 A min, 0.5 A max.

    − 5 VSB   0 A min, 1.0 A max.

Power Cord Requirements

⚠️ **WARNING:** Do not attempt to modify or use an external 100 V ac (Japan only) or 115 V ac power cord for 220-240 V ac input power. Modifying either power cord can cause personal injury and severe equipment damage.

The power cord used with this workstation must meet the following criteria:

- UL and CSA Certified cordage rated for use at 250 V ac with a current rating that is at least 125% of the current rating of the product. In Europe, the cordage must have the <HAR> mark.

- The ac plug is terminated in a grounding-type male plug designed for use in the region. It must also have marks showing certification by an agency acceptable in the region.

- The connector at the workstation end is an IEC type CEE-22 female connector.

- The maximum length is 4.5 meters (14.5 feet).

Main Logic Board Switch Settings

The switch settings located on the main logic board can be set to control many features in your workstation. Use the following table and figure to locate the switch settings on the main logic board and then modify the settings for desired results.

| Feature	Function	Setting	Description
Clear password	Enable Disable(1)	SW1-1, ON SW1-1, OFF(1)	If you forget your password, set this switch to ON and then restart the workstation.
Recovery mode	Enable Disable(1)	SW1-2, ON SW1-2, OFF(1)	If your flash BIOS upgrade failed, set this switch to ON so you can boot your workstation from a Crisis Recovery diskette. Refer to the README.TXT provided with the flash BIOS upgrade.
Clear CMOS	Enable Disable(1)	SW1-3, ON SW1-3, OFF(1)	Clears CMOS of all BIOS setup information. Use the Enable setting when your workstation will not boot, and BIOS setup cannot be accessed due to configuration data corruption. This switch must be set back to Disable before rebooting your workstation.
Flash enable	Enable Disable(1)	SW1-4, ON SW1-4, OFF(1)	When disabled, prevents corruption or reprogramming of BIOS boot block data. Updating the BIOS boot block data is normally reserved for factory use only, unless instructed otherwise by your Service provider.
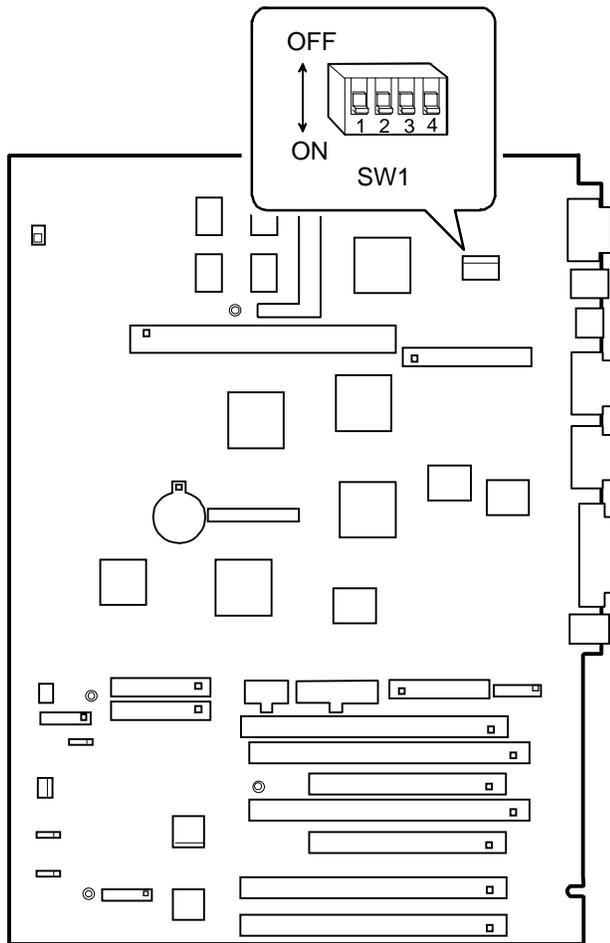
(1) Factory default

DEC01302-8

**Figure A-1. Main Logic Board Switch Locations**

Pentium® II Processor Module Switch Settings

The following table lists the Pentium® II processor module switch settings and factory default settings. Figure A-2 shows the switch location.

Description	Switch 1	Switch 2	Switch 3	Switch 4
66 x 3.5 = 233 MHz	ON	OFF	ON	OFF
66 x 4 = 266 MHz	OFF	ON	OFF	OFF
66 x 4.5 = 300 MHz(1)	OFF	ON	ON	OFF
66 x 5 = 333 MHz	ON	ON	OFF	OFF
66 x 5.5 = 366 MHz	ON	ON	ON	OFF
66 x 6 = 400 MHz	OFF	OFF	OFF	ON
66 x 6.5 = 433 MHz	OFF	OFF	ON	ON
66 x 7 = 466 MHz	ON	OFF	OFF	ON
66 x 7.5 = 500 MHz	ON	OFF	ON	ON
66 x 8 = 533 MHz	OFF	ON	OFF	ON
Reserved	ON	ON	OFF	ON

(1) Factory default
OFF = switch up; ON = switch down
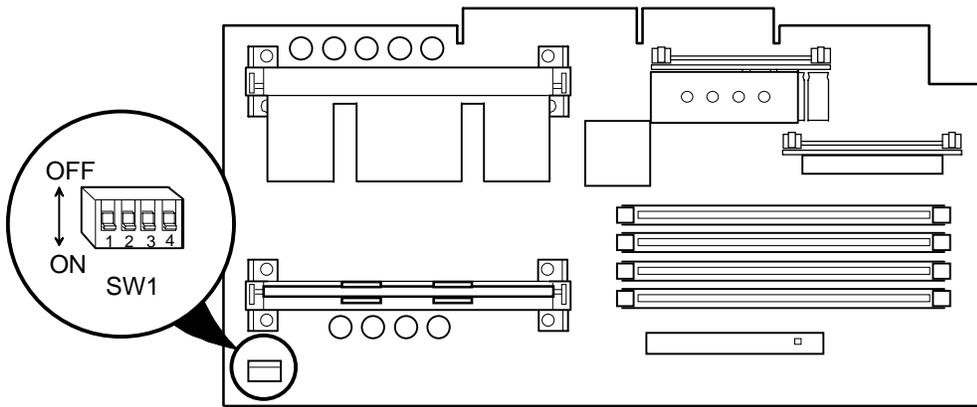
DEC01304-8

Figure A-2. Pentium® II Processor Module Switch Locations

If You Forget Your Password

Use the following procedure to erase a password from your computer.

1. Turn off your computer and remove the outside cover.

2. Change switch SW-1 on the main logic board to enabled (switch on).

3. Reconnect your computer and turn it on.

   Booting your computer with this switch in the on position erases the existing password(s).

4. Turn off your computer and remove the outside cover.

5. Change switch SW-1 on the main logic board to disabled (switch off).

6. Reconnect your computer and turn it on.

7. Using the BIOS Setup utility, assign a new password.

   Refer to Chapter 2, "Using the BIOS Setup Utility," for more information.

Device Mapping $\boldsymbol{B}$

Introduction

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

Your workstation's memory and address locations are allocated at the factory to operate within a standard PC 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 network 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.

Refer to Chapter 2, "Using the BIOS Setup Utility," for additional information.

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.

Full Range Processor Memory Address Map

Range	Function	Size
0 to 9FFFFh	Base memory	640 KB
A0000h to BFFFFh	Video RAM	128 KB
C0000h to C7FFFh	Video BIOS	32 KB
C8000h to DFFFFh	BIOS extension ROM (AT bus used)	96 KB
E0000h to FFFFFh	PnP BIOS/APM BIOS	128 KB
100000h to 3FFFFFFFh	Extended memory	1023 MB

I/O Address Map

Range (hexadecimal)	Function
000 - 00F	DMA controller one
020 - 021	Interrupt controller one
040 - 043	Interval timer
060 - 06F	Keyboard controller
070 - 07F	Real-Time Clock (RTC), NMI
080 - 08F	DMA page register
0A0 - 0A1	Interrupt controller two
0C0 - 0CF	DMA controller two
0F0	Clear math co-processor busy
0F1	Reset math co-processor
0F8 - 0FF	Math co-processor
170 - 177	Secondary IDE controller
1F0 - 1F7	Primary IDE controller
200 - 207	Audio, Joystick
220 - 22F	Audio Sound Blaster Pro compatible
278 - 27A	LPT2
2E8 - 2EF	COM4

continued

Range (hexadecimal)	Function
2F8 - 2FF	COM2
300 - 301	Audio, MP401
378 - 37A	LPT1
388 - 38B	Audio, FM music synthesizer
3BC - 3BE	LPT3
3E8 - 3EF	COM3
3F0 - 3F7	Diskette (floppy disk) controller
3F6 - 3F7	Primary/secondary IDE controller (alt status, device address)
3F8 - 3FF	COM1
4D0	Edge/level control register - INTCNTRL1
4D1	Edge/level control register - INTCNTRL2
530 - 533	Audio, Windows Sound System
CF8 - CFF	PCI configure space control register
F00 - F07	Audio, Control Port
22-3F	Programming chip select

Interrupt Levels

Interrupt Number	Interrupt Source
IRQ0	Timer tick
IRQ1	Keyboard controller
IRQ2	Cascade interrupt
IRQ3	COM2, COM4, if enabled
IRQ4	COM1, COM3, if enabled
IRQ5	Audio, if enabled
IRQ6	Diskette (floppy disk) drive, if enabled
IRQ7	LPT1, LPT3, if enabled
IRQ8	Real Time Clock (RTC)
IRQ9	(PCI device or reserved) default video
IRQ10	(PCI device or reserved) default SCSI
IRQ11	(PCI device or reserved) default network
IRQ12	Mouse interrupt, if enabled
IRQ13	Math co-processor
IRQ14	IDE primary, if enabled
IRQ15	IDE secondary, if enabled

DMA Channel Assignment

Channel	Controller	Function
0	1	Audio
1	1	Audio
2	1	Diskette (floppy disk) controller
3	1	ECP
4	2	Cascade DMA
5	2	Audio full duplex
6	2	Available
7	2	Available

Video Output Information C
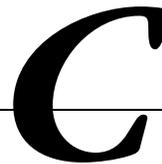
Introduction

Your computer can be used with a variety of industry-standard VGA analog monitors. These computers also support several PCI local bus video adapters as well as many industry-standard ISA video adapters.

CAUTION: Your monitor's capabilities must match the capabilities of the onboard video controller or an optional video adapter if you select a video resolution higher than 640 x 480. Failure to match video capabilities can damage your monitor.

Also, do not connect a low-resolution monitor to a computer that has been configured with high-resolution video drivers. High-resolution drivers can damage a low-resolution monitor.

NOTE: Refer to your monitor's documentation and the following table to determine the maximum video resolution of your monitor and onboard video controller. If you are using an optional video adapter, refer to the documentation supplied with that adapter to determine the maximum video resolution.

2D Video Modes with 4 MB of SGRAM

Resolution Mode	Color Depth	Refresh Rate (Hz)
640 x 480	256 32,768 65,536 True color	60/75/85/100
800 x 600	256 32,768 65,536 True color	60/75/85/100
1024 x 768	256 32,768 65,536 True color	60/75/85/100
1152 x 870	256 32,768 65,536 True color	60/75/85/100 60/75/85/100 60/75/85/100 60/75/85
1280 x 1024	256 32,768 65,536 True color	60/75/85/100 60/75/85/100 60/75/85/100 60/75/85
1600 x 1200	256 32,768 65,536 True color	60/75/85 60/75/85 60/75/85 60/75/85

3D Video Modes with 4 MB of SGRAM

Resolution Mode	Color Depth	Refresh Rate (Hz)
640 x 480	256 32,768 65,536 True color	60/75/85/100
800 x 600	256 32,768 65,536 True color	60/75/85/100
1024 x 768	256 32,768 65,536	60/75/85/100
1152 x 870	256	60/75/85/100
1280 x 1024	256	60/75/85

2D Video Modes with 8 MB of SGRAM

Resolution Mode	Color Depth	Refresh Rate (Hz)
640 x 480	256 32,768 65,536 True color	60/75/85/100
800 x 600	256 32,768 65,536 True color	60/75/85/100
1024 x 768	256 32,768 65,536 True color	60/75/85/100
1152 x 870	256 32,768 65,536 True color	60/75/85/100
1280 x 1024	256 32,768 65,536 True color	60/75/85/100 60/75/85/100 60/75/85/100 60/75/85
1600 x 1200	256 32,768 56,536 True color	60/75/85

3D Video Modes with 8 MB of SGRAM

Resolution Mode	Color Depth	Refresh Rate (Hz)
640 x 480	256 32,768 65,536 True color	60/75/85/100
800 x 600	256 32,768 65,536 True color	60/75/85/100
1024 x 768	256 32,768 65,536 True color	60/75/85/100
1152 x 870	256 32,768 65,536 True color	60/75/85/100
1280 x 1024	256 32,768 65,536	60/75/85/100
1600 x 1200	256	60/75/85

Video Output Information

Glossary G

address

A specific location or range of locations in your workstation's memory or in a port (such as a parallel or serial port). Memory addresses specify the location of information, while I/O addresses specify the location of a port used by a particular component of your workstation.

application

A program or set of programs that operate in conjunction with an operating system, also called "application software." Categories of application software include word processors, databases, spreadsheets, and telecommunications software. Specific examples of application software include WordPerfect, Lotus 1-2-3, and Procomm Plus.

base memory

Memory accessible to MS-DOS, up to a maximum of 640 KB; also called "conventional memory." See also expanded memory (EMS) and extended memory (XMS).

Basic Input/Output System (BIOS)

Abbreviated as BIOS and pronounced "by-oss." The BIOS enables your workstation to control major input/output devices such as the keyboard and disk drives.

batch file

A defined series of commands saved in a file, which can then be executed as a unit in order to save time and/or keystrokes. MS-DOS batch files have the extension .BAT. Batch files created for other operating systems, such as Windows 95 or Windows NT Workstation, might have other extensions.

baud

A unit of speed in data transmission, as one bit per second for binary signals. See also bits per second (bps).

bit

The smallest unit of electronically stored information, represented by the binary digits 0 or 1. See also byte.

bits per second

Abbreviated as bps. The number of binary digits transmitted by an electronic device (such as a modem) in one second. Also see baud and bit.

board

A device containing electronic circuitry and microprocessors. Usually used in connection with a modifying word, as follows:

- main logic board - The primary electronic component of your workstation

- expansion board - A board which enhances your workstation's abilities in some way

- video board - A board which enables your workstation to display information on a monitor

booting

The process of self-testing and configuration that completes each time your workstation is turned on (a "hard boot") or restarted (a "soft boot" or "reboot") by pressing the reset button or the [Ctrl]+[Alt]+[Del] key combination, under MS-DOS. This might include a memory test, loading of device drivers via CONFIG.SYS, and execution of the AUTOEXEC.BAT file.

byte

The amount of storage space used to represent one character (such as a letter or number). One byte contains eight bits. The following table describes other commonly-used units of electronic storage space. These units are typically used to describe amounts of available memory.

Kilobit (Kb)	1,024 bits
Kilobyte (KB)	1,024 bytes
Megabit (Mb)	1,048,576 bits
Megabyte (MB)	1,048,576 bytes
Gigabyte (GB)	1,073,741,824 bytes

cache memory

A block of reserved memory that improves workstation performance by minimizing the number of processor memory accesses. The workstation achieves this by storing recently used data or instructions in reserved memory, where it can be retrieved more quickly.

CD-ROM

Compact Disk-Read Only Memory. The CD-ROM drive and CD-ROM disk comprise an integral part of a multimedia system. The disk stores a very large amount of audio, video, graphic and/or encyclopedic information that is read by the drive for use in a workstation application. Because the disk is read only, you cannot write to the disk from your workstation's hard drive, floppy drive, or from your workstation's memory.

ClientWORKS

ClientWORKS is the family of client management and networking tools that DIGITAL supports on its entire line of desktop personal workstations. The Client Management feature provides workstation users with an easy method to keep track of their components. See Desktop Management Interface.

CMOS

A type of memory that uses very little power. CMOS memory is often used to store information such as the time and date for your workstation's internal clock.

cursor

A line, block, or other indicator on your monitor screen. The cursor identifies the point at which typed characters or other information will appear on the screen. Note that while a mouse or other pointing device can often be used to move the cursor, the mouse-pointer and a normal cursor might appear in different places on your screen.

DDC

Display Data Channel - a feature that queries the monitor to identify itself to the workstation which then chooses the optimal refresh rate for the monitor.

Desktop Management Interface (DMI)

DMI is a component of ClientWORKS and provides an enhanced and powerful set of utilities and software to help network administrators keep track of the installed hardware and software, either locally or on a network. See ClientWORKS.

device driver

A file that gives your workstation specific information on operating a particular physical device (such as a CD-ROM drive or a mouse) or application software (such as a memory manager). Device drivers are usually loaded into memory each time your workstation boots if they are listed in your CONFIG.SYS file.

DIMM

A Dual In-line Memory Module. DIMMs are small memory cards (sometimes called "sticks") that can be used to increase the amount of Synchronous Dynamic Random Access Memory (SDRAM) in your computer.

Direct Memory Access (DMA)

DMA displays or delivers information from your workstation's memory without making use of the processor. Devices with DMA capability (for example, many sound cards) must be properly configured in order for your workstation to recognize and make use of this ability.

DPMS

1. Display Power Management Signaling. Technology that enables video controller circuitry to control the operating condition of a monitor, thereby decreasing the monitor's energy consumption.

2. DOS Protected Mode Services. A way for a software application to access extended memory, often by use of a specialized device driver. Examples of software that uses DPMS include certain versions of Stacker and PKZip.

EDO

See Extended Data Out.

Enhanced Parallel Port (EPP)

An option available in your workstation's BIOS which affects the way a printer attached to your parallel port communicates with your workstation. If your printer supports this standard, enabling the EPP option will allow faster printing. This specification also provides a parallel port with the expansion bus ability to support up to 64 external devices, such as: disk drives, tape drives, CD-ROM drives, and other mass-storage devices.

expanded memory (EMS)

Memory beyond 640 KB that can only be accessed by use of expanded memory manager software. Expanded memory can be provided by installing an expanded memory expansion board, or by using software that enables extended memory to simulate expanded memory. Some application software requires expanded memory in order to operate correctly.

Extended Capabilities Port (ECP)

An option available in your workstation's BIOS which affects the way a printer attached to your parallel port communicates with your workstation. If your printer supports this standard, enabling the ECP option will allow faster printing.

Extended Data Out (EDO)

A DRAM feature that allows for fast, main memory access timing. EDO memory is faster than Fast Page memory (which is an older industry standard) and is available in 8-MB, 16-MB, and 32-bit SIMMs.

extended memory (XMS)

Memory beyond 1 MB that can only be accessed by use of extended memory manager software (such as HIMEM.SYS, included with MS-DOS and Windows). Some application software, including Windows and Windows-based software, requires extended memory in order to operate correctly. Extended memory can be added to your workstation, within specified limits, by installing SIMMs.

firmware

Information that is permanently stored in your workstation's ROM and cannot be changed. This might consist of application software and/or configuration information about certain aspects of the workstation. Your workstation's BIOS (see Basic Input/Output System) is an example of firmware.

graphical user interface

Abbreviated as GUI. The visual "desktop" image generated by software such as Windows, that allows you to operate your workstation by using a mouse or other pointing device to manipulate icons that might represent application software, files containing data, and/or operating system commands. An alternative to a command line.

hardware

Workstations, printers, modems and other physical devices for managing electronically stored information.

icon

A symbol or picture on your monitor screen that represents a file, a software application, an operating system command, or some other form of stored information. Groups of icons might sometimes be referred to as button bars or toolbars.

interrupt

An event, condition, or instruction which causes your workstation to temporarily stop performing a task, but does so in a way that permits the task to be resumed and completed later. For example, not using your keyboard or mouse for several minutes might cause a screen saver program to interrupt another software application. Interrupts also occur within your workstation's memory that cannot be easily detected by users.

IRQ

A hardware setting which instructs your workstation how to allocate memory resources between various components of the system. For example, serial ports COM1 and COM3 are often assigned to the same IRQ setting. If IRQ settings are not properly allocated to the various components of your workstation (such as expansion boards), your workstation might not be able to operate all of the affected components.

An IRQ setting on a given component establishes an interrupt condition for that component.

jumper

Jumper pins allow you to set specific workstation parameters. They are set by changing the pin location of jumper blocks. A jumper block is a small, plastic-encased conductor (shorting plug) that slips over the pins. To change a jumper setting (make sure that your workstation is turned OFF), remove the jumper from its current location with your fingers. Position the jumper over the two pins designated for the desired setting. Press the jumper evenly onto the pins; being careful not to bend the pins.

Kbyte

A Kilobyte (Kbyte, KB) is a unit, usually of workstation storage space, equal to 1,024 bytes. Also see byte and bit.

legacy

A legacy expansion board is any ISA board that does not comply with the new Plug and Play ISA Board Specification. Legacy ISA boards must be configured using the ISA Configuration Utility (ICU).

mapping

The process of identifying specific addresses and locations within your workstation's memory, and describing what kinds of information might be found at those locations. Sometimes referred to as device mapping or memory mapping.

media

Physical objects or devices used for storing information. These might include floppy disks, hard disk drives, CD-ROM disks, and PCMCIA cards.

memory

The electronic space in which information can be stored and/or processed. Types of memory include Random Access Memory (RAM), Read-Only Memory (ROM), expanded memory (EMS) and extended memory (XMS).

memory-resident

A condition in which software remains loaded in your workstation's memory but does not operate until and unless it is activated by the user or by another software application. For example, a virus-detection program might be memory-resident.

microprocessor

A chip that processes electronic information and instructions, such as Intel's Pentium-Pro processors. Note, however, that not all microprocessors are central processing units.

modem

A device for transmitting electronic information from one workstation to another at high speeds over telephone lines.

multimedia

A form of electronic information that combines pictures, sounds, and text in an integrated manner. CD-ROM hardware and software is usually required to make use of information stored in the form of multimedia.

operating system

The software that tells your workstation how to manage and process electronically stored information, enables it to run application software, and controls the flow of information between various parts of your workstation system. MS-DOS, OS/2, and UNIX are operating systems.

PCI

Peripheral Component Interconnect - provides fast, 32-bit, I/O data transfer.

Pel - Picture Element, also known as Pixel

The smallest graphic unit that can be displayed on the screen of your monitor. This unit is usually a single-colored dot; the size of the dot is determined by the dot pitch of your monitor (typically .25 mm to .42 mm).

port

The physical connection between your workstation and a peripheral device, such as a printer, mouse, or SCSI device.

Parallel ports, also called LPT ports, are typically used to connect your workstation to a printer. Serial ports, also called COM ports, can be used to connect your workstation to a variety of devices, including a mouse, a modem, and some printers. Other types of ports can include keyboard ports, mouse ports, and SCSI ports. See EPP.

Power-On Self Test (POST)

A series of diagnostic tests performed by your workstation every time it is turned on (but not necessarily every time it is booted).

quiet boot

Inhibits the display of POST messages. Quiet boot, when enabled, displays the DIGITAL logo, instead of POST messages.

Random Access Memory (RAM)

Abbreviated as RAM; also called read/write memory. The memory your workstation uses to manage information and software while that information and software is in use. Information stored only in RAM is lost when your workstation is turned off.

Read-Only Memory (ROM)

Abbreviated as ROM. Information or software stored in ROM is permanent, cannot be altered, and remains intact when your workstation is turned off. Note that you cannot move or copy information into ROM from other areas of your workstation's memory. In some cases, however, you can copy information from ROM into other areas of your workstation's memory.

ROM BIOS

See Basic Input/Output System and Read-Only Memory. ROM BIOS software enables your workstation to control major input/output devices such as the keyboard and disk drives.

SCSI device

Hardware that communicates with your workstation via a specific data-transmission technology (Small Computer System Interface). Devices that use the SCSI interface include CD-ROM drives and some hard disk drives.

software

A program or set of programs that operate in conjunction with an operating system, also called "application software." Categories of application software include word processors, databases, spreadsheets, and telecommunications software. Specific examples of application software include Word for Windows, MS Excel, and Procomm Plus.

system utilities

Software designed to increase your workstation's efficiency, determine whether it is operating properly, and/or correct problems that might arise as you use your workstation. Some system utility software might be provided with your workstation (such as a Setup program). Other utility software is available from various commercial and non-commercial sources. Examples of utility software include Stacker, PKZip, and Norton Utilities.

upper memory

The area of memory between base memory (640 KB) and 1 MB. When properly configured, Windows 95 or Windows NT Workstation can load device drivers, and memory-resident software into upper memory. While the upper memory area can be configured as expanded memory, expanded memory is not limited to the upper memory area.

video adapter

Also called a video controller or video board. A board that enables your workstation to display information on a monitor screen.

video controller

The electronic circuitry which enables your workstation to display information on a monitor screen. This might be provided on a video adapter or on the main logic board. In the latter case, it is referred to as onboard video.

Windows NT Workstation

Software that provides a graphical user interface for use in operating your workstation.

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