

OpenSystems

W O R K S T A T I O N S

ELI and MPI Series

***Hardware Installation
and Owner's Guide***

UNISYS

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About This Guide

The *OpenSystems ELI and MPI Series Workstations Hardware Installation and Owner's Guide* tells you how to plan, install, and start the following workstations:

- PW² Advantage Partner (ELI) workstations
- PW² Advantage (MPI) workstations

The guide also explains device drivers and the use of other software shipped with your workstation. To help you maintain the workstation, the guide also provides information on basic troubleshooting, power-on confidence testing, and system upgrades.

Scope

The *Installation and Owner's Guide* is designed as a hardware reference and, consequently, focuses on hardware related topics. For example, the guide tells you how to upgrade system memory, install feature boards, and connect peripheral equipment (monitors, printers, and so forth). The guide also explains how to review the hardware configuration stored in CMOS memory. Additionally, the guide provides information on the integrated drive controllers (floppy disk, IDE, and SCSI) and the video controller.

Note: *Some systems do not include all of the integrated controllers discussed above.*

Some systems come with preinstalled software. For those of you who do not receive a system with preinstalled software, the guide includes an overview of software installation. Since this discussion is quite brief, it should be treated as a summary only. For details on installing your software, see the instructions that arrived with your software package. The guide assumes that you know how to perform basic tasks like inserting media, cleaning workstation surfaces, and so forth.

Who Should Use This Guide

Anyone with an ELI or MPI system should read this guide. Whether you are installing a workstation for the first time or the twentieth time, you will find the guide a valuable tool. System configurations and options vary widely, and some of the information in this guide may be unnecessary for your initial installation but useful as a reference in case you ever need to add, remove, or replace system components.

You do not need to be an expert, but you should be able to handle common tools like screwdrivers. You should know the meaning of widely used terms like "software," "hardware," "monitor," and so forth.

How to Use This Guide

Use this guide as a hands-on procedural reference while you perform your installation. Keep the *Installation and Owner's Guide* at your side as you unpack and assemble your workstation. The guide will help you complete the following tasks:

- Plan the layout of the workstation and unpack your equipment
- Install your system and connect such peripheral devices as monitors, keyboards, mice, and printers
- Start your equipment
- Review the CMOS-stored hardware configuration
- Install device drivers
- Troubleshoot your equipment
- Upgrade your system unit by installing processors, memory, feature boards, internal drives, and so forth

Your system unit comes with a document called a configuration map. The configuration map shows you system board jumper locations and settings. You may need to adjust these settings if you add, remove, or replace system unit components. In this case, be sure to look at the configuration map before you turn on the system to make sure that all jumpers are properly set. The configuration map is shipped in the system unit carton. A copy is also affixed to the inside of the system unit cover.

Some equipment arrives with documents called installation sheets. These sheets provide installation instructions and visual overviews for the device in question (a cache upgrade or disk drive, for example). Use the instructions on these sheets in conjunction with the *Installation and Owner's Guide* as you install the device.

Organization

The *Installation and Owner's Guide* is organized as follows:

Section 1. About Your System

This section introduces the various systems that make up the ELI and MPI product lines. Section 1 provides information on system features, controls, and indicators.

Section 2. Installing Your System

This section explains how to install your system. Section 2 tells you how to plan your workstation, connect the monitor, keyboard, and other peripherals to the processor unit, and select the correct system voltage. Also included in the discussion are external SCSI drives and network connections. Section 2 furnishes ergonomic guidelines that you can follow when you arrange your hardware.

Note: *Most customers can consider their hardware installation complete when they finish the procedures in this section. However, if you ordered system upgrades, you should also review Section 5.*

Section 3. Configuring Your System

This section covers the basic startup procedures you need to complete before installing your software. Included in this discussion are instructions on defining your hardware configuration in CMOS memory, working with SCSI equipment, and configuring your video devices. For your convenience, Section 3 also provides a brief discussion of software installation.

Section 4. Troubleshooting Your System

This section outlines the basics of system troubleshooting. Section 4 focuses on the Power-On Self-Test (POST) and common installation problems.

Section 5. Upgrading Your System

This section explains how to install system upgrades. Included in the discussion are processor chips, system memory, system cache, video memory, Ethernet card, feature boards, and internal disk drives.

Appendix A. Workstation Specifications

This appendix provides details on the environmental and electrical specifications for your system. This information is crucial to the workstation planning process. Also included in Appendix A are the memory map, I/O address map, system interrupts, and Direct Memory Access (DMA) channels.

Conventions

To simplify discussion, the *Hardware Installation and Owner's Guide* uses the following conventions:

- The terms "workstation" and "system" are used interchangeably.
- The term "ELI" refers to a PW² Advantage Partner system.

- The term "MPI" refers to a PW² Advantage system.
- Unless otherwise stated, all directional references are oriented as

Related Product Information

Unisys publishes a variety of manuals designed to familiarize you with your equipment and some of the situations you may encounter when you operate your workstation. As you plan your library, you may want to review the following documents.

Configuration Maps

These maps provide a visual overview of the system board for the unit in question. Configuration maps also include system board jumper locations and settings. You can find the configuration map for your system on the inside of the system unit cover.

Installation Sheets

These documents are pictorial representations of how you install various pieces of equipment. If an installation sheet is available for a particular device, it ships in the carton containing the device.

Software Guides

Once you begin to operate your workstation, you will probably need guides that cover specific programs, utilities, and so forth. These guides provide valuable information on software characteristics and parameters. Be sure to read this material carefully before you try to install your software. Some of these guides come with your software and others must be specially ordered or purchased.

Other Publications

As your level of experience increases, you may want to expand your library by adding manuals that pertain to specific applications, special-interest topics, or equipment used in your workstation. Many of these manuals are available through your Unisys sales representative.

Section 1

About Your System

This section introduces you to the hardware components that make up your system. Among the topics discussed are workstation features, controls, and indicators. Section 1 also provides a general overview of the equipment you can attach to your workstation. Here is an overview of the subjects you will read about in Section 1:

- System overview
- Three-slot systems
 - ELI system features
 - MPI system features
- Six-slot systems
 - ELI system features
 - MPI system features
- System controls and indicators

System Overview

The ELI and MPI commercial systems are high-performance workstations providing a wide range of user-configurable options, an integrated VGA™ graphics controller, a built-in floppy disk controller, and a choice of either an intelligent drive electronics (IDE) controller or a small computer system interface (SCSI) controller. The ELI and MPI systems are designed for use in an MS-DOS environment; some systems come with preinstalled software. Each of these workstations provides a cost-saving alternative to systems that provide similar features only through expensive feature boards plugged into expansion bus slots.

Your workstation can include a number of different devices. Here is a list of these devices:

- System unit
- Peripherals (monitors, keyboards, printers, and so forth)
- External SCSI drives

Read the following paragraphs to learn more about these devices.

System Unit

The system unit is the device responsible for most of the control functions performed by your workstation. It is the heart of your computer system, managing an extensive range of hardware operations and protocols. The system unit incorporates such features as a PC/AT floppy disk controller, an IDE or SCSI controller, a VGA graphics controller, expandable system memory, external cache as either a preinstalled feature or user upgrade, and a high-performance Intel 80486 processor.

This product line offers two basic system units: a three-slot unit and a six-slot unit. Three-slot system units provide three expansion slots designed for industry-standard architecture (ISA) feature boards. These systems can house up to three half-height internal drives. Six-slot system units have six expansion slots, with one (ELI) or two (MPI) slots designed for use with VESA Local Bus Adapter boards. You can install up to five half-height internal drives in a six-slot system. Outside of these differences, the three- and six- slot systems are functionally identical.

Three-slot and six-slot systems are available in either ELI or MPI versions. MPI versions come with a wider range of preinstalled features (external cache and SCSI interface, for example) and allow more extensive system upgrades.

Note: *To find out whether you have an ELI or MPI system, look at the label on the front of your system unit. The ELI and MPI systems will be labeled with "ELI" or "MPI" followed by four digits.*

Peripherals

A peripheral is a device that supports your workstation by letting you communicate with your equipment, receive printouts, and so on. You connect peripherals to the workstation by interface cables. The peripheral family includes the following devices:

- Monitors
- Keyboards and mice
- Serial devices (printer, modems, and so forth)
- Parallel devices (printers, scanners, and so forth)

Although most peripherals are optional, your workstation must include a monitor and keyboard. For most systems, you will also need a mouse.

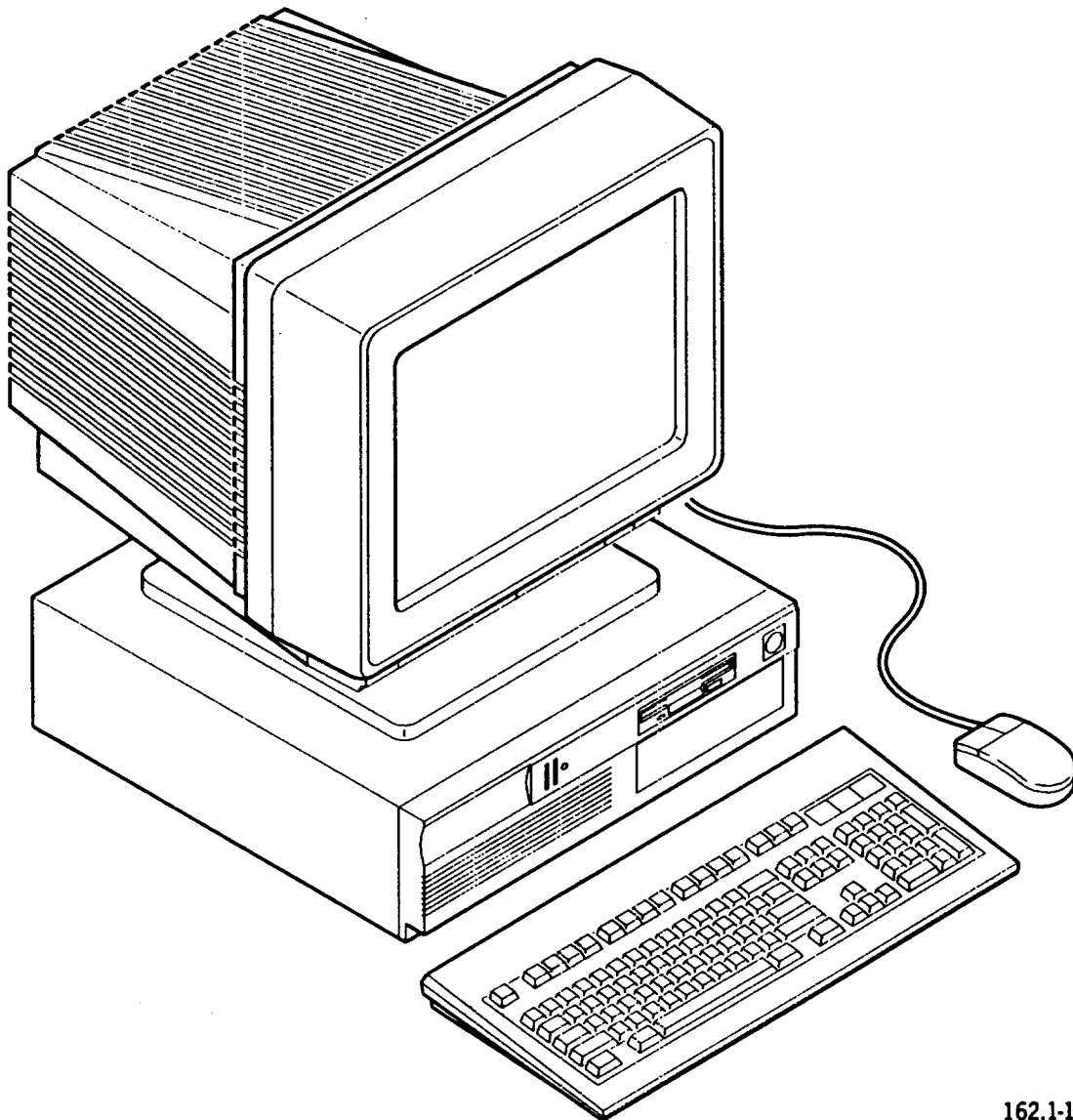
External SCSI Drives

If you have an MPI system or an ELI system equipped with a SCSI feature board, you can connect external SCSI drives to the back of your system unit. You can select from a wide variety of SCSI devices for this part of your configuration. As an example, you can include SCSI hard disk drives, CD-ROM drives, quarter-inch cartridge (QIC) tape drives, and so forth. Since the system unit does not provide power for external SCSI devices, you need to add a power supply to any external SCSI device that does not have one.

Three-Slot Systems

You have just been introduced to some of the characteristics of the three-slot system unit. Read the following paragraphs to learn more about three-slot system features. The discussion is organized according to system version (ELI and MPI), so be sure you are reviewing the correct feature list for your system. For an idea of what the three-slot system looks like, see Figure 1-1.

Figure 1-1. Typical Three-Slot System



162.1-1

Three-Slot ELI System Features

Three-slot ELI systems offer a wide range of preinstalled features and user upgrades. Here is a list of these features and upgrades:

- **User-upgradeable processor** — ELI systems come with a 25- or 33-megahertz (MHz) processor. You can upgrade the processor by installing a 33-MHz DX or 66-MHz DX2 processor chip.
- **User-upgradeable system memory** — ELI systems come with 4 megabytes (MB) of system memory. You can expand the system memory for a maximum memory size of 64MB.
- **User-installable cache memory** — You can add 128 or 256 kilobytes (KB) of external cache memory to your system.
- **Three feature board slots** — Your system provides expansion slots for up to three full-size ISA feature boards.
- **User-installable Ethernet card** — You can add an Ethernet card to your system. This card is an alternative to a full-size ISA feature board.

***Note:** This card is not an ISA feature board. If you want to connect your system to more than one network, you can add LAN feature boards to your system, too.*

- **PC/AT floppy disk drive controller** — Your system features a PC/AT floppy disk controller with a three-connector cable. The floppy disk interface configuration allows a maximum of two internal floppy disk drives and one internal tape drive. The floppy disk controller supports the following drive capacities:
 - 360KB floppy disk drives
 - 720KB floppy disk drives
 - 1.2MB floppy disk drives
 - 1.44MB floppy disk drives
 - 2.88MB floppy disk drives
 - 2.88MB three-mode floppy disk drives (Japan only)

- **Preinstalled 3.5-inch floppy disk drive** — Your system comes with a 1.44MB floppy disk drive accessible from the front panel. If you are a Japanese customer, your system comes with a three-mode floppy disk drive instead.
- **IDE hard disk drive controller** — Your system features an IDE controller with cabling for up to two hard disk drives.
- **Optional preinstalled hard disk drive** — You can order a preinstalled 120MB or 240MB IDE hard disk drive for your system. Both drives have a 3.5-inch form factor.
- **Drive bays for extra drives** — Your system includes a drive bay so that you can install extra drives. The drive bay provides mountings for the following equipment:
 - One 3.5-inch floppy disk drive (preinstalled)
 - One 3.5-inch hard disk drive (preinstalled on some systems)
 - One 5.25-inch drive

Note: You can install a 5.25-inch hard disk, floppy disk, or tape drive. If you have a SCSI feature board, you can install any compatible SCSI drive (CD-ROM, DAT drive, and so forth).
- **VGA controller** — Your system features a VGA controller with 1MB of video RAM to provide EVGA capabilities (1280 x 1024 pixel resolution, 72-hertz refresh rate, with 256 colors from a palette of 262,244).

- **User-upgradeable video memory** — You can add 1MB of video memory to your system for a total of 2MB. With expanded video memory, your system can produce higher resolutions and a wider color spectrum.
- **Video feature connector** — Your system provides a video feature connector for use with video accelerator and multimedia feature boards.
- **PS/2-style receptacles for keyboard and mouse** — Your system features PS/2-style receptacles for the keyboard and mouse.
- **Serial and parallel ports** — Your system comes with two serial ports and one parallel port.
- **Password-protected BIOS** — Your system incorporates both system and VGA BIOS code in one chip. The BIOS functions can be protected by assigning two BIOS passwords: one for the user and one for the system administrator.
- **BIOS shadowing** — Your system features shadowing for the system BIOS and VGA BIOS.
- **200-watt power supply** — The system unit is equipped with a power supply rated for a 200-watt dc output. The power supply includes a manual Voltage Select switch.

Three-Slot MPI System Features

Three-slot MPI systems offer an extensive range of preinstalled features and user upgrades. Here is a list of these features and upgrades:

- **User-upgradeable processor** — MPI systems come with a 25-, 33-, or 66-MHz processor. You can upgrade the processor by installing a 33-MHz DX or 66-MHz DX2 processor chip.
- **User-upgradeable system memory** — MPI systems come with 4MB of system memory. You can expand the system memory for a maximum memory size of 64MB.
- **Preinstalled cache memory** — Your system comes with 256KB of external cache memory.
- **Three feature board slots** — Your system provides expansion slots for up to three full-size ISA feature boards.
- **User-installable Ethernet card** — You can add an Ethernet card to your system. This card is an alternative to a full-size ISA feature board.

***Note:** This card is not an ISA feature board. If you want to connect your system to more than one network, you can add LAN feature boards to your system, too.*

- **PC/AT floppy disk drive controller** — Your system features a PC/AT floppy disk controller with a three-connector cable. The floppy disk interface configuration allows a maximum of two internal floppy disk drives and one internal tape drive. The floppy disk controller supports the following drive capacities:
 - 360KB floppy disk drives
 - 720KB floppy disk drives
 - 1.2MB floppy disk drives
 - 1.44MB floppy disk drives
 - 2.88MB floppy disk drives
 - 2.88 MB three-mode floppy disk drives (Japan only)

- **Preinstalled 3.5-inch floppy disk drive** — Your system comes with a 1.44MB floppy disk drive accessible from the front panel. If you are a Japanese customer, your system comes with a three-mode floppy disk drive instead.
- **SCSI controller** — Your system features an integrated SCSI controller with cabling for up to two internal SCSI drives. The SCSI cable provides a connector on the system back panel so that you can install external SCSI drives as well. The controller can manage up to seven SCSI devices.
- **Optional preinstalled hard disk drive** — You can order a preinstalled 120MB or 240MB SCSI hard disk drive for your system. Both drives have a 3.5-inch form factor.
- **Drive bays for extra drives** — Your system includes a drive bay so that you can install extra drives. The drive bay provides mountings for the following equipment:
 - One 3.5-inch floppy disk drive (preinstalled)
 - One 3.5-inch hard disk drive (preinstalled on some systems)
 - One 5.25-inch drive

Note: You can install a 5.25-inch hard disk, floppy disk, or tape CD-ROM, or DAT drive.
- **VGA controller** — Your system features a VGA controller with 1MB of video RAM to provide EVGA capabilities (1280 x 1024 pixel resolution, 72-hertz refresh rate, with 256 colors from a palette of 262,244).
- **User-upgradeable video memory** — You can add 1MB of video memory to your system for a total of 2MB. With expanded video memory, your system can produce higher resolutions and a wider color spectrum.
- **Video feature connector** — Your system provides a video feature connector for use with video accelerator and multimedia feature boards.

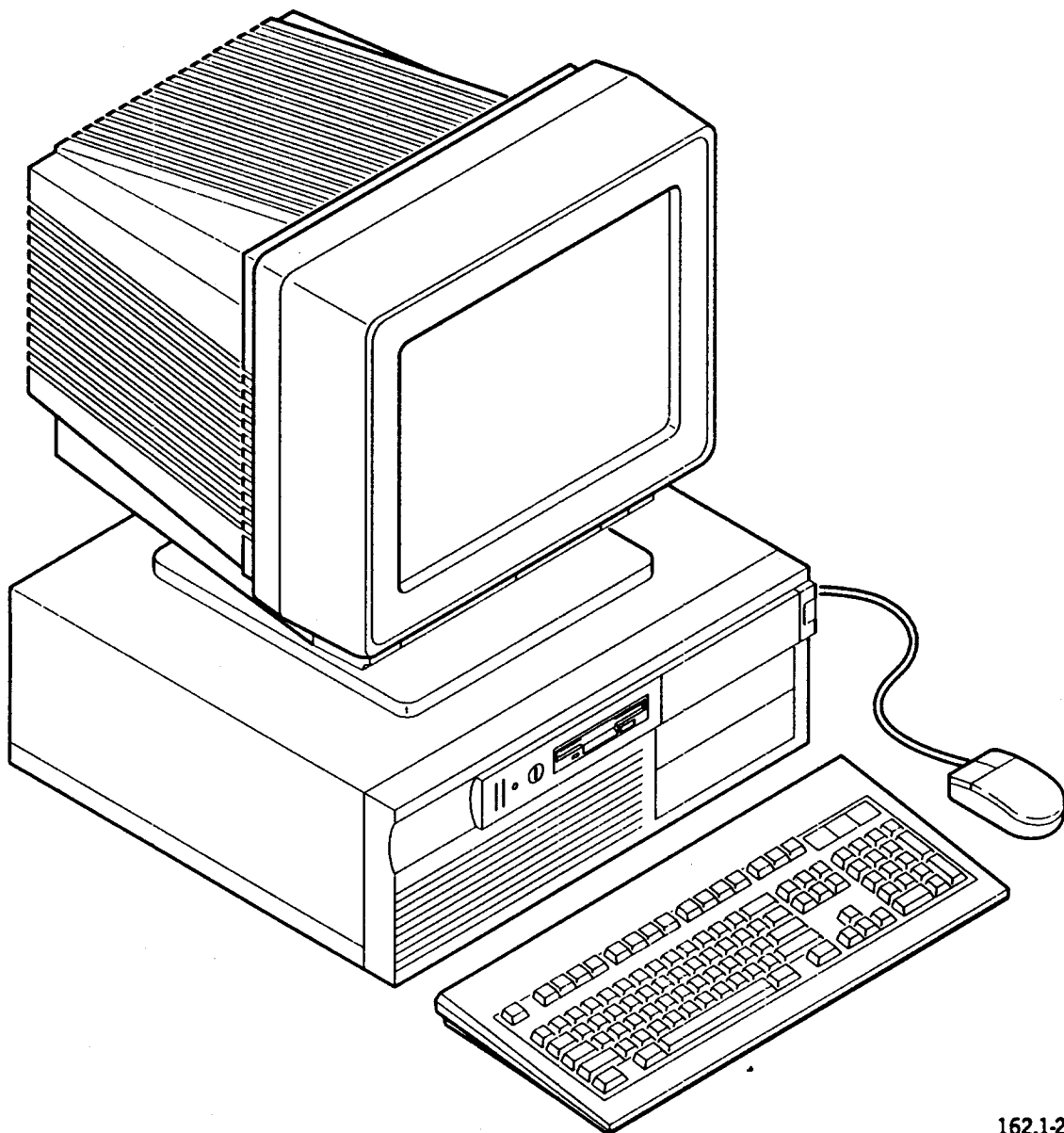
About Your System

- **PS/2-style receptacles for keyboard and mouse** — Your system features PS/2-style receptacles for the keyboard and mouse.
- **Serial and parallel ports** — Your system comes with two serial ports and one parallel port.
- **Password-protected BIOS** — Your system incorporates both system and VGA BIOS code in one chip. The BIOS functions can be protected by assigning two BIOS passwords: one for the user and one for the system administrator.
- **BIOS shadowing** — Your system features shadowing for the system BIOS, SCSI BIOS, and VGA BIOS.
- **200-watt power supply** — The system unit is equipped with a power supply rated for a 200-watt dc output. The power supply includes a manual Voltage Select switch.

Six-Slot Systems

Earlier in this section, you read about some of the characteristics of the six-slot system unit. Read the following paragraphs to learn more about six-slot system features. The discussion is organized according to system version (ELI and MPI), so be sure you are reviewing the correct feature list for your system. For an idea of what the six-slot system looks like, see Figure 1-2.

Figure 1-2. Typical Six-Slot System



162.1-2

Six-Slot ELI System Features

Six-slot ELI systems offer a wide range of preinstalled features and user upgrades. Here is a list of these features and upgrades:

- **User-upgradeable processor** — ELI systems come with a 25-, 33-, or 66-MHz processor. You can upgrade the processor by installing a 33-MHz DX or 66-MHz DX2 processor chip.
- **User-upgradeable system memory** — ELI systems come with 4MB of system memory. You can expand the system memory for a maximum memory size of 64MB.
- **User-installable cache memory** — You can add 128KB or 256KB of external cache memory to your system.
- **Six feature board slots** — Your system provides expansion slots for up to six full-size ISA feature boards. One of these slots is designed for a VESA Local Bus Adapter board.
- **PC/AT floppy disk drive controller** — Your system features a PC/AT floppy disk controller with a three-connector cable. The floppy disk interface configuration allows a maximum of two internal floppy disk drives and one internal tape drive. The floppy disk controller supports the following drive capacities:
 - 360KB floppy disk drives
 - 720KB floppy disk drives
 - 1.2MB floppy disk drives
 - 1.44MB floppy disk drives
 - 2.88MB floppy disk drives
 - 2.88MB three-mode floppy disk drives (Japan only)
- **Preinstalled 3.5-inch floppy disk drive** — Your system comes with a 1.44MB floppy disk drive accessible from the front panel. If you are a Japanese customer, your system comes with a three-mode floppy disk drive instead.
- **IDE hard disk drive controller** — Your system features an IDE controller with cabling for up to two hard disk drives.

- **Optional preinstalled hard disk drive** — You can order a preinstalled 120MB or 240MB IDE hard disk drive for your system. Both drives have a 3.5-inch form factor.
- **Drive tray for 3.5-inch drive** — Your system includes a drive tray for one 3.5-inch hard disk drive.

Note: If your system came with a preinstalled hard disk drive, the 3.5-inch drive tray is already in use.

- **Drive bay for 5.25-inch drives** — Your system includes a drive bay for up to three 5.25-inch floppy disk, hard disk, or tape drives. If you have a SCSI feature board, you can install any compatible SCSI drive (CD-ROM, DAT drive, and so forth).
- **VGA controller** — Your system features a VGA controller with 1MB of video RAM to provide EVGA capabilities (1280 x 1024 pixel resolution, 72-hertz refresh rate, with 256 colors from a palette of 262,244).
- **User-upgradeable video memory** — You can add 1MB of video memory to your system for a total of 2MB. With expanded video memory, your system can produce higher resolutions and a wider color spectrum.
- **Video feature connector** — Your system provides a video feature connector for use with video accelerator and multimedia feature boards.
- **PS/2-style receptacles for keyboard and mouse** — Your system features PS/2-style receptacles for the keyboard and mouse.
- **Serial and parallel ports** — Your system comes with two serial ports and one parallel port.
- **Password-protected BIOS** — Your system incorporates both system and VGA BIOS code in one chip. The BIOS functions can be protected by assigning two BIOS passwords: one for the user and one for the system administrator.
- **BIOS shadowing** — Your system features shadowing for the system BIOS and VGA BIOS.
- **200-watt power supply** — The system unit is equipped with a power supply rated for a 200-watt dc output. The power supply includes a manual Voltage Select switch.

Six-Slot MPI System Features

Six-slot MPI systems offer an extensive range of preinstalled features and user upgrades. Here is a list of these features and upgrades:

- **User-upgradeable processor** — MPI systems come with a 25-, 33-, or 66-MHz processor. You can upgrade the processor by installing a 33-MHz DX or 66-MHz DX2 processor chip.
- **User-upgradeable system memory** — MPI systems come with 4MB of system memory. You can expand the system memory for a maximum memory size of 64MB.
- **Preinstalled cache memory** — Your system comes with 256KB of external cache memory.
- **Six feature board slots** — Your system provides expansion slots for up to six full-size ISA feature boards. Two of these slots are designed for VESA Local Bus Adapter boards.
- **PC/AT floppy disk drive controller** — Your system features a PC/AT floppy disk controller with a three-connector cable. The floppy disk interface configuration allows a maximum of two internal floppy disk drives and one internal tape drive. The floppy disk controller supports the following drive capacities:
 - 360KB floppy disk drives
 - 720KB floppy disk drives
 - 1.2MB floppy disk drives
 - 1.44MB floppy disk drives
 - 2.88MB floppy disk drives
 - 2.88MB three-mode floppy disk drives (Japan only)
- **Preinstalled 3.5-inch floppy disk drive** — Your system comes with a 1.44MB floppy disk drive accessible from the front panel. If you are a Japanese customer, your system comes with a three-mode floppy disk drive instead.

- **SCSI controller** — Your system features a SCSI controller with cabling for up to four internal SCSI drives. The SCSI cable provides a connector on the system back panel so that you can install external SCSI drives as well. The controller can manage up to seven SCSI devices.
- **Optional preinstalled hard disk drive** — You can order a preinstalled 120MB or 240MB SCSI hard disk drive for your system. Both drives have a 3.5-inch form factor.
- **Drive tray for 3.5-inch drive** — Your system includes a drive tray for one 3.5-inch hard disk drive.

Note: If your system came with a preinstalled hard disk drive, the 3.5-inch drive tray is already in use.

- **Drive bay for 5.25-inch drives** — Your system includes a drive bay for up to three 5.25-inch floppy disk, hard disk, tape, CD-ROM, or DAT drives.
- **VGA controller** — Your system features a VGA controller with 1MB of video RAM to provide EVGA capabilities (1280 x 1024 pixel resolution, 72-hertz refresh rate, with 256 colors from a palette of 262,244).
- **User-upgradeable video memory** — You can add 1MB of video memory to your system for a total of 2MB. With expanded video memory, your system can produce higher resolutions and a wider color spectrum.
- **Video feature connector** — Your system provides a video feature connector for use with video accelerator and multimedia feature boards.
- **PS/2-style receptacles for keyboard and mouse** — Your system features PS/2-style receptacles for the keyboard and mouse.
- **Serial and parallel ports** — Your system comes with two serial ports and one parallel port.
- **Password-protected BIOS** — Your system incorporates both system and VGA BIOS code in one chip. The BIOS functions can be protected by assigning two BIOS passwords: one for the user and one for the system administrator.

- **BIOS shadowing** — Your system features shadowing for the system BIOS, SCSI BIOS, and VGA BIOS.
- **200-watt power supply** — The system unit is equipped with a power supply rated for a 200-watt dc output. The power supply includes a manual Voltage Select switch.

System Controls and Indicators

Your workstation features several controls and indicators that let you manage system functions and keep track of device status. ELI and MPI system controls and indicators take the following form:

- **Controls** — Workstation controls usually take the form of switches. You use the controls to turn on your equipment, boot your software, adjust the brightness of your screen, and so forth.
- **Indicators** — Workstation indicators typically take the form of LEDs (light emitting diodes). The indicators tell you whether a device is turned on and actively processing data.

Read the following discussion to learn about workstation controls and indicators. For information on controls and indicators for external disk, tape, or CD-ROM drives, see the documentation that came with the drive.

System Unit

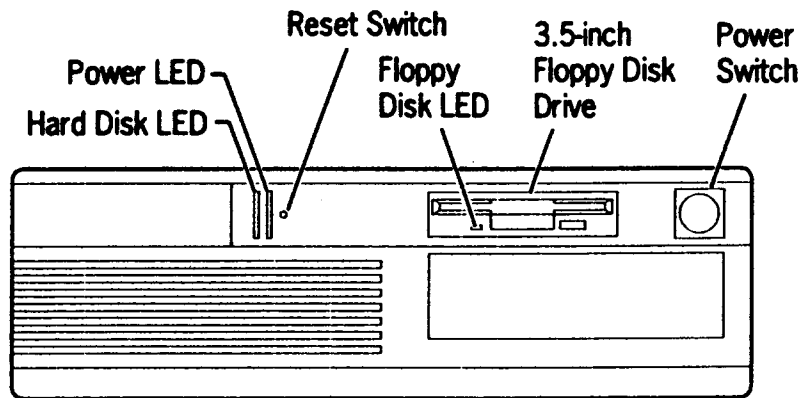
The system unit is equipped with several controls and indicators, as shown in Figure 1–3. Here is a description of each one:

Note: *Since the controls and indicators are identical for the three- and six-slot systems, both systems are covered by the same discussion. If a control or indicator is not present on one of the systems, the discussion notes this fact.*

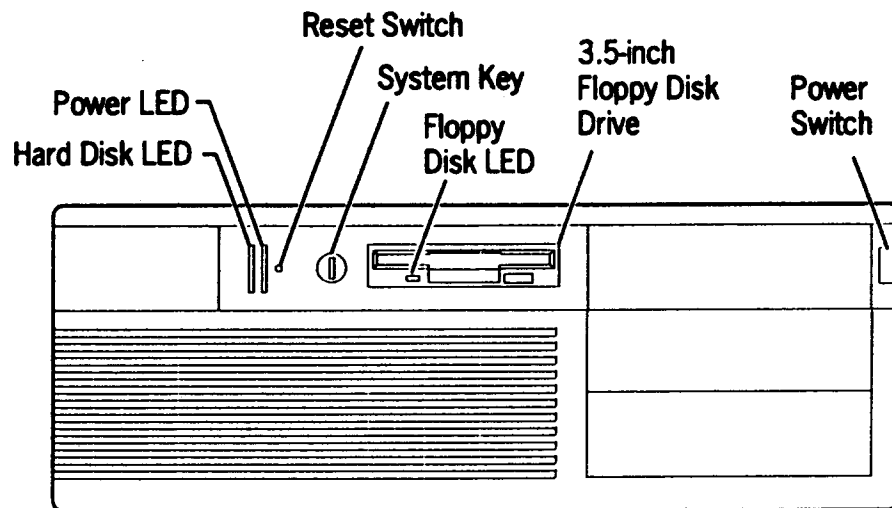
Power switch	This pushbutton switch enables and disables dc power for the system unit. When you turn on the system unit, the internal power supply provides dc power to the system unit; you will see the Power LED light and hear the fan start. If your monitor is plugged into the ac convenience outlet at the rear of the system unit, the power supply also cycles ac power to the monitor.
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Figure 1-3. System Unit Controls and Indicators

Three-Slot System Unit



Six-Slot System Unit



162.1-3

<i>Reset switch</i>	This pushbutton switch boots your system; the Reset switch is recessed to prevent accidental booting. When you boot the system unit, the system unit runs its POST test and loads the software. You can use this switch whenever you need to boot your system without turning the power off.
<i>Voltage Select switch</i>	This switch allows you to configure the system unit for domestic or international power. The Voltage Select switch is located on the back of the system unit. To learn more about using this switch, see Section 2.
<i>Power LED</i>	This indicator lights when the workstation is turned on.
<i>Hard Disk LED</i>	This indicator lights if one of the internal hard disk drives is processing data.
<i>Floppy Disk LED</i>	This indicator lights if the floppy disk drive is processing data. The Floppy Disk LED is located on the front of the floppy disk drive and is only present on systems that include a floppy disk drive.
<i>System key</i>	<p>This key allows you to lock the system unit, a feature that helps protect the workstation from tampering. When the key is unlocked, you can remove the system unit cover and use the Reset switch. If the key is in the locked position, you cannot remove the system unit cover or use the Reset switch. You can take out the key in either position.</p> <p>Note: <i>The system key is only available for six-slot systems.</i></p>

Peripherals

Virtually all peripherals provide a set of controls and indicators for your use. These controls and indicators vary depending on the function and nature of the equipment. For instance, monitor controls let you adjust screen brightness and contrast, whereas printer controls allow you to feed paper through the print mechanism. The following discussion describes monitor controls and indicators in detail; it also tells you where to look up information on controls and indicators for other peripherals.

Monitors

Most monitors are similar to each other in terms of the controls and indicators they provide. If you are not familiar with monitors, here is a description of the typical controls and indicators:

Note: *Do not be concerned if your monitor does not have all of the controls and indicators listed below.*

<i>Power switch</i>	This switch turns on your monitor. The power switch is sometimes labeled with an I (On position) and O (Off position).
<i>Brightness control</i>	This control adjusts the brightness of your screen. Try to adjust the brightness so the characters are easy to read and you do not see any background lines. This measure helps prevent screen burn.
<i>Contrast control</i>	This control adjusts your screen contrast. The greater the contrast, the greater the difference between light and dark areas on your screen.
<i>Image-sizing controls</i>	These controls adjust the size and placement of the image field on your screen. The image-sizing control set usually includes image width and height controls, horizontal and vertical image placement controls, centering controls, and a save function. Try to adjust the image to its maximum size and be sure it is centered on the screen.

<i>Degauss switch</i>	This switch demagnetizes a color monitor's screen. If your screen colors become uneven over time, pressing the degauss switch can often help. Some color monitors do not include a degauss switch; these monitors degauss the screen automatically when you turn them on.
<i>Voltage Select switch</i>	This switch lets you configure your monitor for domestic or international use. The Voltage Select switch is a feature of certain VGA monitors.
<i>Power LED</i>	This indicator lights when the monitor is turned on.

Other Peripherals

Because the range of remaining peripherals is such a broad one, specific discussions of peripheral controls and indicators are not included in this guide. If you need information on a peripheral device, refer to the appropriate hardware description for that device. In some cases (for example, keyboards), you may also need to look at software application descriptions.

External Drives

As mentioned, you can attach external SCSI drives to your MPI system unit. If you have an ELI system equipped with a SCSI feature board, you can also connect external SCSI drives. The controls and indicators for these devices vary depending on the type and model, but might typically include a Power switch, Power LED, and Activity LED. To learn about the controls and indicators for a specific drive, see the documentation that came with that drive.

Where to Go From Here

You have now been introduced to your system and learned about its features and controls. Here are the things you have accomplished:

- You have read about the components that make up your workstation.
- You have learned about the features and upgrades for your system.
- You have become familiar with all workstation controls and indicators.

If you have not completed these tasks, take some time to do so now. When you are ready, turn to Section 2 to learn how to unpack and install your system.

Section 2

Installing Your System

This section tells you how to install your system. Section 2 also covers some of the topics you should think about before you start the installation. These topics include physical placement and ergonomics. The subjects covered in Section 2 are as follows:

- Preliminary notes
- Where to put your equipment
 - Choosing a work surface
 - Promoting a comfortable workplace
- Unpacking and inspecting your equipment
- Installing your system
 - Connecting peripherals to the system unit
 - Connecting external SCSI drives
 - Setting the system voltage
 - Connecting to a power source and starting the system
 - Connecting the system to a network

Preliminary Notes

As you read Section 2, consider the following points:

- Section 2 focuses on installing a system that does not require equipment upgrades. If you plan to install any upgrades at this time, look for instructions in Section 5. As a rule, you should complete any upgrades before starting the installation procedures described later in Section 2.
- Section 2 discusses connecting various types of equipment to the system. Your workstation may not include every component. Feel free to skip material that does not apply to your system.
- Remember to treat any directional references as though you were looking at the front of the equipment. In other words, "left" means "toward the left side as viewed from the front of the device."

Where to Put Your Equipment

The location of your workstation can affect how well it performs and how comfortably it serves you. For your equipment to function correctly, its immediate surroundings must comply with certain environmental and electrical specifications. If you choose a site that does not adhere to the following guidelines, your workstation can experience problems.

- Make sure the room you choose meets the environmental specifications listed in Appendix A.
- Make sure the room you choose does not heat up past the limits listed in Appendix A. If you have this problem, you *must* turn up the air conditioning. Otherwise, your workstation can experience performance problems and reduced reliability.
- Disk and tape drives are sensitive to sudden temperature and humidity changes. If the room you select undergoes rapid climate changes, you *must* adjust your climate controls to minimize these changes.
- Make sure the room has enough electrical outlets for all your equipment. Overloading a single outlet can cause electrical problems.

Choosing a Work Surface

Once you find a room that meets the requirements discussed above, you need to decide what kind of surface to use for your equipment. Here are some guidelines:

- Choose a desk or some other open surface as the location for your system. Whatever surface you select, *make sure* it can support the combined weight of your workstation and any other equipment it is commonly used for. For example, a system unit, monitor, and keyboard can weigh 50 lbs (22.7 kg) combined, depending the specific models involved.
- Make sure the work surface you choose is large enough for your equipment. When estimating whether the work surface is large enough, remember to include some space at the front, rear, and top of the workstation for proper system ventilation. If you do not leave extra space, your system can overheat.
- Do not place your equipment in a location that receives direct sunlight.
- Make sure the devices in your workstation are close enough together so that the cables and connections are not stressed.

Promoting a Comfortable Workplace

The more comfortable you are with your workstation, the more effectively you use it. Physical factors like room lighting, seat height, and posture can affect your level of comfort. Before you install your equipment, take a few moments to think about whether the location you have chosen will make your workstation easy to use. Here are a few suggestions:

- Choose a chair with good lower back support. Unisys suggests using a cushioned model with adjustable height.
- If you place your monitor at an angle to your seat, find a chair that swivels and turn to squarely face the monitor each time you use it.

Installing Your System

- **Make sure the work surface you select is a good height for typing. To check the height, sit down at the table and place your hands on the surface. If your table is the right height, your elbow will bend at a 90° angle.**
- **Make sure there is enough space in front of your keyboard so that the table will support your wrists. Some people find wrist support pads handy.**
- **Position your monitor so that you can look directly at the screen. If you need to hunch or look up to see the screen, the monitor is at the wrong height and should be adjusted accordingly. Make any height changes before you cable the monitor.**
- **Make sure that the screen is parallel to your plane of vision; keep the screen clean.**
- **Make sure that the screen is a comfortable distance from your eyes. If your screen is too close or far away, you may experience eyestrain.**
- **To reduce eyestrain, look away from your screen periodically and focus on a distant object. This measure will be easier if you orient your screen so that you face an open area.**
- **Sit in front of your monitor and adjust the screen angle to reduce glare. Make sure to keep backlighting at a minimum.**
- **If your monitor and application let you select the type face, choose an easy-to-read font and character size. Fonts that have serifs are easier to read than fonts without serifs.**
- **If your monitor and application let you select screen and type color, choose colors that are easy to look at. Harsh colors and poor color contrasts can cause eyestrain.**
- **Make sure the screen brightness and contrast are properly adjusted.**

Unpacking and Inspection

Begin your installation by unpacking your equipment. As you take the equipment out of its cartons, make sure to inspect it for any shipping damage. Also, check the packing material to ensure that you have found any cables, accessories, and installation sheets. Please take a moment to fill out the Arrival Quality Report cards that came with your equipment. Save your cartons and packing material in case you decide to move your workstation later.

WARNING

Some of the equipment in your workstation may be fairly heavy. We strongly recommend that you have a second person help you lift such equipment out of the cartons. Always use safe lifting practices.

Make a written inventory of the items you received and check it against the original order to make sure that all of your equipment arrived. Be sure the equipment matches your configuration plan. If you are installing more than one system, sort the equipment into groups according to the individual workstation plans.

Note: *If you are installing a six-slot system, be sure to record the system key number that appears on the key ring information tag. You will need to provide the key number if you ever lose your keys.*

If you receive a damaged device, call your sales or Hotline representative. When the damages are the result of shipper mishandling, you also need to file a claim against the carrier who delivered your equipment. In this case, save *all* shipping material and *immediately* contact the shipping firm for information on how to file a claim.

Installing Your System

Unless you plan to upgrade it at installation time, your system comes ready to install. All you need to do is connect your peripherals to the back of the system unit, select the voltage, and plug the system into a power source. If your system includes network or cluster circuitry, you also need to connect this equipment. Read the following paragraphs for instructions on these procedures.

Note: *If you are planning to upgrade your system at this time, you need to install all the upgrades before you connect your peripherals. For information on installing upgrades, see Section 5.*

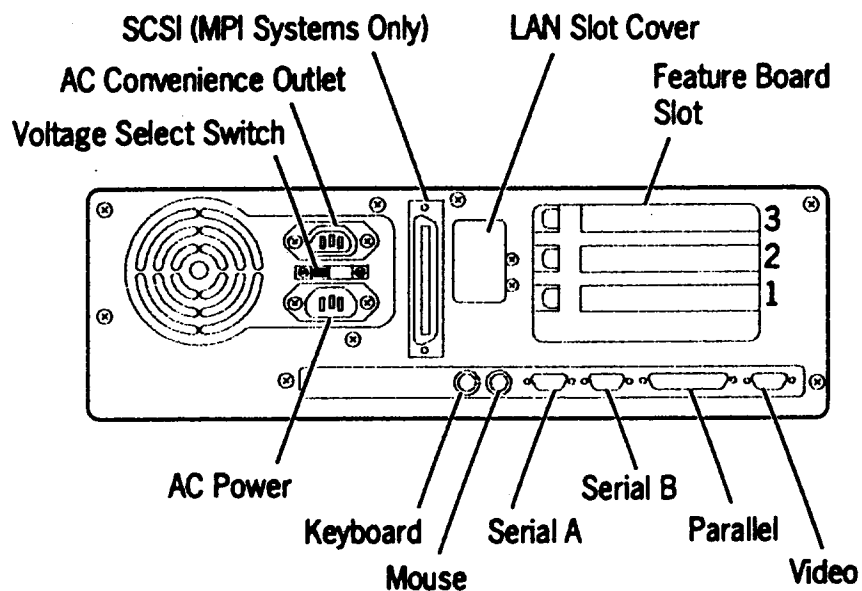
Connecting Peripherals

As mentioned in Section 1, you can connect a wide variety of peripherals to your workstation. The peripherals for your workstation are all cabled to the rear of the system unit. Figure 2-1 shows the system unit back panel for the three- and six- slot systems, highlighting the locations of the back panel receptacles for your peripherals. Here is an overview of how to connect peripherals:

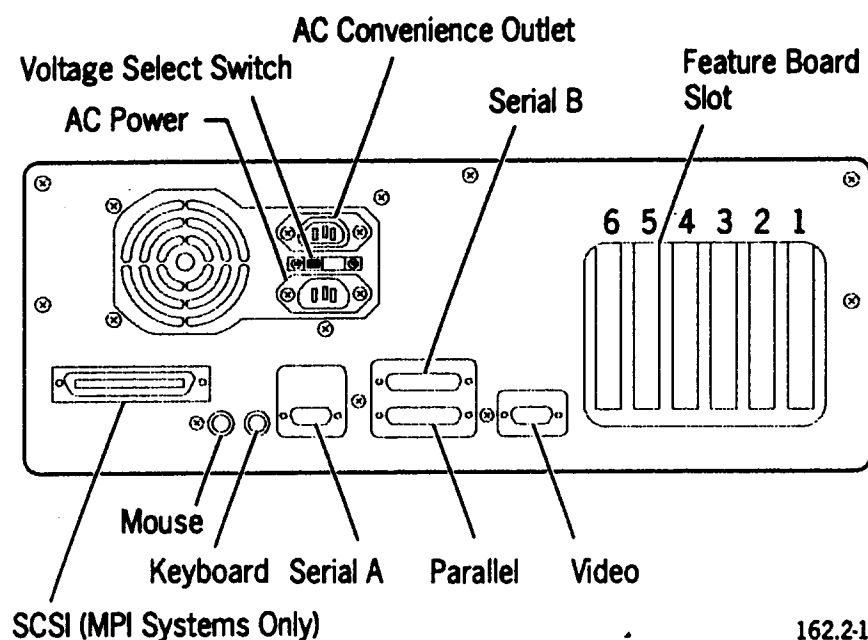
- **Monitor** — Your monitor comes with a video interface cable. Connect this cable to the video receptacle at the rear of the system unit and secure the cable by tightening any connector screws.
- **Keyboard** — Your keyboard comes with a keyboard cable. Simply attach the free end of this cable to the keyboard receptacle on the system unit.
- **Mouse** — Your mouse comes with a mouse cable. To connect the mouse, attach the free end of this cable to the mouse receptacle on the system unit.

Figure 2-1. System Back Panel

Three-Slot System Unit



Six-Slot System Unit



162.2-1

- **Parallel Printers** — Parallel printers come with a parallel interface cable. Plug the parallel interface cable into the parallel receptacle and secure the cable by tightening any connector screws.
- **Serial Equipment** — Serial devices come with a serial interface cable. Some serial devices are shipped with additional cables (modems, for example). Three-slot system units provide two 9-pin serial receptacles, while six-slot systems units furnish both a 9-pin and 25-pin serial receptacle. For six-slot units, the 9-pin receptacle is designated as Port A and the 25-pin receptacle, as Port B. Attach the serial interface cable to the serial receptacles and secure the cable by tightening any connector screws.

Connecting External SCSI Drives

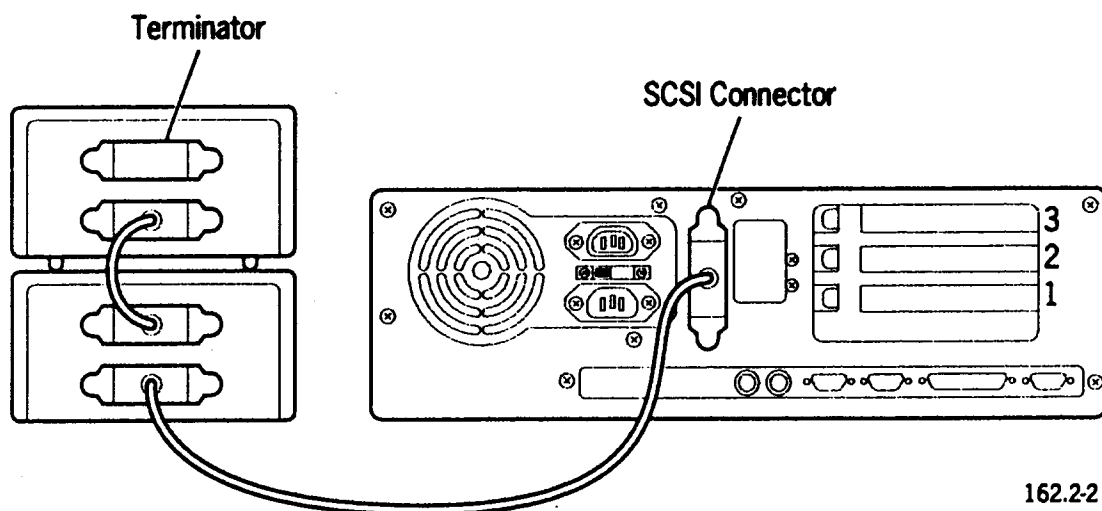
If you have an MPI system, you can connect external SCSI drives to the rear of your system unit, as shown in Figure 2-1. These drives are managed by the SCSI controller on the system board; the SCSI controller also manages any SCSI drives installed inside the system unit. Those of you planning to attach external SCSI drives should be aware of the following points.

Note: *If you want to attach external drives to an ELI system, you need to install a SCSI feature board. ELI system units do not include a SCSI connector at the rear of the system unit.*

- You can attach up to seven drives to the SCSI controller. The number of external SCSI drives you can configure depends on the number of internal drives already installed in the system unit. For example, if your system unit has two internal SCSI drives, you can configure up to five external drives.
- The combined cable length for the SCSI configuration (both internal and external drives) cannot exceed 19.7 feet (6 meters). Be sure to subtract the length of the internal SCSI cable (2.5 feet [0.76 meters] for three-slot systems or 4.2 feet [1.27 meters] for six-slot systems) from this total when calculating the maximum length of the external cable.
- If you plan to install more than one external SCSI drive, you connect the external drives in a "daisy chain" configuration using cables supplied with each drive. In this configuration, the first external drive is cabled to the rear of the system unit, the second drive connects to the first, and so on. For an example of this cable scheme, see Figure 2-2.

- Be sure to terminate the last drive in the external SCSI string. If a terminator did not ship with the drive, read the product documentation to find out which terminator to use. Some SCSI devices do not have a receptacle for a terminator; avoid using this type of device as the last unit in the string. For more on termination, see "Special Procedures for SCSI Drives," in Section 5.
- Be sure to assign SCSI IDs for all drives in the external SCSI string. You can use SCSI IDs 00 through 06; SCSI ID 07 is reserved for the controller. SCSI IDs must be unique for each device. In other words, *do not* assign the same SCSI ID to two different drives. The SCSI ID assigned to a drive is independent of the position of the drive in the SCSI string. For example, the drive assigned SCSI ID 06 may be the second device in the string, while the drive assigned SCSI ID 03 may be the last. For more on SCSI IDs, see "Special Procedures for SCSI Drives," in Section 5.

Figure 2-2. Daisy-Chain Cabling for External SCSI Drives



162.2-2

Setting the System Voltage

AC wall voltage is supplied at two different levels: 115 volts and 230 volts. Although there may be slight variations in the exact level, every nation employs one of these two wall voltages. For example, the United States and Canada use 115-volt wall sources. European countries, on the other hand, use 230-volt wall sources. Before operating your workstation, you must make sure that all devices in the system support your nation's wall voltage. You should also make sure your equipment has the right type of power cables.

Your system unit supports both input voltage ranges, but is preset at the factory for 230-volt operation. If your nation uses 115-volt wall sources, you need to change the factory setting. To alter the setting, remove the yellow label that covers the Voltage Selection switch (see Figure 2-1 for the location) and power supply plugs. Set the switch to "115" instead of "230." Also, take a moment to verify that all peripherals attached to the system unit are set for the correct wall voltage.

Note: *Even if your nation uses 230-volt wall sources, be sure to verify the system unit voltage by lifting the label and checking the setting.*

Connecting to a Power Source and Starting the System

At this point, you are ready to connect the devices in your system to the electrical outlets in your office or computer center. To plug in your equipment, complete these steps:

1. Take an inventory of each device that needs a power cable. Make sure you have cables for all of this equipment. The following devices commonly require power cables:
 - System unit
 - Monitor
 - Printers, modems, and other serial or parallel devices
2. Locate the power switches on the system unit, monitor, and any other device that has one. Make sure these switches are all turned off.
3. Locate the system unit power cable. Connect one end of the cable to the power receptacle at the rear of the unit. Plug the other end into the wall socket, power strip, or other room power source.
4. Plug the monitor power cable into the wall outlet, power strip, or other room power source. As an alternative, you can plug the cable into the ac convenience outlet on the rear of the system unit, if the monitor came with a compatible cable.
5. If you have any of the other devices listed in step 1, connect each one to an outlet as just described. Make sure that you have the right cable for each device.

Once you have connected all your equipment to a power source, you can turn on your system. In most cases, you should turn on your monitor first, your system unit next, and your other peripherals last. When your workstation receives power, the system's Power LEDs light, and the system begins a Power-On Self Test (POST). For more about the startup sequence and POST test, see Section 3.

Connecting Your System to a Network

Once you have successfully powered up your system, you can connect it to a network, provided your system includes one of the following features or upgrades:

- **Network feature board** — Network feature boards let you connect your ELI or MPI system to an existing network. Unisys sells a variety of network feature boards. For example, if you wanted to connect your system to an Ethernet LAN (local area network), you could select either the PCC 300-ETH or PCC 400-ETH, depending on which type of Ethernet cable you have. For instructions on adding a network feature board to your system, see Section 5.
- **Ethernet card** — If you have a three-slot ELI or MPI system and plan to use Ethernet, you can install an Ethernet card instead of a network feature board. The Ethernet card offers the same performance as the feature board, but does not use any of the feature board expansion slots, so your configuration can include an extra feature board. To learn about installing the Ethernet card, see Section 5.

Because your system supports so many different network products, this guide does not provide specific instructions on cabling network feature boards or the Ethernet card. To learn about this subject, see the guides that come with the feature board or card. Pay special attention to the discussions of jumper settings. Before you cable your workstation to a network, be sure that it must pass the POST test, have a valid CMOS hardware configuration, and contain the correct network drivers. To learn about each of these procedures, read Section 3.

Where to Go From Here

You have now finished installing your equipment. Here are the things you have accomplished:

- You have planned your work site.
- You have unpacked and inspected your equipment.
- You have connected your peripherals to the system unit.
- You have set your system's input voltage and started the system.
- If you have a network feature board or Ethernet card, you have connected your system to a network.

If you have not completed these tasks, take some time to do so now. When you are ready, turn to Section 3 to learn about using the BIOS Setup utility to verify and edit the hardware configuration stored in CMOS memory, installing drivers, and so forth.

Note: *If you experienced problems with your installation or your equipment did not power up successfully, turn to Section 4 for help with troubleshooting.*

Section 3

Configuring Your System

This section discusses additional tasks that you may need to perform before starting your system. Some of these tasks, for example, running the BIOS Setup utility, must be done whenever you change your system hardware configuration.

This section discusses the following topics:

- **Rebooting the system**
- **Running the BIOS Setup utility**
- **Assigning or changing a password**
- **Installing MS-DOS device drivers**
- **Configuring SCSI devices**
- **Configuring video**

Rebooting the System and Running the POST Test

When you configure your system hardware or software, you sometimes need to reboot (restart) the system in order for the changes you made to take effect. To reboot the system, do any of the following:

- Turn the system off and then on.
- Press the Reset switch.
- With MS-DOS systems, press the **CTRL+ALT+DELETE** keys simultaneously.
- With CTOS systems, use the **Bootstrap** command.

When you start your system, you may be prompted to change the date and time. If the date and time are already displayed correctly, press **ENTER** to continue. Otherwise, enter the correct date and time; then press **ENTER** to continue.

Each time you restart your system, it conducts a short Power-On Self-Test (POST) to test the operational status of functions related to the system memory, system board, video controller, floppy disk drives, hard disk drives, drive controllers, and peripheral devices.

While the POST test is running, it displays information about your system configuration. If you need information about your system configuration, you can restart the system and view the POST messages.

The BIOS Setup Utility

Your system contains CMOS memory that stores information about the system and about the devices attached to the system. Because the CMOS memory is supported by a battery (located inside the system unit), the information in CMOS memory is retained even when the system is turned off.

The information in the CMOS memory is used by a special type of software called *BIOS* (Basic Input Output System). The BIOS reads the CMOS information every time you turn on the system and instructs the CPU and other devices to operate according to this information. For example, the CMOS memory contains information on what type of video monitor is installed, which floppy disk is drive A and which is drive B, and so forth. If the information in the CMOS memory is incorrect, the system might not function properly. In that case, you need to run the BIOS Setup utility.

The BIOS Setup utility functions the same for ELI and MPI systems, and works the same for all operating systems.

Note: *If you are using the SCO UNIX operating system, do not change any Setup options. Use only the default settings.*

When to Run the BIOS Setup Utility

You run the BIOS Setup utility for the following reasons:

- Whenever you change components in your system, for example, if you add a hard disk or memory. If you don't run Setup after adding components, the system will halt and prompt you to run Setup.
- To customize your system. Your system may be functioning properly, but you may want to take advantage of some of the Setup options, for example, to activate the **NUMLOCK** key at startup.
- If you lose CMOS memory. This is a very unlikely situation, but it may happen. Therefore, it is a good idea to write down the Setup options in case you need to restore them if you lose the CMOS information.

Note: *Earlier systems used two programs for system configuration, a Setup program and a Startup program. The BIOS Setup utility includes most of the configuration options provided by the previous Setup program. Unlike the previous Setup program, however, you cannot run the BIOS Setup utility as a separate program; you can only run it when the system reboots. The Startup program is no longer used.*

Running the BIOS Setup Utility

The Setup utility is stored in read-only memory (ROM) on your system board and works the same regardless of which operating system you run.

You can start the Setup program in the following ways:

- To start Setup during the system boot process, press **CTRL+ALT+ESC** when prompted to do so. If you do not press **CTRL+ALT+ESC** when prompted, the boot process continues without starting Setup and you will need to reboot the system and try again.
- If your system is already running, you need to reboot the system in order to start Setup. (See "Rebooting the System and Running the POST Test," earlier in this section.) If you are running an application, save your work before rebooting.
- If your system detects a configuration error during the boot process, the system halts and prompts you to start Setup before continuing.

You may be prompted to enter a password to start Setup. Your system may use two different passwords, a user password and a supervisor password. A user password cannot be used to start Setup. If you enter a password and Setup doesn't start, the password is a user password. In that case, press **CTRL+ALT+DELETE** to restart the system. For information on passwords, see the discussion on system security options, later in this section.

Use the following keys when working in Setup:

- Use the arrow keys to move between options in an area.
- Use **TAB** and **SHIFT+TAB** to move from one category of options to another.
- Use the plus (+) and minus (-) keys to change the values in a field.
- Use **ALT+F1** to get online help for an option.
- Use **PGUP** and **PGDN** to change screens.
- If necessary, press **F2** to change between a color display and a monochrome display.
- Use **F10** to exit the Setup program. When you exit, you have the option of saving your changes to Setup or discarding them. When you exit Setup, the system reboots automatically.

Note: *The Setup utility displays information relevant to the hardware configuration of your system. Therefore, the available options vary from one system to another, and your Setup screens may not include all of the options described in this section.*

Selecting Basic System Setup Options

The basic system setup options are listed below:

- Date and time
- Drive A and Drive B configuration
- Video type
- Halt on error
- System memory
- Cache
- Shadowing
- Security
- Boot sequence
- Virus warning
- NumLock
- Drive C and Drive D configuration

Each of these options is described in the following subsections. Figure 3–1 shows the Setup Status screen that contains the basic system setup options.

Figure 3-1. Setup Status Screen

Date: 01 Jul 1993	ROM ISA BIOS (VA) Award Software, Inc. Base Memory: 640K Extended Memory: 3072K Expanded Memory: OK Other Memory: 384K Total Memory: 4096K					
Time: 11:31:41						
Drive A: 1.44M, 31/2 in.						
Drive B: None						
Video: EGA/VGA						
Halt on: All Errors						
Cache: External and Internal Cache	Boot Sequence: A, C					
Shadow: System & Video	Virus Warning: Enabled					
Security: Disabled	NumLock Boot Status: On					
		CYLS	HEADS	SECTORS	PRECOMP	LANDZONE
Drive C: None (****Mb)	0	0	0	0	0	0
Drive D: None (****Mb)	0	0	0	0	0	0
ALT-F1 for Menu Help	F10 exits					
Page 01: Status Page	PgDn=Options Page				F2 change colors	

Setting the Date and Time

You set the time using a 24-hour clock. For example, to set the clock for 1:00 PM, you enter **13:00**. The system clock keeps the date and time current even when the system is turned off.

Defining the Characteristics for Drive A and Drive B

The Drive A and Drive B options define the type of drives that are installed in your system. The type of drive is determined by the storage capacity (for example 1.44MB), and the size of the drive (for example, 3.5-inch or 5.25-inch). The default for drive A is *1.44MB 31/2-in.* The default for drive B is *None*.

If you change drive A from the default drive supplied with your system, you must change the Drive A: field. If your system includes only one drive, set the Drive B: field to *None*.

If you remove the preinstalled drive from drive A and install a 2.88MB drive, you need to change the FDD Select jumper on the system board from 1.44MB to 2.88MB. See the configuration map for information on jumper settings.

Specifying the Video Type

This option specifies the type of video monitor your system uses. The default is *EGA/VGA*. This option does not enable or disable the integrated video controller. To enable or disable the integrated video controller, set the Video Enable or Video Disable jumper on the system board. See the configuration map for information on jumper settings.

Setting the System to Halt on Error

This option defines the type of system error that will cause the system to stop processing. The choices are:

- *All Errors* (the default setting). This setting halts the system on any type of system error.
- *No Errors*. This setting ignores all errors.
- *All but Keyboard*. This setting halts the system on all errors except keyboard errors.
- *All but Diskette*. This setting halts the system on all errors except floppy disk errors.
- *All but Diskette/Keyboard*. This setting halts the system on all errors except floppy disk and keyboard errors.

Reviewing System Memory

The memory fields in the Setup Status screen show the amount of system memory detected when the system starts up. If the values shown in these fields are different from the amount of memory you know is installed in your system, check to see if all the SIMMs are installed properly (see Section 5). You cannot enter new values in the memory fields, but you need to run Setup whenever you change the amount of memory in your system so the system can automatically update the information in CMOS.

The types of memory shown in the memory fields are as follows:

- *Base memory.* This is the amount of basic system memory.
- *Extended memory.* This is the amount of system memory above the 640KB base memory.
- *Expanded memory.* This field specifies if extended memory is enabled.
- *Other memory.* This is memory that has been moved to upper memory from the range between 640KB and 1MB.
- *Total memory.* This is all of the memory listed in the fields above.

Defining the Cache

This option lets you determine how to use cache memory. Using cache memory usually allows your system to run faster. However, some older software may work best without cache memory.

MPI systems come with 256KB cache memory already installed. ELI systems come with no cache memory, but you can add a cache memory upgrade. For instructions on adding a cache upgrade, see Section 5, "Upgrading Your System."

The choices for using cache memory are:

- *External and Internal* (the default setting for systems with external cache). This setting enables both the external and internal cache.

The *internal cache* is the cache memory included in the CPU. The *external cache* is the separate cache memory. MPI systems have preinstalled external cache. With ELI systems, you need to install optional cache memory before using this setting.

- *Disabled*. This setting disables cache memory.
- *Internal Cache*. This setting enables only the internal cache. Use this setting if your system has no external cache.

Defining Shadowing

Shadowing copies software from ROM (Read Only Memory) into RAM (Random Access Memory), which allows the software on your system to run faster. The choices for defining shadowing are as follows:

- *System and Video* (the default setting). This setting shadows both the system BIOS and the video BIOS. If you have problems running application software, try disabling shadowing for the system BIOS, video BIOS, or both.
- *Disable*. This setting disables system and video BIOS shadowing.
- *System BIOS*. This setting enables shadowing only for system BIOS.
- *Video BIOS*. This setting enables shadowing only for video BIOS. If you install an alternate video controller, you may choose to shadow or not shadow the onboard video BIOS. However, to avoid any potential timing error, Unisys recommends that you enable video BIOS shadowing.

Setup also allows you to shadow other ROM address ranges. Shadowing can enhance the performance of feature boards that contain software in ROM. To shadow other ROM address ranges, use the Setup Shadow Control options. For more information, see "Defining Shadow Control," later in this section.

Defining System Security

System security provides password protection for your system.

The choices are:

- *Disabled* (the default setting). This setting disables system security.
- *User*. A user password provides access to the system, but it does not provide access to the BIOS Setup utility.
- *Supervisor*. A supervisor password provides access to the system and to the BIOS Setup utility.

You can use two different passwords on your system, a user password and a supervisor password. This allows a system administrator (who knows the supervisor password) to control access to disk drives, peripheral ports, and so forth.

Assigning or Changing a Password

To assign or change a password, complete the following steps:

1. Select *User* or *Supervisor* from the Security option on the Setup Status screen.
2. Press **ENTER** when prompted.
3. Enter the password and press **ENTER**. The password cannot be longer than six characters.
4. When you are prompted, enter the password again to confirm it and press **ENTER**.

The password is enabled after you reboot the system. When you reboot the system, you are prompted to enter a password. You can enter either the user or the supervisor password.

What to Do If You Forget Your Password

If you forget your password, you need to erase the CMOS memory in order to delete the password.

Caution

Clearing the password erases all of the CMOS information. Therefore, make sure to write down your Setup settings before clearing the password so you can reenter the settings later.

To erase the CMOS memory,

1. Turn off the system and unplug the system unit.
2. Remove the cover, as explained in Section 5, "Upgrading Your System."
3. At this point you can either wait two to four hours for the CMOS memory to clear by itself, or you can clear it immediately by jumping the CMOS Setup Clear pad. (See the configuration map for the location of the CMOS Setup Clear pad.)

To jump the CMOS Setup Clear pad, touch both points on the pad simultaneously with a slot screwdriver.

4. Replace the system unit cover. Make sure you replace the screws that hold the cover on.
5. If necessary, run Setup and reenter your configuration settings.

Defining the Boot Sequence

When you define the boot sequence, you specify which device the system will first try to boot from (the *boot device*), for example, from drive C or from drive A. If the boot program is not found, the system will try to boot from the next device in the boot sequence.

- A, C (the default setting). This setting specifies that the system will first try to boot from drive A and, failing that, from drive C.
- C, A. This setting specifies that the system will first try to boot from drive C and, failing that, from drive A.

Defining the Virus Warning

This option enables or disables the virus warning for the system boot sector. When this option is enabled, and an attempt is made to write to the system boot sector, a warning message is displayed. The default is *Enabled*.

Defining the NumLock Boot Status

This option specifies whether the NUMLOCK key is on or off after the system boots. When the NUMLOCK key is on, you can use the numeric keypad to type numbers. When the NUMLOCK key is off, you can use the numeric keypad for cursor control keys. The default is *On*.

Defining the Characteristics of Drive C and Drive D

Use these fields to specify the physical and electronic properties of the IDE hard disk drives installed on your system. On SCSI systems, the default for these fields is *None*.

If you use this option, choose from among the drives described. Each description includes the capacity of the drive, the number of cylinders, heads, sectors, and precompression and landing zone properties. If the drive you are installing is not shown, use disk type 49 and fill in the properties that describe your drive.

Selecting Control Options

The control options are listed below:

- Bus Control
- SCSI Control
- Shadow Control
- I/O Control

Each of these options is described in the following subsections. Figure 3-2 shows the Setup Options screen that contains the control options.

Figure 3-2. Setup Options Screen

BUS CONTROL		SHADOW CONTROL	
256K Relocation	:Enabled	Shadow 16K at C8000h	:Enabled
Video Cacheable	:Enabled	Shadow 16K at CC000h	:Disabled
System Cacheable	:Enabled	Shadow 16K at D0000h	:Enabled
		Shadow 16K at D4000h	:Disabled
		Shadow 16K at D8000h	:Disabled
		Shadow 16K at DC000h	:Disabled
		Shadow 64K at E0000h	:Disabled
SCSI CONTROL		IO CONTROL	
SCSI BIOS Position	:C8000h	COM1 Select	:Enabled
SCSI Message Level	:2	COM2 Select	:Enabled
SCSI Dev ID	:7	Parallel Port Address	:0278h
SCSI Disconnect	:Enabled	IDE Select	:Enabled
SCSI Sync Transfer	:Enabled	FDC Select	:Enabled
SCSI Parity Checking	:Enabled	SCSI Control	:Enabled
SCSI Int Level	:11		
SCSI I/O Port	:340h		
ALT-F1 for Menu Help		PgUp = Status Page	
Page 02: Options Page		F10 exits	
		F2 change colors	

Defining the Bus Control Options

There are three bus control options, 256K Relocation, Video Cacheable and System Cacheable. These options are described below.

256K Relocation

This option moves unused memory to the upper end of system memory. The default is *Enabled*.

Video Cacheable

This option sets the video ROM address area as a cacheable area in 486 CPU internal cache. Since cached memory provides faster data access, this option can provide faster system performance. The default is *Enabled*.

System Cacheable

This option sets the system ROM address area as a cacheable area in CPU internal cache. This increases performance even more than shadowing. You can use this feature with or without shadowing. The default is *Enabled*.

Defining Shadow Control

Shadowing copies software from ROM (Read Only Memory) into RAM (Random Access Memory), which allows the software on your system to run faster. The shadow control settings specify which areas of ROM to shadow. Shadowing can improve the performance of feature boards that include software contained in ROM.

By default, there are two locations set to *Enable*, 16K at C4000h and 16K at C8000h. These locations enable shadowing for the system BIOS and video BIOS. You can use the remaining areas to shadow the integrated SCSI controller and feature boards that contain extension BIOS's.

Note: *Some feature boards may fail if run from shadowed RAM. If a failure occurs, try disabling shadowing for that board.*

Defining SCSI Control

The SCSI control options allow you to configure the integrated SCSI controller. These options only apply to MPI systems.

In many cases, settings made with the Setup program must correspond to system board jumper settings and to options specified when you configure the SCSI device driver. (For more information, see "Configuring SCSI Devices," later in this section.)

The SCSI control options are:

- SCSI BIOS Position
- SCSI Message Level
- SCSI Device ID
- SCSI Disconnect
- SCSI Sync Transfer
- SCSI Parity Checking
- SCSI Interrupt Level

Each of these options is described in the following subsections.

SCSI BIOS Position

This option specifies the integrated SCSI controller BIOS ROM address. If you install an alternate SCSI controller, you may need to change this option, as explained below.

The system can contain other BIOS's besides the system BIOS. For example, feature boards that control external devices sometimes have their own BIOS's; these are called extension BIOS's. The BIOS for the integrated SCSI controller is treated by the system as an extension BIOS.

Since the system scans memory to search for extension BIOS's, the memory location of the extension BIOS determines when it is executed. The SCSI BIOS Position option allows you to adjust the time at which the SCSI BIOS is executed, in relation to the other extension BIOS's.

For example, if your system contains two SCSI controllers, the integrated controller and a feature board controller, you have two choices:

- If you want the system to boot from the drive controlled by the integrated SCSI controller, set the integrated BIOS ROM position to a location *less than or equal to* the position of the feature board ROM.
- If you want the system to boot from the feature board controller, set the integrated BIOS ROM position to a location *greater* than the position of the feature board ROM.

Specifying the SCSI BIOS position does not change the actual location of the SCSI BIOS. Instead, it executes the SCSI BIOS *as if* it were located at the position you specify. For this reason, you can specify that the integrated BIOS ROM be in the same location as the BIOS ROM of another device. The integrated BIOS ROM is not really at that location, but the system acts as if it were.

SCSI Message Level

This option specifies the type of messages to be displayed when you restart your system. Choose one of the following levels:

- *Level 0.* This setting displays errors only.
- *Level 1.* This setting displays the message heading, and errors.
- *Level 2* (the default setting). This setting displays the message heading, errors, and the boot progress.
- *Level 3.* This setting displays the message heading, errors, boot progress, configuration information, and the SCSI device identification.

SCSI Device ID

This setting determines the SCSI bus identification (ID). The SCSI bus is the path for data transferred between the system and the SCSI device. Each SCSI device must have a unique ID in order to use the bus. SCSI device IDs range from 0 to 7, with 7 being the default for the integrated SCSI controller.

For information on setting the SCSI ID for additional SCSI devices, see "Configuring SCSI Devices," later in this section. Also see the information on SCSI IDs in Section 5, "Upgrading Your System."

SCSI Disconnect

When the SCSI Disconnect option is set to *Enabled*, the SCSI device can interrupt data transmission to allow multitasking. (Multitasking means running more than one program at the same time.) The default is *Enabled*.

In a software environment that does not require multitasking, the SCSI disconnect option slows the system unnecessarily. For MS-DOS systems that do not require multitasking, Unisys recommends that the ASPI2DOS.SYS device driver entry in your *Config.sys* file include a */C* switch to disable disconnect/reselect. For information on ASPI2DOS.SYS options, see "Configuring MS-DOS SCSI Device Drivers," later in this section.

SCSI Sync Transfer

When SCSI synchronous transfer is *Enabled* (the default setting), the integrated SCSI controller initiates synchronous negotiations during initialization or after a SCSI reset. With synchronous negotiations, data transmission between SCSI devices and the system is faster. If this option is disabled, the SCSI controller supports synchronous SCSI transfers, but only when the target device initiates them.

If you have an MS-DOS system and you disable synchronous data transfer, add the */U-* switch to the ASPI2DOS.SYS entry in your *Config.sys* file. For information on ASPI2DOS.SYS options, see "Configuring MS-DOS SCSI Device Drivers," later in this section.

SCSI Parity Checking

The SCSI parity check is a simple data verification procedure. The default for this option is *Enabled*.

If you change this value to *Disabled* on an MS-DOS system, add the parity-checking disabled switch (*/Y-*) to the ASPI2DOS.SYS device driver entry in your *Config.sys* file. For information on ASPI2DOS.SYS options, see "Configuring MS-DOS SCSI Device Drivers," later in this section.

SCSI Interrupt Level

This option specifies the interrupt request line (IRQ) to be used by the integrated SCSI controller. (An IRQ is a hardware line used by devices to send a specific type of communication, called an *interrupt*, to the central processing unit.) The default for this option is *11*.

If you change this setting, you need to change the SCSI Interrupt Select

Defining I/O Control

You use the I/O control options to configure the system input/output ports, for example, the parallel port and serial ports. These ports are usually used to link your system to peripherals, such as printers.

The I/O control options are:

- COM 1 Select
- COM 2 Select
- Parallel Port Address
- IDE Select
- FDC Select
- SCSI Control

Each of these options is described in the following subsections.

COM 1 Select

This option enables or disables the Serial A port. The default is *Enabled*. You may want to disable this port if you install a feature board and need to use the I/O port normally assigned to COM 1.

COM 2 Select

This option enables or disables the Serial B port. The default is *Enabled*. You may want to disable this port if you install a feature board and need to use the I/O port normally assigned to COM 2.

Parallel Port Address

This option specifies the address for the parallel port. You can also use this option to disable the parallel port.

IDE Select

This option enables or disables the internal IDE disk drive controller. The default is *Enabled*. The system will still function properly if the option is set to *Enabled* and you do not have an IDE drive installed. This option is available only on three-slot systems.

FDC Select

This option enables or disables the floppy disk controller. The default is *Enabled*. You should disable the internal floppy disk controller if you install a floppy disk controller on a feature board.

SCSI Control

This option enables or disables the integrated SCSI controller. The default is *Enabled*. You may want to disable the integrated SCSI controller if you install a SCSI controller on a feature board. You can, however, use both the integrated SCSI controller and a SCSI controller on a feature board. For more information, see "Configuring SCSI Devices," later in this section.

Installing MS-DOS Device Drivers

Device drivers are software programs that are used by the CPU to communicate with devices on your system. To install MS-DOS device drivers, you use the driver installation floppy disks that came with your system. These floppy disks include video drivers for popular MS-DOS applications and interfaces, SCSI device drivers, and Ethernet LAN drivers.

Note: *Some applications require that you install the application software before installing device drivers. You should install your MS-DOS applications before you install the device drivers.*

To install MS-DOS device drivers,

1. Insert floppy disk 1 in drive A.
2. Change the MS-DOS prompt to A: by typing **a:** and pressing **ENTER**.
3. Type **install** at the prompt and press **ENTER**. The driver installation program starts. The first screen describes the program and lists the drivers that you can install. Use the following keys to make selections in the driver installation program:
 - Use the arrow keys to highlight options.
 - Press **ENTER** to choose an option.
 - Press **ESC** to cancel a screen or exit the program.
4. Choose the driver you want to install and press **ENTER**. Note the following points:
 - Most video drivers are identified by the application program they support, for example, *Lotus 1-2-3*®.

- When you install SCSI drivers from the driver installation floppy disk, you can choose from a list of SCSI device drivers and MS-DOS SCSI disk utilities. For MPI systems, choose the device driver `ASPI2DOS.SYS`. If you install an alternate SCSI controller, see the documentation for the controller to determine which device driver to install.

Note: *After installing SCSI device c drivers, you need to edit your `Config.sys` file. See the discussion "Configuring MS-DOS SCSI Device Drivers," later in this section.*

- Some of the device drivers are stored on an additional driver floppy disk. You may be prompted to change floppy disks to install some drivers. Also, some drivers may not be stored on the driver floppy disks. In that case, they are stored on the floppy disks that came with the hardware requiring the driver.
- At various times in the installation, you might be asked to specify alternate directories on which to install drivers. You can change the directories if you want, but the defaults should work in almost all cases.
- The driver installation floppy disks include the MS-DOS `FRESH.EXE` utility. This utility keeps the display from flickering at a resolution of 800 x 600 pixels. After installing this utility, enter the following line in your `AutoExec.bat` file, as explained in the file `\Monitor\Refresh.txt`:

```
C:\Monitor\REFRESH 800 2
```

5. Press `ESC` to exit the program.

Some applications require additional configuration changes after you install the device driver. See the documents that came with the application for more information.

Configuring SCSI Devices

On MPI systems, you can connect SCSI devices to the integrated SCSI controller, to an optional feature board, or to both.

On ELI systems, since there is no integrated SCSI controller, you can only connect SCSI devices to an optional feature board.

This discussion includes information on the following:

- Configuring MS-DOS SCSI device drivers
- SCSI system board settings
- Using SCSI controller feature boards
- Using MS-DOS SCSI disk utilities

See the following discussions for additional information about SCSI devices:

- For information on installing SCSI devices, see Section 2, "Installing Your System."
- For information on installing feature boards, see Section 5, "Upgrading Your System."
- For additional information on SCSI configuration, see the discussion on SCSI control, earlier in this section.
- For information about SCSI feature boards or external devices, see the documentation that came with the board or device.

Configuring MS-DOS SCSI Device Drivers

MS-DOS SCSI device drivers are installed from the driver installation floppy disk, as explained earlier in this section (see "Installing MS-DOS Device Drivers").

After installing the MS-DOS SCSI device drivers, you need to edit your *Config.sys* file. The *Config.sys* file tells the system which device drivers to load, and where they are located. The recommended *Config.sys* entry for MPI systems using the integrated SCSI controller is as follows:

```
DEVICE=C:\SCSI\ASPI2DOS.SYS /Z /C
```

This entry tells the system to use the ASPI2DOS.SYS device driver, and that it is located on the C hard disk, in the directory named SCSI. The /Z and /C switches are recommended ASPI options for most configurations.

You can alter your *Config.sys* file by editing it with a text editing or word processing program that creates ASCII or text-only files.

Tables 3-1 and 3-2 show the ASPI device driver options. Note the following points:

- The options are divided into two groups, Group 1 and Group 2. You must define the Group 1 options for your SCSI devices to operate properly. Group 2 options are not required, but you can specify them if you want.
- You cannot enable and disable an option at the same time. For example, you cannot use the /C switch and the /C- switch in the same entry.
- When specifying the options described below, make sure that the configuration values you enter in the *Config.sys* file match the configuration values specified in the SCSI configuration options in the BIOS Setup utility. (See "The BIOS Setup Utility," earlier in this section.) Some of the options also require changes to the jumper settings on the system board.

Table 3-1. ASPI2DOS.SYS Group 1 Options

Option	Function	Notes
/C	Prevents SCSI target disconnection during command execution	Recommended for nonmultitasking applications. Changing this option requires a change in the SCSI Disconnect option in Setup.
/C-	Allows SCSI target disconnection	Usually slows system performance on system not multitasking. Changing this option requires a change in the SCSI Disconnect option in Setup.
/TD	Allows DMA data transfer	The DMA channel is specified by jumpers on the system board.
/TP	Allows data transfer as programmed I/O	Recommended (not compatible with /TD).
/Y	Disables SCSI parity check by the integrated controller	Changing this option requires a change in the SCSI Parity Check option in Setup.
/Y-	Enables SCSI parity check by the integrated controller	Changing this option requires a change in the SCSI Parity Check option in Setup.
/U	Enables SCSI controller to initiate synchronous negotiation	Recommended in most cases. Changing this option requires a change in the SCSI Parity Check option in Setup.
/U-	Synchronous data transfer occurs only when initiated by the target device	Changing this option requires a change in the SCSI Parity Check option in Setup.
/Ax	SCSI controller DMA channel	Changing this option requires resetting the SCSI DMA jumpers on the system board, as shown on the configuration map.
/Hx	SCSI controller ID	Normally 7. Changing this option requires a change in the SCSI Device ID option in Setup.
/Qx	SCSI controller IRQ channel	Changing this option requires resetting the SCSI Interrupt Select jumpers on the system board, as shown on the configuration map.

Table 3-2. ASPI2DOS.SYS Group 2 Options

Option	Function	Notes
/D	Displays debugging information when the system restarts	
/L	Instructs the SCSI controller to address drives with logical unit numbers (LUNs) other than 0	Without this option, only LUNs equal to 0 are addressed. With this option, the driver can recognize all eight possible SCSI LUNs on each target device.
/Pxxx	Integrated SCSI controller port address	Changing this option requires resetting the SCSI DMA jumpers on the system board, as shown on the configuration map. You also need to set the SCSI I/O Address option in Setup.
/Nx	AT bus-on time	Maximum value is 15 microseconds.
/F	AT bus-off time	Minimum is 1 microsecond; maximum is 15 microseconds.
/I	Disables loading of INT13 rerouter	Used for debugging only.
/Z	Sets ASPI2DOS.SYS options to default values	Equivalent of specifying: /C- /TP /U /A0 /H7/ Q11; can be modified by adding explicit Group 1 options following /Z.

SCSI System Board Jumper Settings

Some system configuration options are set with jumpers located on the system board, in addition to options selected in the BIOS Setup utility. The system board jumper selections related to the integrated SCSI controller are as follows:

- **SCSI I/O Address Select.** Use these jumpers to select the I/O port address for the primary SCSI controller (the default is 0340h). On MS-DOS systems, you need to make a corresponding change in the SCSI device driver entry in the *Config.sys* file.
- **SCSI Disable.** Use these jumpers to enable or disable the integrated SCSI controller (the default is *Enabled*). If you change these jumpers, you need to set the SCSI Control option in the BIOS Setup utility, as described earlier in this section.
- **SCSI DMA.** Use these jumpers to select DMA request and acknowledge channels
- **SCSI Interrupt Select.** Use these jumpers to select the interrupt request dedicated to the integrated SCSI controller (the default is IRQ[11]). This setting requires that you make a change in the BIOS Setup utility. On MS-DOS systems, you need to make a corresponding change in the SCSI device driver entry in the *Config.sys* file.

For information on the location and settings of these jumpers, see the system board configuration map.

Using SCSI Controller Feature Boards

ELI systems do not have an integrated SCSI controller, so any SCSI devices you connect to the system must be attached to a SCSI controller on a feature board.

MPI systems have an integrated SCSI controller. Therefore, you can connect SCSI devices to the integrated SCSI, to a feature board, or to both. If you use a feature board in an MPI system, you have two options:

- Use the SCSI controller on the feature board *instead of* the SCSI controller on the system board.
- Use the SCSI control on the feature board *in addition to* the SCSI controller on the system board.

Using a SCSI Feature Board Instead of Integrated SCSI

If you want to use the SCSI controller on a feature board instead of the integrated SCSI, you need to do the following:

1. Set the SCSI Interrupt Select jumper that reserves an interrupt request (IRQ) line for the integrated SCSI controller so that the IRQ can be used by the alternate SCSI controller (SCSI IRQ[11]).
2. Install the feature board containing the alternate SCSI controller. Follow the instructions in Section 5, "Upgrading Your System," and the instructions that came with the feature board.
3. Remove the hard disk drive in-use indicator connector on the system board and plug it onto the appropriate connector on the alternate SCSI controller feature board. See the configuration map for the location of the hard disk drive in-use connector.
4. Run the Setup program and set the *SCSI Control* option to *Disabled*.

Using a SCSI Feature Board in Addition to Integrated SCSI

To use a SCSI controller on a feature board in addition to the integrated SCSI controller:

1. Ensure that the I/O port address assigned to the integrated SCSI controller does not conflict with the I/O port address of the alternate controller or any other feature board.
2. Make sure that the interrupt request line (IRQ) for the integrated SCSI controller and the feature board SCSI controller do not conflict. The default IRQ for the integrated SCSI controller is 11. To change the IRQ for the integrated SCSI controller, use the *SCSI Interrupt Level* option in the Setup program, and change the SCSI Interrupt Select jumper on the system board.
3. Install the feature board containing the alternate SCSI controller. Follow the instructions in Section 5, "Upgrading Your System," and the instruction that came with the feature board.
4. Run the Setup program and use the *SCSI BIOS Position* option to specify which SCSI controller will control the boot device. For information, see "SCSI BIOS Position," earlier in this section.

ASPIDISK.SYS

ASPIDISK.SYS, a device driver, is required in MS-DOS SCSI systems that include SCSI devices with removable media, or any SCSI drives above drive D, for example, drive E, drive F, and so on.

Drives running ASPIDISK.SYS can be partitioned with AFDISK.EXE, a utility program installed automatically from the driver installation floppy disk. (For information on AFDISK, see "Using MS-DOS SCSI Disk Utilities," later in this section.)

Note: Use the FDISK program (not AFDISK) to format hard disk drives C and D. Use AFDISK.EXE to format SCSI drives above drive D, for example, drive E, drive F, and so forth.

The entry in the *Config.sys* file that loads ASPIDISK.SYS is inserted automatically when you use the driver installation program (unless you decided to type in the entry yourself in the *Config.sys* file). The entry should appear on a line immediately after the instruction for loading ASPI2DOS.SYS, as shown below:

```
DEVICE=ASPI2DOS.SYS /Z /C
DEVICE=ASPIDISK.SYS
```

Table 3-3 lists the ASPIDISK.SYS options.

Table 3-3. ASPIDISK.SYS Options

Option	Function	Notes
/D	Displays debugging information when the system restarts	This switch is ignored for hard disks with nonremovable media. The variable x is the number of reserved drives. If x is not specified, the number of reserved logical drives is one.
/Rx	Determines the number of logical drives reserved for removable media	

Using MS-DOS SCSI Disk Utilities

In addition to installing SCSI drivers on your system, the driver installation program installs the following SCSI disk utilities:

- AFDISK
- SCSIFMT
- SHOWSCSI

These utilities are used for preparing SCSI disks for operation. These utilities are discussed in the following subsections.

Partitioning SCSI Hard Disk Drives with AFDISK

The standard system BIOS supports a maximum of two physical hard disk drives. AFDISK extends disk drive support beyond the two-drive limitation in BIOS. AFDISK initializes and partitions additional SCSI drives with removable media.

Caution

Do not use the AFDISK program with drives C and D. Drives C and D are not drives that use removable media. For drives C and D, use the MS-DOS FDISK program instead.

To start AFDISK, change your path to the disk and directory containing the program (usually `C:\SCSI`), type **afdisk**, and press **ENTER**. (For information on using AFDISK, press **F1** for online help.) When you're finished, press **ESC** to exit the program. Changes to the system made through AFDISK take effect when you restart the system.

Configuring Your System

The full syntax for the AFDISK command is *afdisk {/m or /mono} {/?}*, for example, **afdisk /m /?** (The braces indicate optional parameters; *do not* enter the braces in the command line.) The /m and /mono switches force AFDISK to run in monochrome mode, which is necessary on some monitors. If the AFDISK screens do not display properly even with the /m or /mono switch, try using the DOS Mode **BW80** command before running AFDISK. (Remember to use the DOS Mode **CO80** command when you have finished.)

Formatting and Verifying Disks with SCSIFMT

Use SCSIFMT to perform a low-level format on SCSI disks, or to verify the integrity of SCSI disks. SCSIFMT supports multiple SCSI controllers and can be used even if SCSI device drivers are not installed.

To start SCSIFMT, path to the directory where SCSIFMT is installed (usually *C:\SCSI*), type **scsifmt**, and press **ENTER**.

The full syntax for the SCSIFMT command is *scsifmt {/m or /mono} {/?}*, for example, **scsifmt /m /?** (The braces indicate optional parameters; *do not* enter the braces in the command line.) The /m and /mono switches force SCSIFMT to run in monochrome mode, which is necessary on some monitors. If the SCSIFMT screens do not display properly even with the /m or /mono switch, try using the DOS Mode **BW80** command before running AFDISK. (Remember to use the DOS Mode **CO80** command when you have finished.)

A SCSI hard disk drive receives a low-level format during manufacturing. You may want to perform a subsequent low-level format on the drive in any of the following circumstances:

- To destroy any data previously stored on the drive.
- As a confidence test to confirm that a drive that does not contain software or data is operational.
- As a last step in returning a drive to service if it does not respond to high-level formatting and partitioning with operating system software, such as the FDISK or AFDISK programs.
- If you are changing operating systems. A drive that has received high-level formatting for one operating system may require low-level formatting before it will accept high-level formatting for another operating system.

Low-level formatting can take 10 minutes or longer.

Caution

Copy any useful software or data from the drive *before* you perform low-level formatting. Data cannot be recovered, even by an "unerase" utility program, after a low-level format.

The low-level formatting utility works one of two ways. If the drive's characteristics are known in advance, the formatting utility instructs the drive's controller to perform a low-level format. (The drive identification comes from the drive itself, and the appearance of a drive's correct manufacturer and model number does not necessarily mean that the drive's characteristics are known to the formatting utility.)

If the drive's characteristics are unknown, the utility writes zeros (hexadecimal 0) to every data storage location on the drive. The result is the functional equivalent of a low-level format.

After a low-level format, you need to initialize the drive using your operating system utilities.

If SCSIFMT encounters any difficulties while running, confirm that:

- Two or more devices do not share the same SCSI ID.
- Data and power cables are properly installed.
- External devices are turned on before the system is started.
- SCSI terminators are installed only at the ends of the bus and not on intermediate devices.

Turn the power off before trying to correct any errors revealed by these checks.

Using SHOWSCSI

SHOWSCSI is a Windows™ utility that provides information about SCSI devices installed on your system.

SHOWSCSI is automatically copied to your hard disk by the driver installation program. To run SHOWSCSI in Windows, you need to install it as a program item or run it from the File Manager. (See your MS-DOS Windows manual for information.)

Configuring Video

Your system's integrated video controller supports most video modes without requiring any special configuration. Depending on your software or hardware, however, you may need to add an additional video feature board, which may require some system configuration.

This discussion includes information about the following:

- Supported video modes
- Using a video feature board

Supported Video Modes

The integrated video controller supports all of the standard VGA modes, including MDA, HGC, CGA, EGA, VGA, SVGA (Super VGA), and extended mode VGA. Supported resolutions are 640 x 480, 800 x 600, 1024 x 768, and 1280 x 1024.

SVGA modes require an appropriate SVGA monitor, and application programs may require special drivers to take advantage of this capability.

The system board's back-panel 15-pin high-density monitor connector supports standard VGA video cables. The video output drives industry-standard VGA monitors, including models supplied by Unisys.

You can also install a video controller feature board to use instead of or in addition to the integrated video controller.

Using a Video Feature Board

You can use a video controller feature board instead of the integrated video controller. If you do, you need to reset jumpers on the system board to disable the integrated video controller. For information on jumper settings, see the configuration map that came with your system.

Some video controller feature boards work in tandem with a VGA controller, typically connecting to the VGA controller through a ribbon cable. In this case, you do not disable the integrated video controller.

If you have a six-slot system, reserve the slot closest to the power supply for feature boards designed to connect to a VGA controller. If you have a three-slot system, reserve the lowest slot for feature boards designed to connect to a VGA controller. Connect the feature board to the VGA pass-through connector. Observe Pin 1 orientations. (See the configuration map for information on the video feature connector.)

Configuring Your System for Ethernet

You can install an Ethernet board in ELI and MPI systems. For information on installing feature boards, see Section 5, "Upgrading Your System."

If you are going to use Ethernet on MS-DOS systems, you need to install the Ethernet drivers from the driver installation floppy disk. See "Installing MS-DOS Device Drivers," earlier in this section.

You should power on your system and make sure it is functioning properly *before* connecting it to a network. That way, if you find any problems, you'll know they are system problems and not problems related to the network.

Installing Software

If everything is working properly, and your system did not come with preinstalled software, it's now time to install your software.

The basic steps for installing software are as follows:

1. Install the operating system software. This is the software that, to put it simply, makes your computer work.
2. Install application software and utilities. *Application software* refers to the programs that you do your daily work with, for example, word processing programs or spreadsheet programs. *Utilities* are specific, single-purpose programs usually used for managing part of your system, for example, a screen-saver program.

Where to Go From Here

By now, your hardware should be installed and your system should be properly configured. If you encountered any problems with the installation, see Section 4, "Troubleshooting Your System."

Section 4

Troubleshooting Your System

This section discusses some of the problems you can experience during hardware installation. Section 4 also tells you how to solve these problems using a process called troubleshooting. When you troubleshoot your workstation, you observe the way your equipment behaves and collect all pertinent data on the failure (error messages, and so forth). You then eliminate the causes of the problem, one by one.

Section 4 focuses on some of the most common installation failures. If your workstation experiences a failure not described in this section, you may need to place a service call. This section reviews the following subjects:

- Typical workstation startup
- Solving workstation problems
 - Preliminary checks
 - Troubleshooting an installation problem
 - Common failures
 - Components you can replace

Typical Startup Sequence

When you turn on your workstation, the system executes a predefined set of activities related to hardware initialization, confidence testing, and so forth. This set of activities is known as a startup sequence. Your workstation must complete each action in the sequence before you can consider it operational. Here is an overview of the startup sequence.

1. Your system receives power and lights the Power LED on the front of the system unit. The power supply fan begins to rotate.
2. The system begins the Power-On Self-Test (POST). This test verifies that the system memory, system board, video controller, floppy disk drives, hard disk drives, drive controllers, and peripheral devices are all operational. The system emits one short beep to indicate that it has passed the POST test.

Note: *If the POST test detects an error, it displays an error message on the monitor. Also, it may emit a corresponding beep code, an error message consisting of speaker tones arranged in distinctive patterns. For information on what to do for POST test errors, see "Solving Workstation Problems," later in this section.*

3. As the POST test executes, it displays system values (processor size, memory size, and so forth) and settings on the monitor screen. Be sure to verify that these values match your actual system configuration. If you need more time to read the screen, press the **PAUSE** key to freeze the POST test. To resume the test, press the **SPACEBAR**.
4. The keyboard LEDs blink on and off, and the Floppy Disk LED for each floppy disk drive lights briefly.
5. If a hard disk drive is installed, the Hard Disk LED on the front of the system unit lights.
6. If you have a properly configured hard disk drive with a boot partition that contains operating system software, the operating system load messages appear on the monitor. These messages are followed by the operating system prompt.

Note: *If the operating system is not yet installed or the system configuration in CMOS memory is not correct, the system does not issue load messages. Also, if you have preinstalled software that includes Windows, the system does not issue operating system load messages.*

When a workstation experiences problems during startup, it either halts the sequence or generates an error message to indicate that a failure has occurred. The following paragraphs discuss some of the actions you can take to resolve an installation problem.

Solving Workstation Problems

Your system is designed for simple, trouble-free installation and maintenance. As a rule, your first attempt to power up your equipment will be a successful one. However, systems sometimes have easily remedied problems when they are first installed.

As mentioned, your workstation follows a specific routine each time you turn it on. Variations from this routine indicate that your equipment may have a failure. If your system does not power up normally, do not be alarmed; fixing a workstation can be as simple as reseating a loose cable. When you think about a problem, keep in mind that your best tools are common sense and deductive reasoning. The following paragraphs guide you through basic installation troubleshooting.

Preliminary Checks

If your workstation does not power up correctly after you have installed it, you may have any of several minor problems. Problems that occur the first time you turn on your system are usually the result of installation errors or an incorrect CMOS hardware configuration. Occasionally, the problem is the result of an actual hardware failure.

If your system fails when you first start it, review the installation and configuration process and reread applicable sections of this guide or other pertinent documentation. Try to answer the following questions:

- Is the Voltage Select switch set for the correct line voltage?
- Are all power cables connected correctly and all power switches turned on?
- Are all interface cable connections secure and correct?
- Are all jumper and switch settings on the system board and peripheral devices correct? For information on the system board jumpers, see the configuration map on the system unit cover.
- Are all feature boards and drives installed correctly?
- Are the values listed in the BIOS Setup utility correct? For more on the BIOS Setup utility, see Section 3.

- If your system includes SCSI drives, do values recorded in the BIOS Setup utility conflict with the values used for the SCSI device drivers? For information on the BIOS Setup utility and SCSI drivers, see Section 3.
- If your system does not include preinstalled software and you cannot load your operating system, did you follow the instructions correctly for loading your operating system? For information on your operating system, see the manuals that came with your software package.

If all these items are correct and the problem recurs, or if you experience a problem that makes it impossible to answer these questions, you will have to do further troubleshooting. Read the next paragraphs to learn more about the troubleshooting process.

Troubleshooting an Installation Problem

If you have an installation failure that cannot be solved by the measures just discussed, you need to study the problem more closely. Your goal should be to eliminate possible causes of the problem until you can determine which components are contributing to the failure. You may find the following approach helpful.

1. If you have not already done so, turn off the system unit and the monitor.
2. If you have not already done so, disconnect any serial or parallel devices (printers, modems, and so forth) from the system unit.
3. Make sure the monitor and keyboard are correctly connected to the system unit.
4. Make sure that the system unit is connected to a properly grounded power outlet. Also verify that the Voltage Select switch is set to the correct voltage.
5. Turn on the monitor and make sure the brightness and contrast controls are turned up at least two-thirds of the way. If you are not sure how to set the brightness and contrast controls, see the documentation that comes with your monitor.
6. Make sure there is no floppy disk in the floppy disk drive.
7. Turn on the system unit.

8. Observe the system's startup sequence. Your system should complete each of the steps described in "Typical Startup Sequence," earlier in this section. If the system does not complete a step, the component activated during that step may be faulty. For example, if the Floppy Disk LED does not light, you may have a bad floppy disk drive. For more on how to resolve problems of this sort, see "Common Problems," later in this section. When you have fixed the problem, return to step 1.
9. If the system issues any error messages during the startup sequence, take the appropriate corrective action. For suggestions, see "Common Problems," later in this section. When you have fixed the problem, return to step 1.

Note: *If the system issues a beep code only or the message does not tell you enough to isolate the problem, contact your Unisys Customer Service Engineer (CSE).*

10. If you isolate the problem to a specific device (for example, a keyboard or monitor) and that device came with repair instructions, try to fix the device in question. When you have fixed the problem, return to step 1.
11. If you do not have preinstalled software but you plan to store your operating system on a hard disk drive, partition and format the hard disk drive appropriately. For instructions, see the operating system manuals. Load the operating system from the drive.
12. Select each hard disk drive or hard disk drive partition in turn to verify that all drives and partitions can be accessed. If you cannot access the drives, the drives may be incorrectly partitioned or configured. For more information, see your operating system documentation and Section 3 of this guide.
13. If you were experiencing problems with a particular program, try running that program. If the problem recurs, see the software documentation for instructions on setting up program parameters. You can also try disabling cache memory and BIOS shadowing.

When your system passes all of the steps just described, you can consider the troubleshooting process complete. Be sure to turn off your system and reconnect any devices that you disconnected during your troubleshooting effort.

Common Problems

For an idea of how to solve problems that can occur during installation and operation, see Table 4-1. This table provides a list of common problems accompanied by several solutions. Try each solution in the order indicated by the table. Each time you implement one of these solutions, test it using the procedure described in "Troubleshooting an Installation Problem," earlier in this section. If you still cannot correct the problem, contact your Unisys CSE for help.

Note: *Faulty devices can cause problems that are difficult to isolate. An effective approach is to replace each suspected device, one at a time, with a known-good identical device and retest the system. If the problem disappears after you replace a device, you have isolated the problem. To find out which devices you can replace, see "Components You Can Replace," later in this section. Should the problem persist, contact your Unisys CSE.*

Table 4-1. Troubleshooting Guide

Problem	Solution
Nothing happens when I turn on the power.	<ul style="list-style-type: none"> — Make sure the power outlet is live and that the system unit Voltage Select switch is set correctly. — Make sure both ends of the system unit power cable are plugged in and firmly seated. — Check the seating on any other power cables.
My workstation periodically powers off by itself.	<ul style="list-style-type: none"> — Make sure the power outlet is live and that the system unit Voltage Select switch is set correctly. — Make sure both ends of the system unit power cable are plugged in and firmly seated. — Check the seating on any other power cables. — Check the monitor interface cable to make sure neither end has been accidentally pulled free.

Continued

Table 4-1. Troubleshooting Guide (Cont.)

Problem	Solution
<p>The fan at the back of my system does not rotate.</p>	<ul style="list-style-type: none"> — Make sure the power outlet is live and that the system unit Voltage Select switch is set correctly. — Make sure both ends of the system unit power cable are plugged in and firmly seated. — With the power off, remove all feature boards and disconnect all internal drives. Turn on the system. If the problem does not reoccur, one of the devices you removed was the cause of the problem. Replace each device one at a time, testing the system after each device is reconnected. When the problem reoccurs, you have found the failing device.
<p>My system unit Power LED does not light.</p>	<ul style="list-style-type: none"> — Check the system unit fan. If the fan is rotating and the system is running normally otherwise, the Power LED may be defective. Contact your CSE for help. — If the system is not running normally, make sure the power outlet is live and that the system unit Voltage Select switch is set correctly. — Make sure both ends of the system unit power cable are plugged in and firmly seated. — With the power off, remove all feature boards and disconnect all internal drives. Turn on the system. If the problem does not reoccur, one of the devices you removed was the cause of the problem. Replace each device one at a time, testing the system after each device is reconnected. When the problem reoccurs, you have found the failing device.
<p>The monitor screen is dark when I turn on the power.</p>	<ul style="list-style-type: none"> — Make sure the monitor power cable is plugged into a power source (system unit or wall socket). — Check the monitor interface cable to make sure neither end has been accidentally pulled free. — Make sure the monitor brightness and contrast controls are turned up all the way. — Make sure all system board video jumpers are set correctly. For information on system board jumpers, see the configuration map on the system unit cover. — Make sure that you installed the correct video drivers.

Continued

Table 4-1. Troubleshooting Guide (Cont.)

Problem	Solution
<p>The characters on my monitor screen are distorted.</p>	<ul style="list-style-type: none"> — Check the monitor interface cable to make sure neither end has been accidentally pulled free. — Make sure the monitor interface cable is not damaged. — Use the monitor screen controls to adjust the screen values. — Make sure that you installed the correct video drivers.
<p>The images on my monitor screen flicker or waver.</p>	<ul style="list-style-type: none"> — Check the monitor interface cable to make sure neither end has been accidentally pulled free. — Make sure the monitor interface cable is not damaged. — Use the monitor screen controls to adjust the screen values. — Make sure that nearby florescent lights and other monitors are not causing interference. — Make sure that you installed the correct video drivers and that you chose a driver with the correct refresh rate.
<p>The entire screen is not displayed.</p>	<ul style="list-style-type: none"> — Use the monitor screen controls to adjust the screen values. — Make sure that you installed the correct video drivers.
<p>When I type on the keyboard, the characters that appear on the monitor are incorrect.</p>	<ul style="list-style-type: none"> — Make sure that no debris has fallen between the keys. Try turning the keyboard upside down and shaking it to dislodge any conductive material that may be shorting the keyboard contacts. — Test the keyboard to find out whether any of the keys is sticking. If so, some one may have spilled liquid on your keyboard, and you will have to take the keyboard apart to clean it.

Continued

Table 4-1. Troubleshooting Guide (Cont.)

Problem	Solution
When I type on the keyboard, nothing appears on the monitor screen.	<ul style="list-style-type: none">— Check the monitor and keyboard interface cables to make sure neither cable has been accidentally pulled free.— Make sure the keyboard interface cable is connected to the correct system unit receptacle. The keyboard cable fits in the mouse receptacle, but does not function properly if you plugged the cable into this port by mistake.
When I move my mouse, the cursor does not move.	<ul style="list-style-type: none">— Clean the mouse and make sure the mouse interface cable has not been accidentally pulled free.— Make sure the mouse interface cable is connected to the correct system unit receptacle. The mouse cable fits in the keyboard receptacle, but does not function properly if you plugged the cable into this port by mistake.— Verify that the correct mouse drivers or software have been installed.
My workstation does not issue a beep code when I turn it on.	<ul style="list-style-type: none">— Check the system unit fan. If the fan is rotating and the system is running normally otherwise, the speaker may be defective. Contact your CSE for help.— With the power off, remove all feature boards and disconnect all internal drives. Turn on the system. If the problem does not reoccur, one of the devices you removed was the cause of the problem. Replace each device one at a time, testing the system after each device is reconnected. When the problem reoccurs, you have found the failing device.
The Floppy Disk LED does not light.	<ul style="list-style-type: none">— Make sure the floppy disk drive interface cable and power cable are properly connected.— Verify that all system board jumpers related to the floppy disk drive are correctly set.

Continued

Table 4-1. Troubleshooting Guide (Cont.)

Problem	Solution
<p>The Hard Disk LED on the front of the system unit does not light.</p>	<ul style="list-style-type: none"> — Make sure the cable from the LED to the system board is properly seated in the system board socket. — Make sure the hard disk drive interface cable and power cable are properly connected. — Verify that all system board jumpers related to the hard disk drive are correctly set. — Verify that the correct hard drive configuration is stored in CMOS memory. You can check your configuration by running the BIOS Setup utility.
<p>The Hard Disk LED on the front of the system unit is always lit or lights and turns off immediately.</p>	<ul style="list-style-type: none"> — Turn on the system unit. Listen to the system unit and try to determine whether you can hear the hard disk spinning. — If you have a SCSI hard disk drive, make sure the SCSI ID is correctly set. For more on setting SCSI IDs, see Section 5.
<p>My workstation does not boot when I turn it on.</p>	<ul style="list-style-type: none"> — If you are installing an operating system from removable media, make sure the correct media is inserted in the drive. — Check the Floppy Disk LED to make sure the drive is reading the media.
<p>My workstation cannot communicate with the network.</p>	<ul style="list-style-type: none"> — Make sure all network cables are properly connected and the Ethernet LAN card jumper settings are correct. — Make sure that you installed the Ethernet drivers correctly. — Reboot the server. Alert all users first.

Continued

Table 4-1. Troubleshooting Guide (Cont.)

Problem	Solution
My operating system does not load from the hard disk.	<ul style="list-style-type: none">— Make sure the hard disk drive has undergone low-level formatting.— Load the operating system from a floppy disk and verify that the hard disk has been correctly partitioned and that the operating system was installed correctly in the boot partition.— Make sure all system and drive jumpers are correctly set.
The application software I just installed does not run properly.	<ul style="list-style-type: none">— Make sure your software and system are correctly configured. For information on software configuration, see the manuals that come with your application.— Make sure you are using an authorized copy of the application software.— Check the keyboard, system board, and video jumper settings to make sure they are correct.— Make sure that your system unit has enough memory and disk space to run the program.
My system and software have been running correctly but suddenly fail.	<ul style="list-style-type: none">— If the problem occurs when you run a program from a floppy disk, try different copy of the program.— If the problem is intermittent, check all cable connections and SIMMs. Also be sure there is no debris in the keyboard or mouse. Try to determine whether any other system component is experiencing random failures.— If the problem occurs regularly, look for a noticeable pattern in the failure. For example, a problem that occurs exclusively with one file may be the result of data corruption in the file or a faulty disk. Try re-creating the data file or using a new copy of the program in question.— If you added or modified any of your hardware or software, remove the additions or changes one by one. If the problem disappears, it was probably the result of the last change you removed.

Components You Can Replace

Your system includes a number of components and devices that you can replace yourself. If you isolate a failure to one of these devices, you can order an identical device and substitute it for the failing component. When you replace a device yourself, you lower the service costs for your system by reducing the number of service calls you place. For tips on replacing system components, see Sections 2 and 5.

Here is a list of customer-replaceable components:

- 33- and 66-MHz processor chips
- System memory chips (SIMMs)
- External cache memory chips
- Video memory upgrade chips
- Ethernet card
- Feature boards
- Hard disk, floppy disk, CD-ROM, or tape drives
- Monitor
- Keyboard
- Mouse
- Serial and parallel devices (printers, plotters, modems, and so forth)
- AC input power cables
- Interface cables

Some of the components in your system are *not* customer-replaceable. If you isolate a hardware failure to one of these components, call your Unisys Customer Support Center for assistance. Here is a list of components that are not customer-replaceable:

- Power supply
- System board
- System unit LEDs, switches, and system lock (six-slot systems only)

Section 5

Upgrading Your System

You can enhance your workstation's performance by adding various components to the system board. You can also increase the workstation's storage capacity by installing extra drives in the system unit. This section tells you how to install the equipment upgrades available for the ELI and MPI systems. Be aware that some of the upgrades discussed in Section 5 may not apply to your system. For example, if you have an ELI system, you cannot upgrade your workstation by adding internal SCSI equipment. To learn more about the upgrades available for your system, see Section 1. The topics covered in Section 5 are as follows:

- Upgrading the processor
- Upgrading the system memory
- Adding cache memory
- Upgrading the video memory
- Adding an Ethernet card
- Adding feature boards
- Adding internal disk drives

Preliminary Notes

As you read Section 5, consider the following points:

- Section 5 discusses connecting various types of equipment to the system. Your workstation may not include every component. Feel free to skip material that does not apply to your system.
- Remember to treat any directional references as though you were looking at the front of the equipment. In other words, "left" means "toward the left side as viewed from the front of the device."
- When using screws to secure components, be sure to leave the screws loose until all screws are in place. Once all the screws are positioned, tighten each one. This technique prevents misalignment of the screw holes and brackets.

Avoiding Electrostatic Discharge

Whenever you remove the system unit cover to upgrade your workstation, your system faces the risk of damage through electrostatic discharge (ESD). This risk is also present for some of your upgrades from the time you unpack them to the time you complete the installation. To minimize this risk, *be sure* to comply with all of the following precautions.

Caution

Damage from electrostatic discharge can result from such everyday activities as walking on rugs during periods of high humidity. The best precaution is to treat all electronic assemblies as though they contain static-sensitive components.

- Keep static-sensitive components (processor chips, video memory chips, and so forth) in their packages until you are ready to install them.
- Before removing a component from its package, sit down and hold the package in one hand and touch the system unit frame with the other. Then, take the component out and install it immediately. Do *not* stand up or shuffle your feet until you finish installing the component.
- Handle components by their edges; avoid touching their leads, connectors, or contact points.
- If you need to remove a component from the system, be sure to store it in antistatic packaging right away.

Removing the System Unit Cover

Before you upgrade your system, you need to remove the system unit cover. Whether you have a three-slot system or a six-slot system, this procedure is very straightforward. Remember, once you remove the cover, you risk damaging the components in your system through electrostatic discharge (ESD).

Removing the Cover from a Three-Slot System

To remove the cover from a three-slot system, complete the following steps:

1. Turn off the system and unplug it from the wall. Also disconnect all other cables from the system unit.
2. Place the system unit on a stable work surface so that you are facing the rear of the unit.
3. Remove the two screws that secure the cover to the system unit, as shown in Figure 5-1.
4. Slide the cover toward the front of the unit.

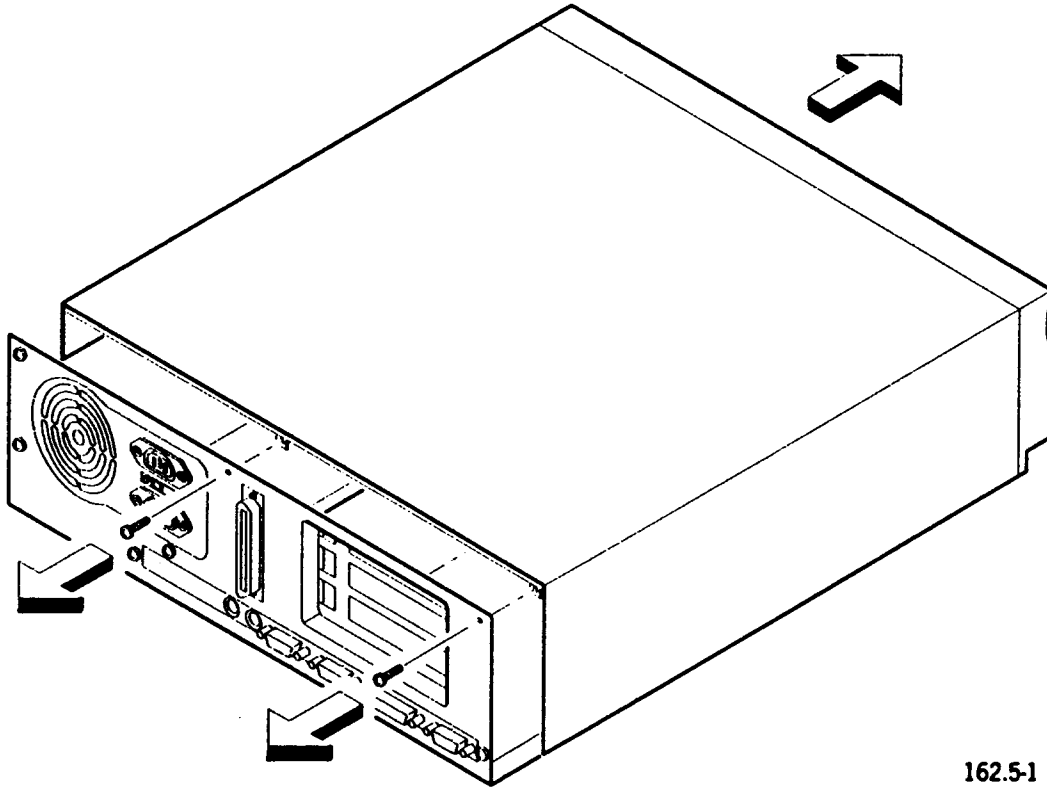
Note: *You do not need to push the cover forward by more than a few inches. You may need to push the cover sharply to dislodge it.*

5. Lift the cover upward and away from the unit, being careful not to snag the Reset switch or LEDs on the front of the unit. Once the cover is off, be sure to observe the ESD precautions described earlier in this section.

WARNING

Do not run the system unit with the cover off. Operating without a cover is a safety hazard and exposes the system unit to the risk of short circuits and overheating.

Figure 5-1. Removing the Cover from a Three-Slot System



162.5-1

Removing the Cover from a Six-Slot System

To remove the cover from a six-slot system, complete the following steps:

1. Turn off the system and unplug it from the wall. Also disconnect all other cables from the system unit.
2. Place the system unit on a stable work surface so that you are facing the front of the unit.
3. Turn the system key to the horizontal position to unlock the cover and remove the key. Be sure to store the key in a safe place.
4. Turn the system around so that you are facing the rear of the unit.
5. Remove the five screws that secure the cover to the system unit, as shown in Figure 5-2.
6. Slide the cover toward the front of the unit.

Note: *You do not need to push the cover forward by more than a few inches. You may need to push the cover sharply to dislodge it.*

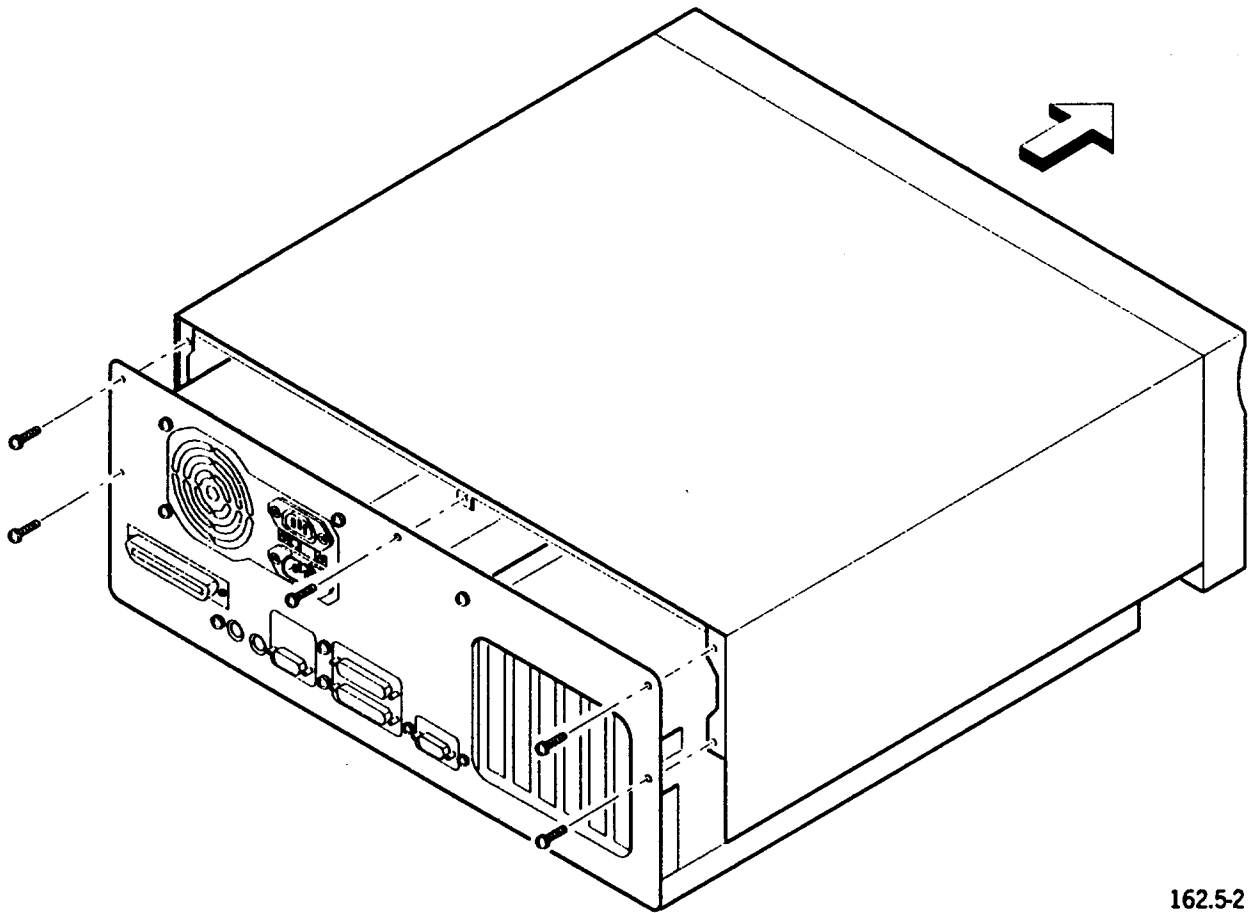
7. Lift the cover upward and away from the unit, being careful not to snag the Reset switch or LEDs on the front of the unit. Once the cover is off, be sure to observe the ESD precautions described earlier in this section.

When you replace the cover, be sure the rungs that run along the sides of the cover fit over the metal lip on each side of the system unit chassis.

WARNING

Do not run the system unit with the cover off. Operating without a cover is a safety hazard and exposes the system unit to the risk of short circuits and overheating.

Figure 5-2. Removing the Cover from a Six-Slot System



162.5-2

Upgrading the Processor

You can enhance your system by replacing the processor chip on the system board with a more powerful processor chip, available as part of an upgrade kit. Unisys currently provides the following upgrade kits:

- UPG 80486-33B — 33-MHz DX processor kit
- UPG 80486-66B — 66-MHz DX2 processor kit

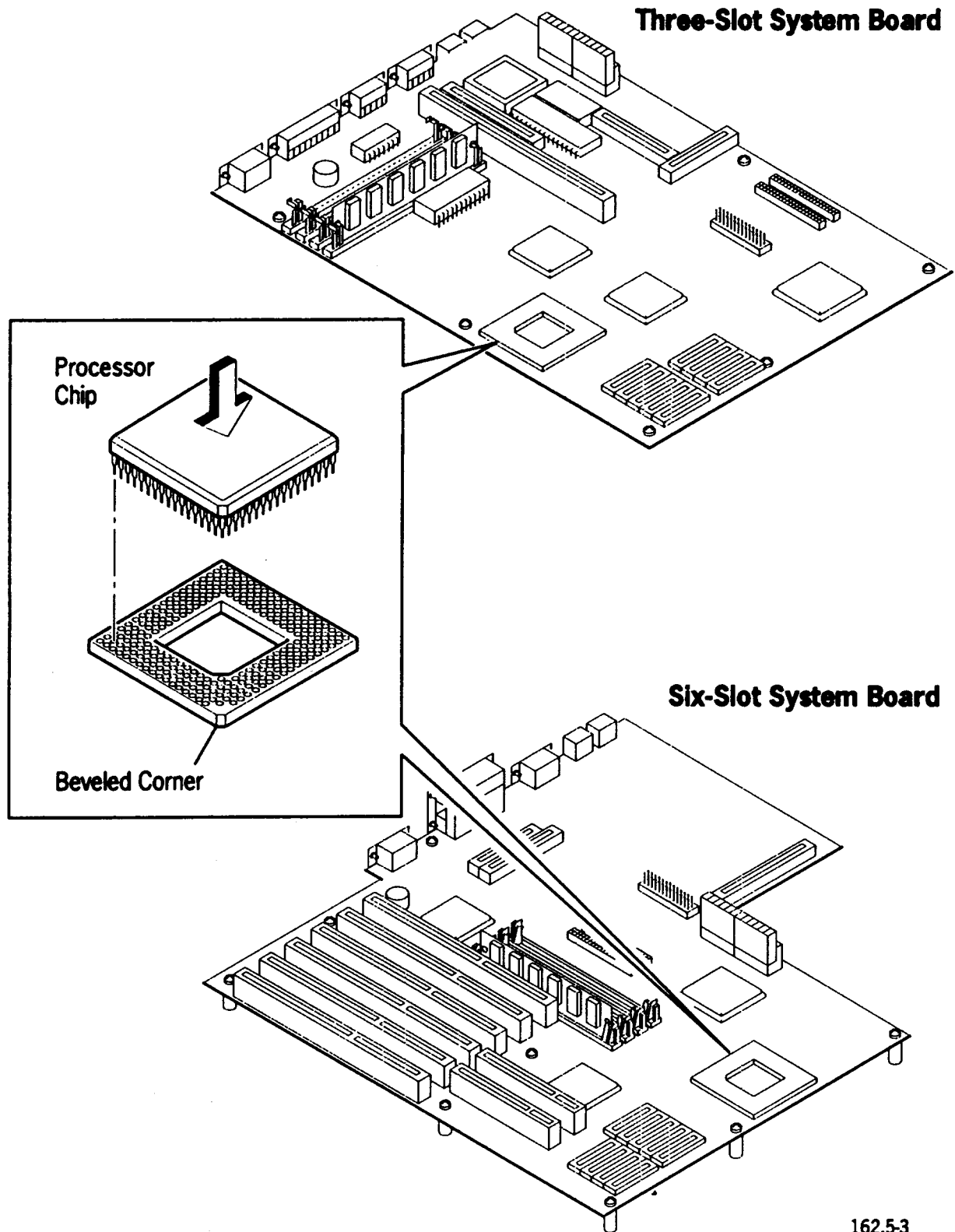
These kits come with a processor chip, BIOS, and written instructions. The BIOS and instructions do *not* apply to the systems described in this guide, so be sure to lay these items aside. To upgrade your processor, complete the following steps:

1. Make sure the system is turned off and unplugged from the wall.
2. Remove the system unit cover, as described in "Removing the System Unit Cover," earlier in this section. As you work, observe the ESD precautions, outlined in "Avoiding Electrostatic Discharge."
3. Use Figure 5-3 to locate the processor chip socket on the system board.
4. If there is already a processor chip in the socket, remove the chip from the socket using one of the following methods, as appropriate. When you are done, lift the chip away from the board and store it on a piece of anti-static foam in case you need it later.

Note: *In six-slot systems, the processor socket lies directly below the drive tray. Some of you may find accessing the socket easier if you remove the drive tray first. For instruction on removing the drive tray, see "Installing a 5.25-Inch Drive in a Six-Slot System," later in this section.*

- For ELI systems, gently pry the chip out using a small slot screwdriver. To lower the risk of damage while removing the chip, lift one corner slightly. Then lift the opposite corner slightly. Work from corner to corner until the chip clears the socket.
- For MPI systems, use the lever on the socket instead; this lever raises the chip enough to free it from the socket.

Figure 5-3. Installing a Processor Chip



162.5-3

5. Remove the new processor chip from its packaging. Orient the chip as shown in Figure 5-3. Press the chip firmly and evenly into the socket.
6. Look at the configuration map on the inside of the system unit cover and make sure the Select CPU jumpers (JC1, JC2, and JC3) are set so that they match the "Select CPU 486DX" entry on the map. If the jumpers do not match this setting, move them accordingly.
7. Refer to the configuration map and set the Clock Generate Select/CPU CLK jumpers according to the type of processor chip you are installing. Check the list below to determine which configuration map entry to use. If you need extra jumpers, look in the hardware packet that came with the system unit.

Processor Type	Configuration Map Entry
----------------	-------------------------

33 MHz	33-MHz DX CPU PGA/66-MHz DX2 CPU
66 MHz	33-MHz DX CPU PGA/66-MHz DX2 CPU

8. If you have finished installing all the hardware that goes inside the system unit, replace the system unit cover. Remember to secure the cover using the screws you removed earlier.

When you next turn on the system, be sure to confirm that the processor chip is correctly installed. You can confirm the installation by running the Power-On Self-Test (POST) and looking at the "CPU Clock" line toward the bottom of the configuration screen.

Note: *If you need more time to read the screen, press the **PAUSE** key to freeze the display; then press the **SPACEBAR** or any key to resume the POST test. For more on the POST test, see Section 3.*

Upgrading System Memory

Your system comes with 4MB of memory, in the form of a 4MB SIMM installed on the system board. This SIMM is mounted in the first of four memory banks, each of which is designed to accept one SIMM. You can upgrade system memory by adding extra SIMMs or replacing the factory installed SIMM with a higher-capacity SIMM. To learn which memory configurations you can use, see Table 5-1. SIMMs are available in the following upgrade kits; each kit contains one SIMM.

- MPM 1-1M — 1MB memory expansion kit
- MPM 1-4M — 4MB memory expansion kit
- MPM 1-16M — 16MB memory expansion kit

Table 5-1. Memory Configurations

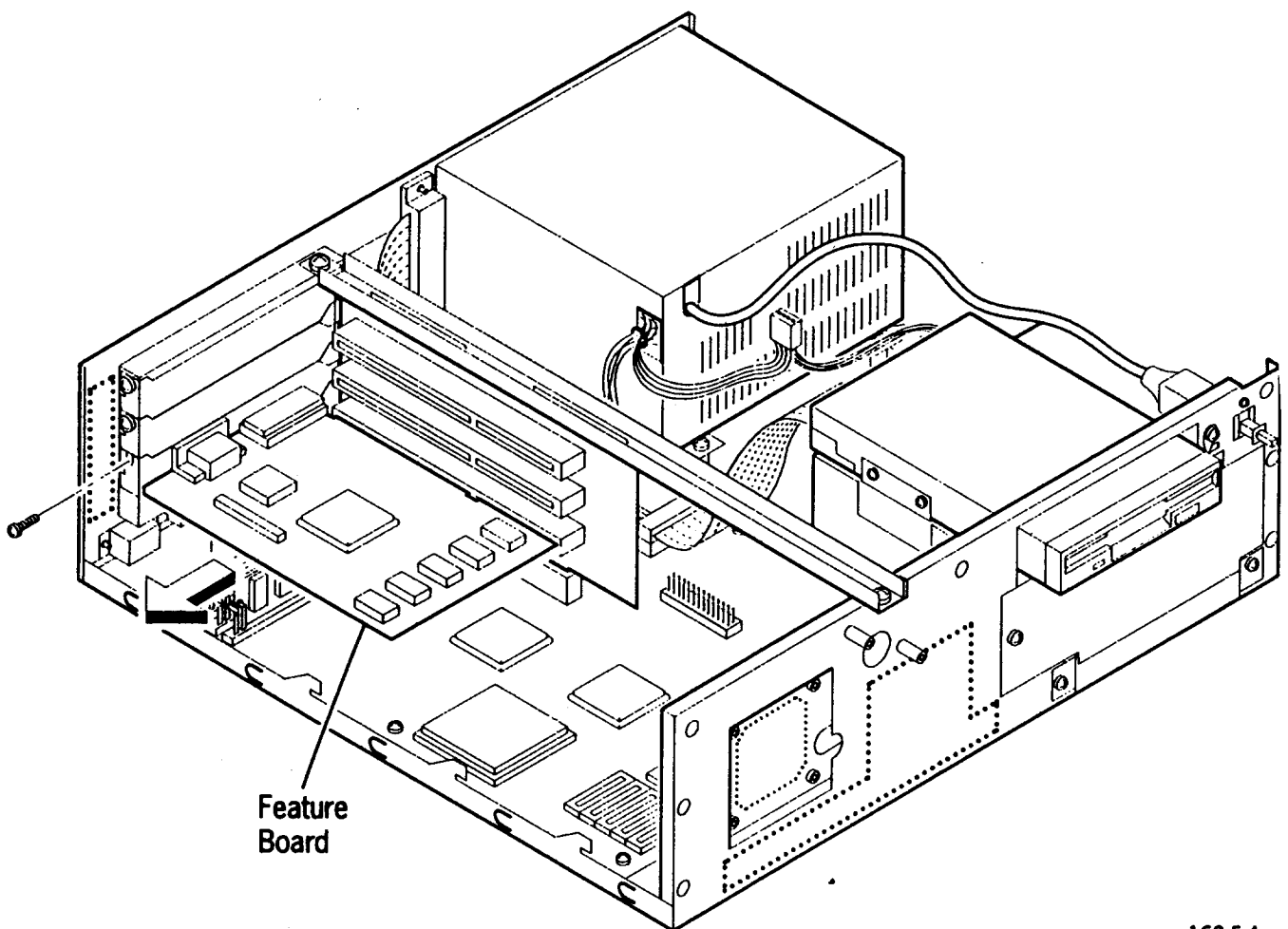
Total Memory *	Bank 0	Bank 1	Bank 2	Bank 3
2MB	1MB	1MB		
4MB	1MB	1MB	1MB	1MB
4MB	4MB			
8MB	4MB	4MB		
10MB	1MB	1MB	4MB	4MB
16MB	4MB	4MB	4MB	4MB
20MB	4MB	16MB		
32MB	16MB	16MB		
40MB	16MB	16MB	4MB	4MB
64MB	16MB	16MB	16MB	16MB

* *When upgrading the memory, be sure to use only the following SIMM types: 1MB (265K x 36), 4MB (1M x 36), or 16MB (4M x 36). All SIMMs must support 70 ns or faster access times.*

To upgrade system memory, complete the following steps:

1. Make sure the system is turned off and unplugged from the wall.
2. Remove the system unit cover, as described in "Removing the System Unit Cover," earlier in this section. As you work, observe the ESD precautions, outlined in "Avoiding Electrostatic Discharge."
3. If you have a three-slot system, remove all feature boards so that you can access the memory banks. To take out a feature board, first disconnect any cables attached to the board, then remove the screw that secures the board to the slot. Slide the board out of the slot and lay it aside, as shown in Figure 5-4.

Figure 5-4. Removing a Feature Board from a Three-Slot System

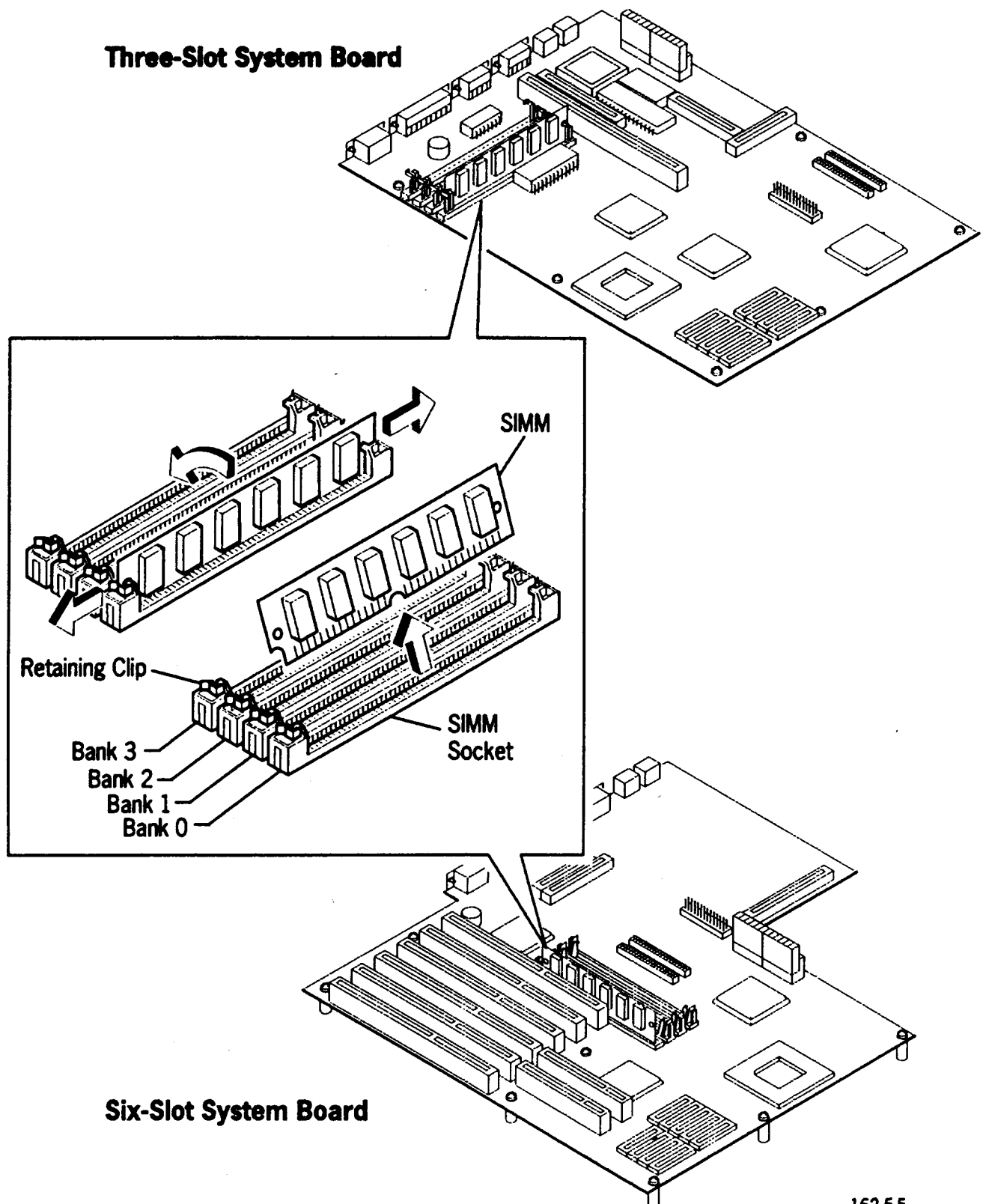


Upgrading Your System

4. Use Figure 5-5 to locate the memory banks on the system board.
5. If the memory configuration you want to install requires that you remove the 4MB SIMM shipped in memory bank 0, release the retaining clips that hold the SIMM in place, as shown in Figure 5-5. Rock the SIMM backward and lift it out of the socket.

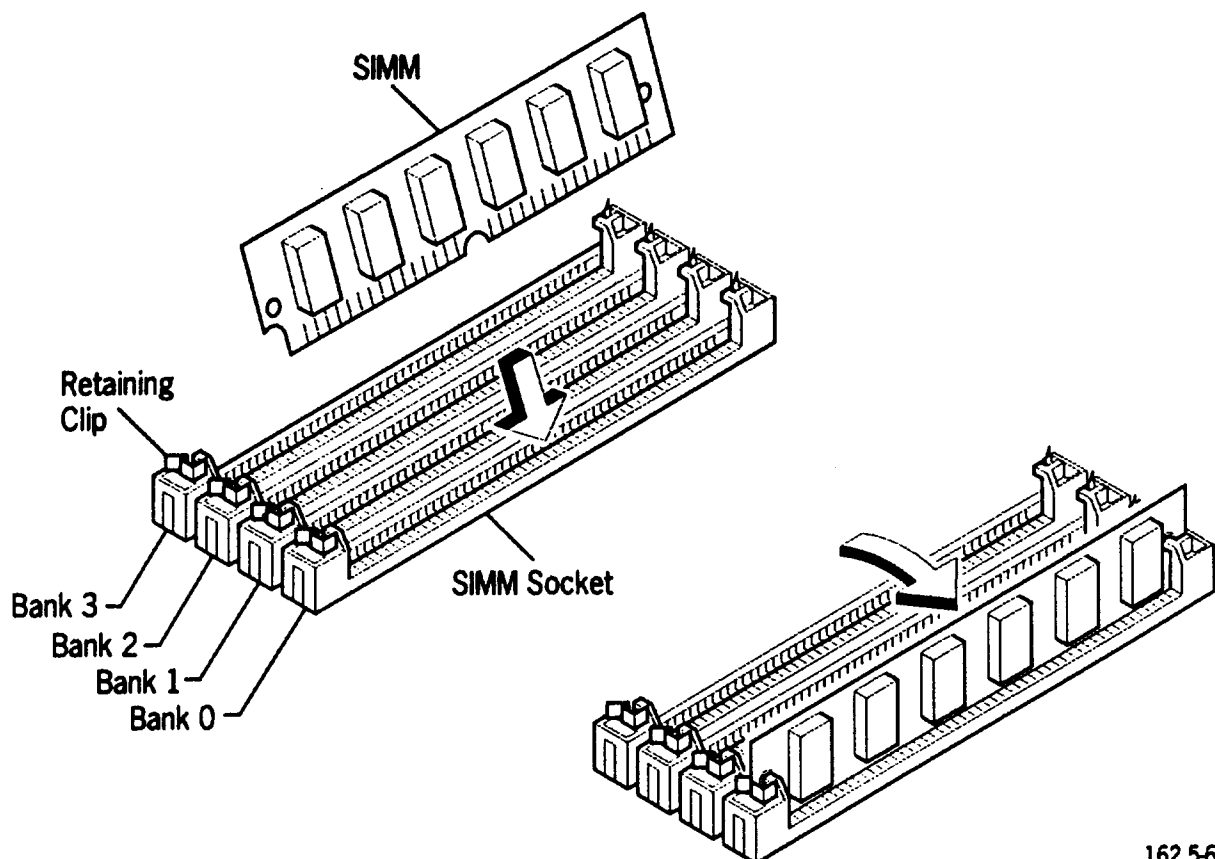
Note: *The SIMM installed on your system board may look different from the one shown in the figure.*

Figure 5-5. Removing a SIMM



6. Position the first SIMM at an angle to the SIMM socket, as shown in Figure 5-6. The SIMMs are keyed and will not latch into place fully if they are not correctly oriented.
7. Insert the SIMM, rocking it forward into the socket. Then gently move the SIMM from side to side for proper seating, and pull it forward to secure it in the socket. You should hear a click as the retaining clips latch the SIMM in place. Do not be concerned if the SIMM you are installing is slightly taller or shorter than other SIMMs in your system. As long as the SIMM is fully seated, size differences do not represent a problem.

Figure 5-6. Installing a SIMM



162.56

8. Repeat steps 6 and 7 for each remaining SIMM. Be sure to fill the banks sequentially; do *not* leave any gaps between SIMMs. If you are not sure which memory banks to use for your overall memory size, review Table 5-1.
9. If you have a three-slot system, replace each of the feature boards you removed in step 3. Be sure to secure the boards to the expansion slot using the slot cover screw. Remember to reconnect all feature board cables.
10. If you have finished installing all the hardware that goes inside the system unit, replace the system unit cover. Remember to secure the cover using the screws you removed earlier.

When you next turn on the system, be sure to confirm that the memory is correctly installed. You can confirm the installation by running the BIOS Setup utility and looking at the memory information block in the upper right hand corner of the screen. The amount of memory is shown in KB instead of MB.

Note: For details on running the BIOS Setup utility, see Section 3.

Adding Cache Memory

You can upgrade ELI systems by adding 128KB or 256KB of external cache memory. Cache memory is available in upgrade kits made up of chips that you mount on the system board. Unisys currently provides the following upgrade kits:

- EMC 128-CA — 128KB cache memory kit
- EMC 256-CA — 256KB cache memory kit

To add cache memory to the system board, complete the following steps. If you have an MPI workstation, your system unit comes with 256KB of external cache memory already installed, so you can skip this procedure.

Upgrading Your System

1. Make sure the system is turned off and unplugged from the wall.
2. Remove the system unit cover, as described in "Removing the System Unit Cover," earlier in this section. As you work, observe the ESD precautions, outlined in "Avoiding Electrostatic Discharge."
3. Use Figure 5-7 to locate the cache memory sockets on the system board.
4. Remove the first cache memory chip from its packaging and press it firmly and evenly into one of the cache memory sockets, as shown in Figure 5-7. Be sure the chip is correctly oriented. For your reference, pin 1 is located on the notched end of the chip.

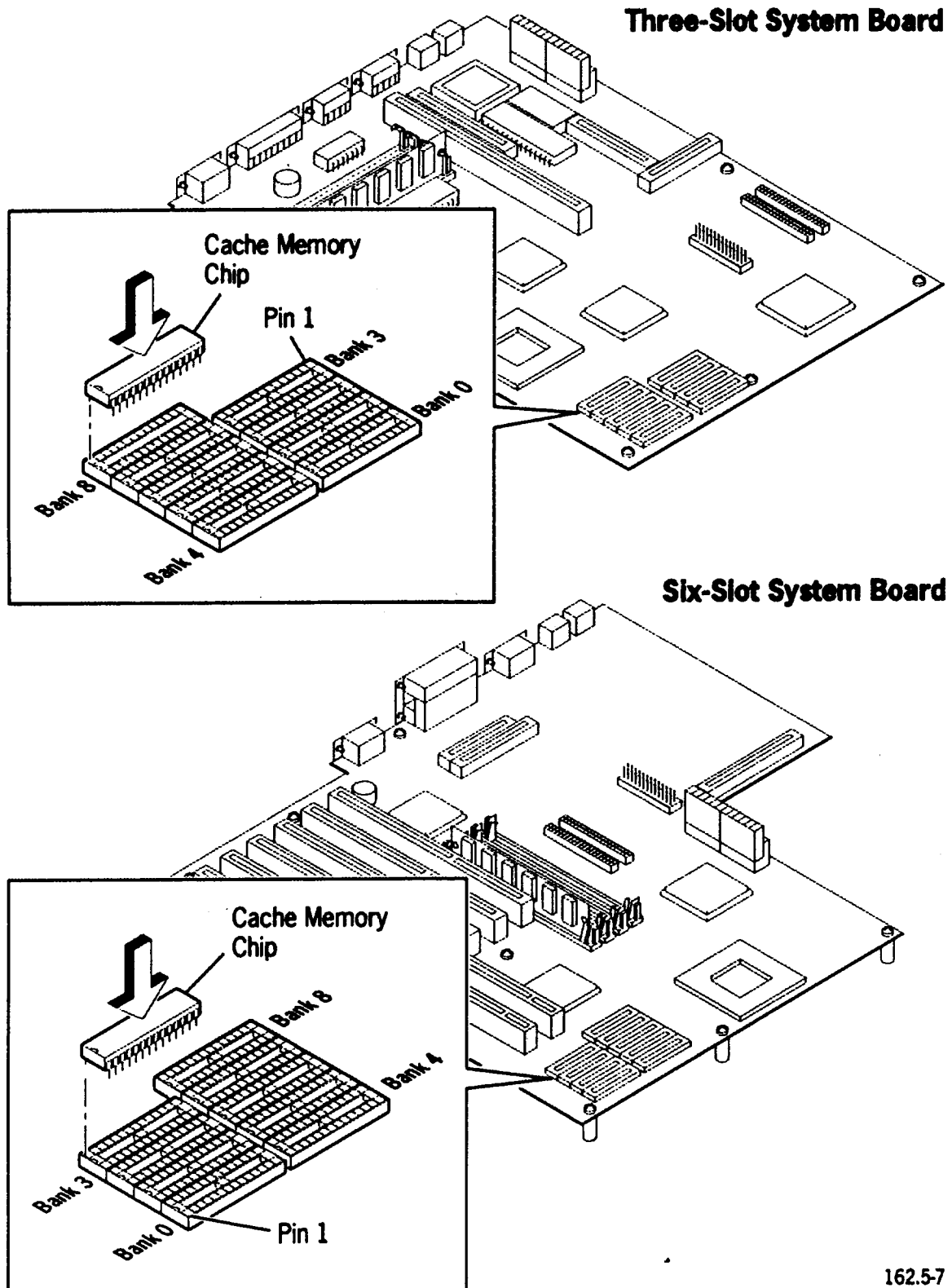
Note: 128-kilobyte upgrade kits (EMC 128-CA) include four chips labeled 32K x 8 and one chip labeled 8K x 8. For three-slot systems, install the 32K x 8 chips in cache banks 4 through 7 and the 8K x 8 in cache bank 8. If you have a six-slot system, install the 32K x 8 chips in cache banks 0 through 3 and the 8K x 8 chip in cache bank 8.

5. Repeat step 4 for each of the remaining cache memory chips.
6. Set the Cache Size jumpers to match the cache size. For jumper locations and settings, see the configuration map on the inside cover of the system unit.
7. If you have finished installing all the hardware that goes inside the system unit, replace the system unit cover. Remember to secure the cover using the screws you removed earlier.

When you next turn on the system, be sure to enable the external cache memory. You can enable the external cache by running the BIOS Setup utility.

Note: For details on running the BIOS Setup utility, see Section 3.

Figure 5-7. Installing a Cache Memory Chip in an ELI System



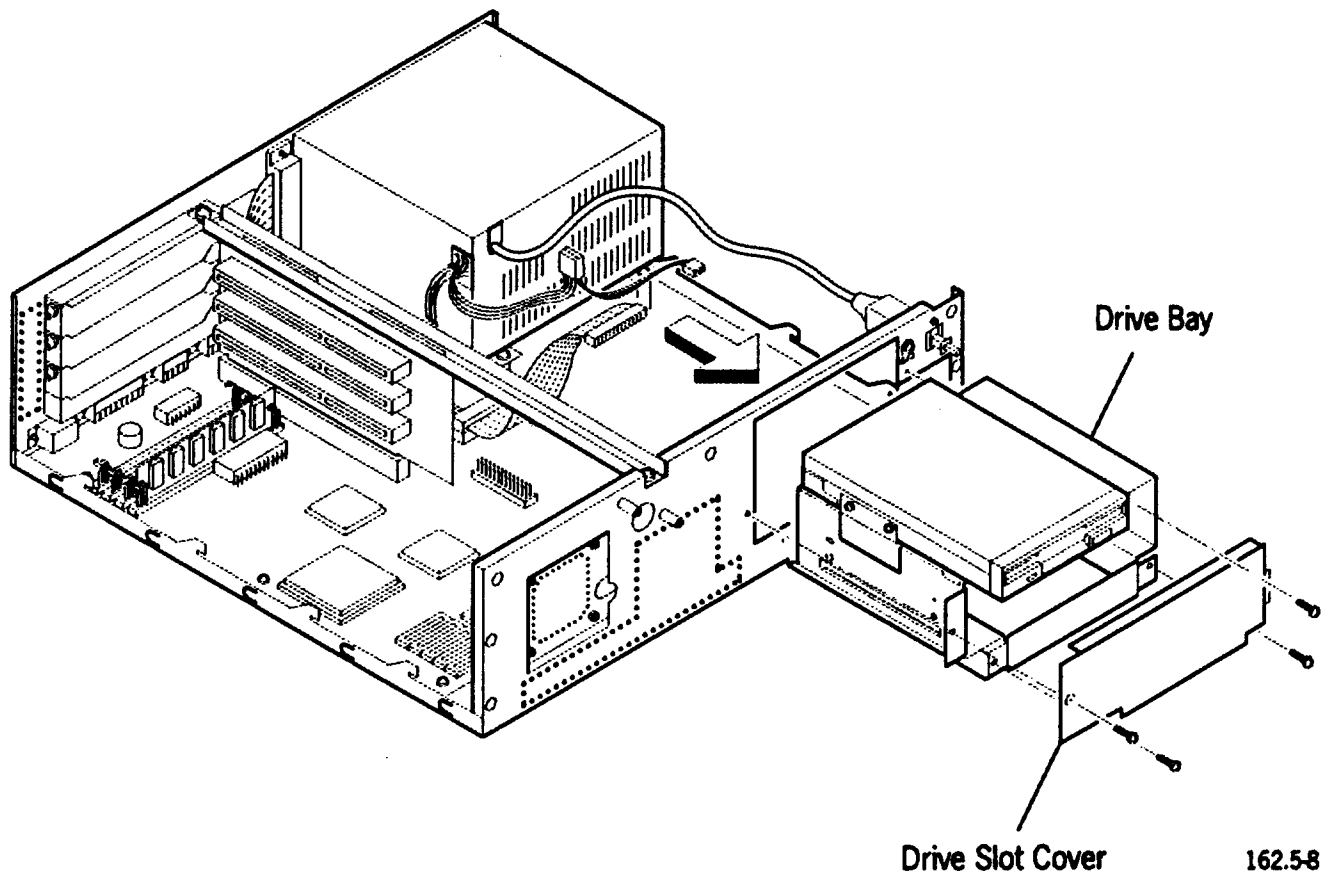
162.57

Upgrading Your System

Upgrading Video Memory

Your system unit is equipped with 1MB of video memory. You can enhance it by adding an extra 1MB of video memory for a total of

Figure 5-8. Removing the Drive Bay from a Three-Slot System



Upgrading Your System

4. Use Figure 5–9 to locate the video memory sockets on the system board.
5. Remove the first video memory chip from its packaging and press it firmly and evenly into either of the video memory sockets, as shown in Figure 5–9. Be sure the chip is correctly oriented. For your reference, pin 1 is located on the beveled end of the chip.

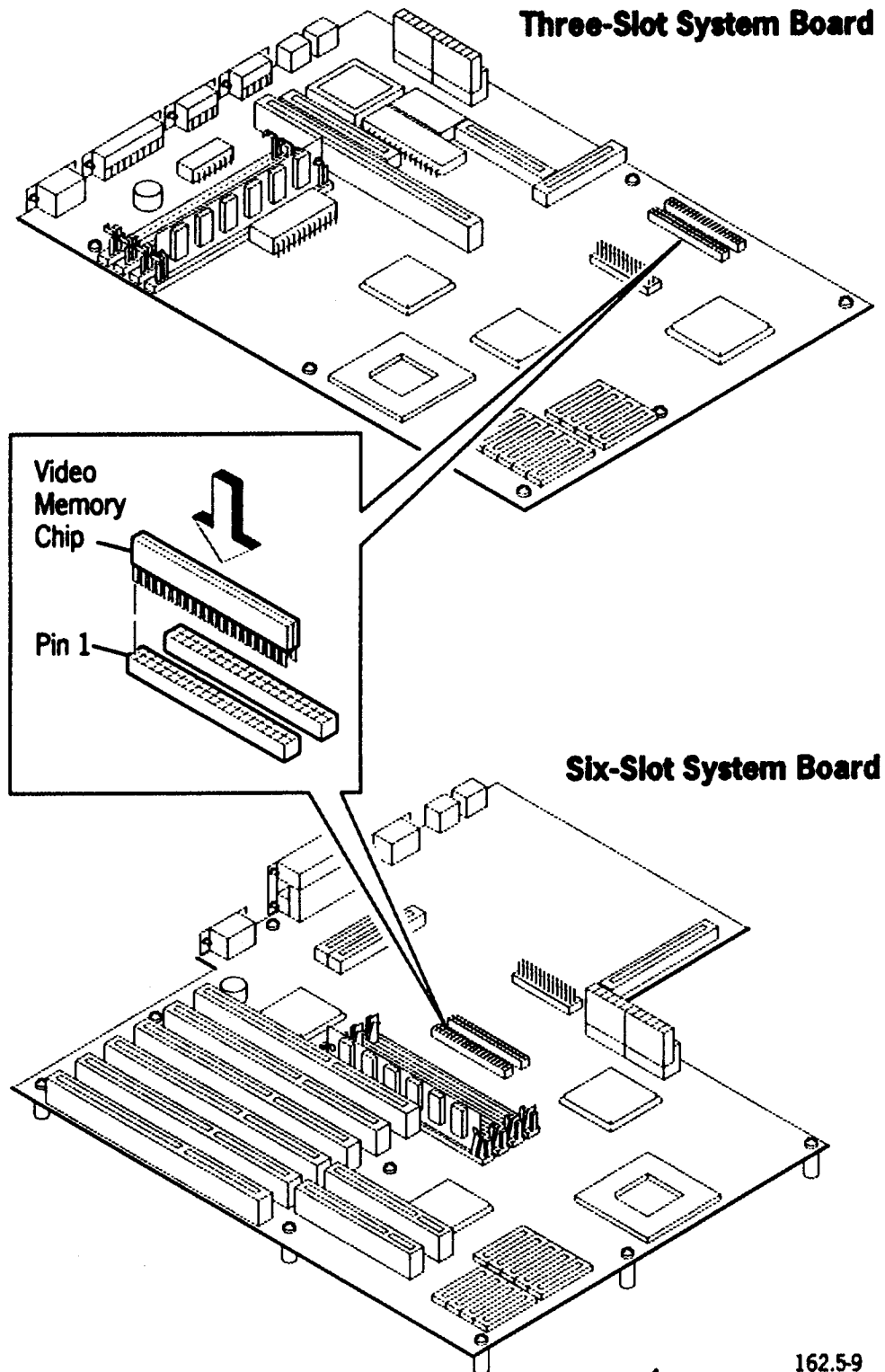
Note: *You may need to shift several cables aside to access the video memory sockets. Be careful not to stress the cables.*

6. Repeat step 5 for the remaining video memory chip.
7. If you have a three-slot system, slide the drive bay into place and install the 5.25-inch drive slot cover. Secure the bay and slot cover using the four screws removed in step 3.

Note: *Be sure to reconnect the SCSI and power cables to the drive before securing the bay.*

8. Set the VGA DRAM Size jumpers to match the video memory size. For jumper locations and settings, see the configuration map on the inside cover of the system unit.
9. If you have finished installing all the hardware that goes inside the system unit, replace the system unit cover. Remember to secure the cover using the screws you removed earlier.

Figure 5-9. Installing a Video Memory Chip

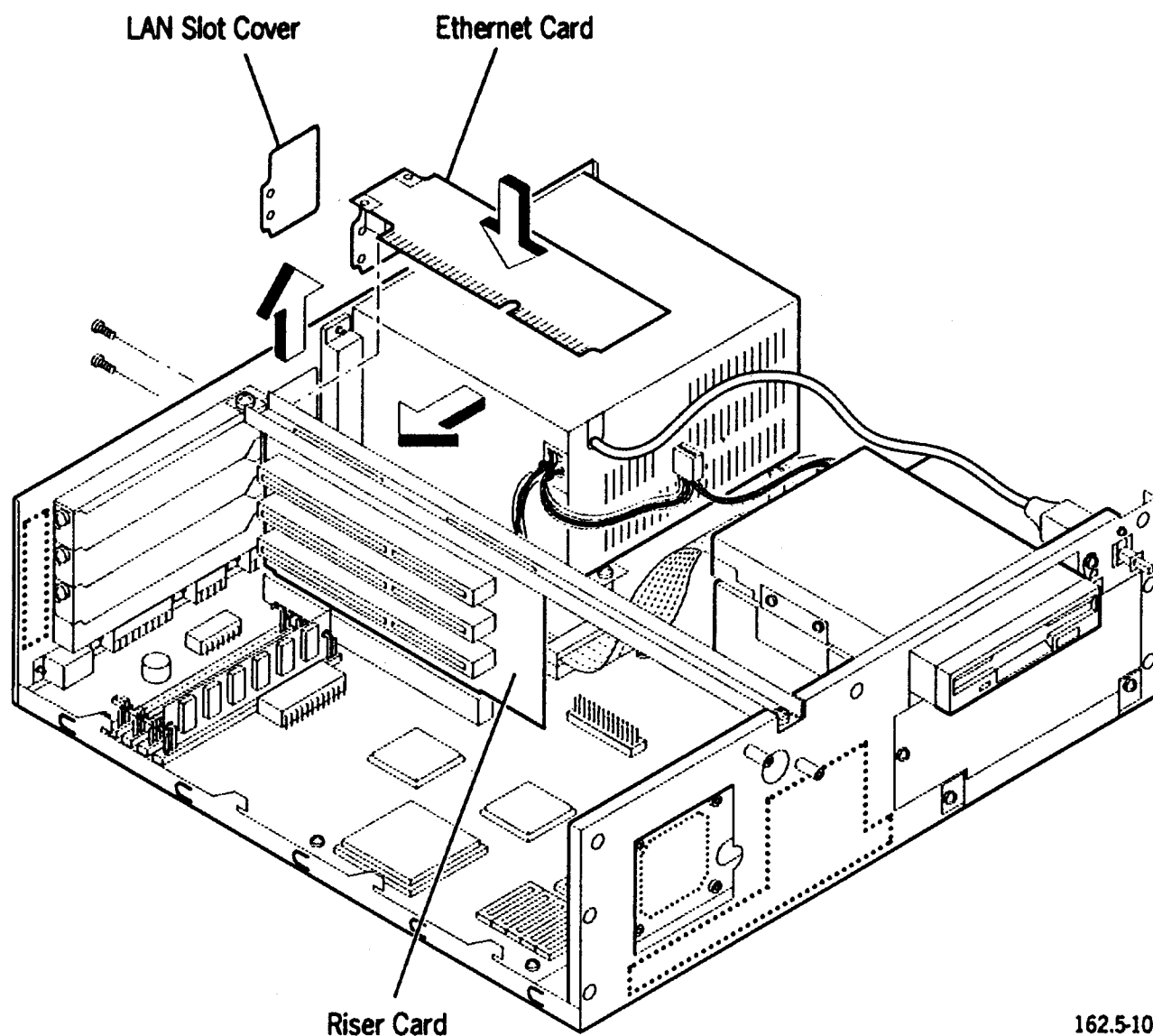


Adding an Ethernet Card

You can upgrade three-slot systems by adding an Ethernet card. This card is an alternative to a full-size feature board and, since it does not occupy any of the feature board slots, allows greater configuration flexibility. The Ethernet card is available as an upgrade kit (PCC 420-ETH) made up of one printed circuit board that you mount on the rear of the riser board; the card is equipped with an RJ45 port. To install an Ethernet card in your system, complete the following steps:

1. Make sure the system is turned off and unplugged from the wall.
2. Remove the system unit cover, as described in "Removing the System Unit Cover," earlier in this section. As you work, observe the ESD precautions, outlined in "Avoiding Electrostatic Discharge."
3. Remove the two screws that secure the LAN slot cover to the system unit, as shown in Figure 5-10. Lift the slot cover away from the unit and store it in a safe place in case you decide to remove the Ethernet card later.

Figure 5-10. Removing the LAN Slot Cover and Installing an Ethernet Card



162.5-10

4. Remove the Ethernet card from its packaging and check the jumper settings to determine whether they are appropriate for your system. If necessary, change the settings. For information on Ethernet card jumper settings, see the guide that comes with the card.

Note: *The factory jumper settings for this card should be correct for most system configurations. Do not change the factory settings unless they are in conflict with settings for one of the feature cards.*

5. Holding the card by its edges, insert the Ethernet card into the connector on the back of the riser board, as shown in Figure 5–10. Press the Ethernet card firmly into place.
6. Secure the Ethernet card's RJ45 port to the rear of the system unit using the two screws removed in step 3.
7. If you have finished installing all the hardware that goes inside the system unit, replace the system unit cover. Remember to secure the cover using the screws you removed earlier.

When you next turn on the system, be sure to verify your hardware configuration. You can verify the configuration by running the BIOS Setup utility. Once you have verified the configuration and your system passes the POST test, you can connect the workstation to the Ethernet network. For instructions on attaching Ethernet cable, see the guide that comes with the card.

Note: *For details on running the BIOS Setup utility, see Section 3.*

Adding Feature Boards

Your system unit is equipped with three or six expansion slots designed for industry-standard architecture (ISA) bus feature boards. These expansion slots are all capable of handling boards with both 8- and 16-bit expansion slot connectors.

Note: *In six-slot systems, one or two of the expansion slots are configured for use with VESA Local Bus Adapter boards. For more on these slots, see "Installing Feature Boards in Six-Slot Systems," later in this section.*

Feature boards may include switches and jumpers that need to be set before installation. See the documentation that comes with each feature board for instructions on switch settings, jumper settings, and external cabling requirements.

Address and interrupt assignments must be unique for each feature board. Make sure to resolve any conflicts before turning on the system. Those of you who have MPI systems should note that the SCSI Interrupt Select jumpers on the system board set the SCSI controller interrupt channel; check these jumpers to be sure the factory assignment does not conflict with the feature board assignments. If you need to change the SCSI controller interrupt assignment, see the configuration map on the inside cover of the system unit for the SCSI Interrupt Select jumper locations and settings.

The following paragraphs explain how to install feature boards for three- and six-slot systems.

Installing Feature Boards in Three-Slot Systems

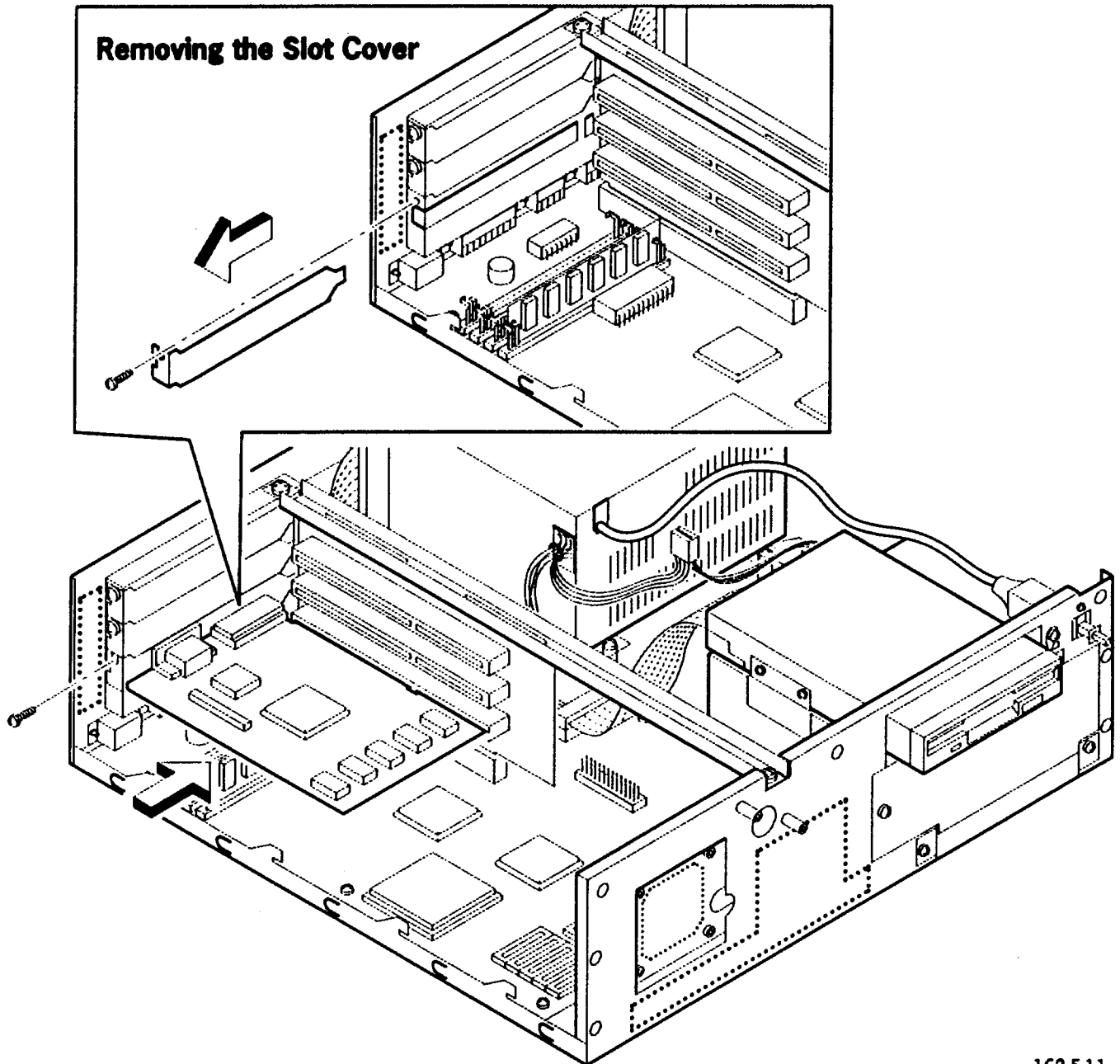
To install a feature board in a three-slot system, complete the following steps:

1. Make sure the system is turned off and unplugged from the wall.
2. Remove the system unit cover, as described in "Removing the System Unit Cover," earlier in this section. As you work, observe the ESD precautions, outlined in "Avoiding Electrostatic Discharge."
3. Remove the screw that secures the metal cover to the selected expansion slot, as shown in Figure 5-11. Save the screw for later use. Slide the slot cover out and save it in case you ever need to remove the board.

Note: *Do not run your system without either a feature board or a slot cover in each of the expansion slots. If you operate the system unit without these items in place, your workstation can generate electromagnetic interference.*

4. Remove the feature board from its packaging. Set any necessary switches and jumpers on the board, according to the documentation provided with the board.
5. Holding the board by its edges, insert the board into the expansion slot, as shown in Figure 5-11. Press the board firmly into place. Some boards have a tight fit, so you may need to push fairly hard.
6. Secure the board using the screw removed in step 3.

Figure 5-11. Installing a Feature Board in a Three-Slot System



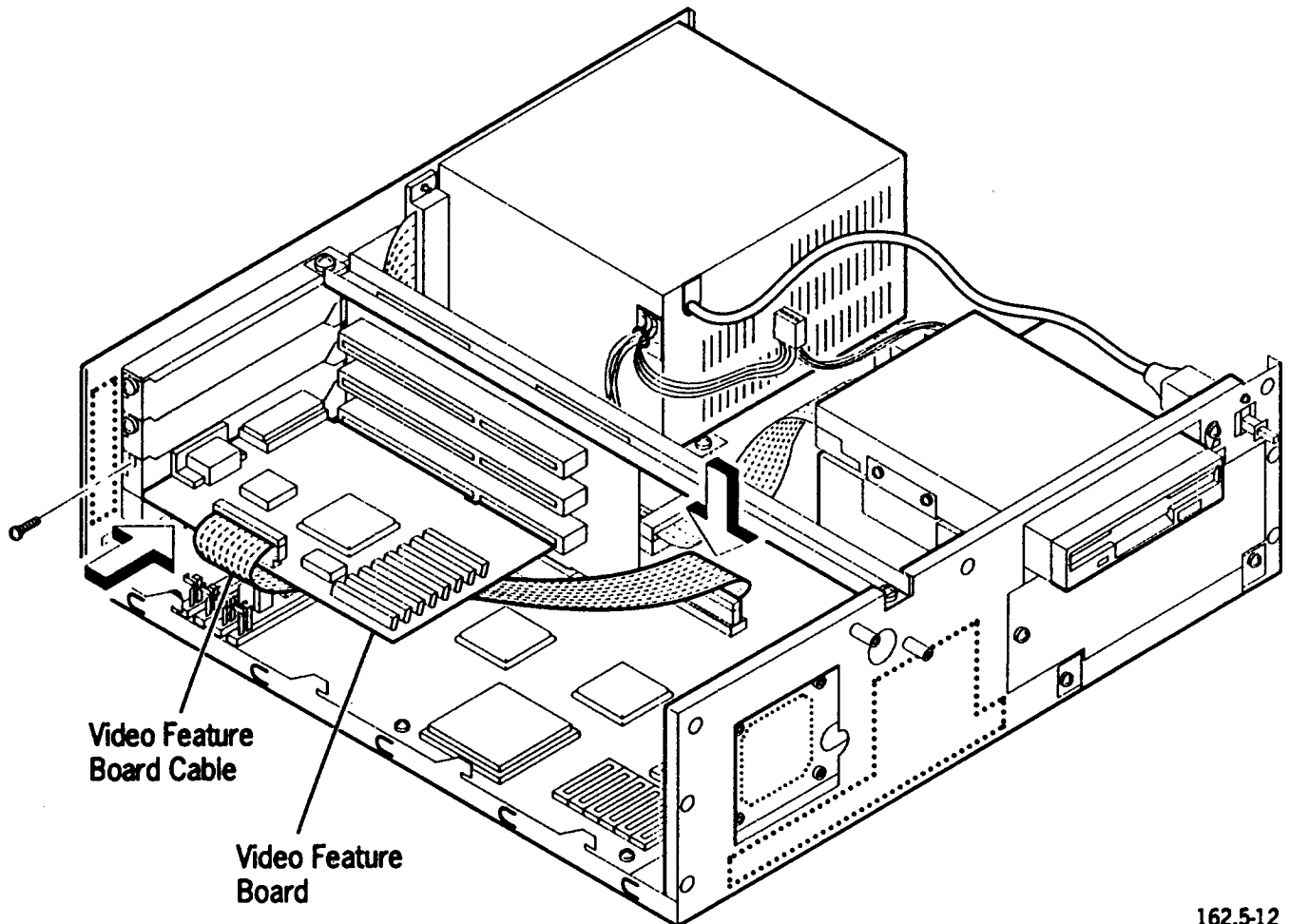
162.5-11

7. If you are installing a video accelerator or multimedia board that will be used in conjunction with the system board video controller, attach the cable that comes with the board to the video feature connector on the system board, as shown in Figure 5-12. Refer to the diagram on the inside cover of the system unit for the location of the feature connector.
8. Repeat steps 3 through 7 for any remaining feature boards.
9. If you have finished installing all the hardware that goes inside the system unit, replace the system unit cover. Remember to secure the cover using the screws you removed earlier.

When you next turn on the system, be sure to verify your hardware configuration. You can verify the configuration by running the BIOS Setup utility. Also check the documentation that came with the feature board to find out about special software requirements.

Note: For details on running the BIOS Setup utility, see Section 3.

Figure 5-12. Connecting the Video Accelerator or Multimedia Cable for a Three-Slot System



162.5-12

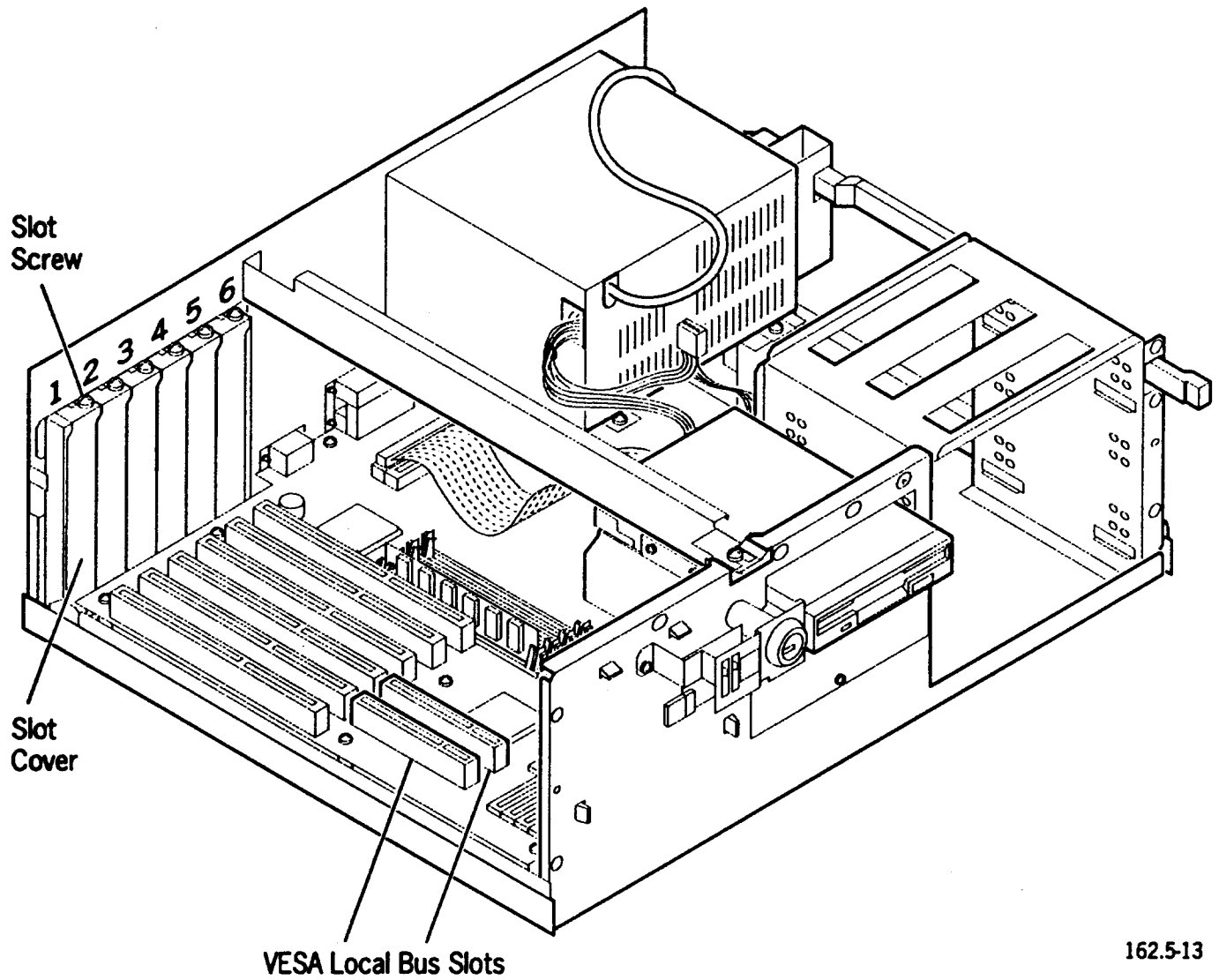
Installing Feature Boards in Six-Slot Systems

Before installing feature boards in a six-slot system, you should be aware that some of the feature board slots are designed to accept VESA Local Bus Adapter boards. VESA Local Bus Adapter boards are physically different than other feature boards because they include an extra connector.

For MPI systems, the VESA Local Bus slot are slots 2 and 3, as shown in Figure 5-13. In the case of the ELI system, slot 3 is configured for VESA Local Bus Adapter boards.

Note: *VESA Local Bus slots also accept regular feature boards.*

Figure 5-13. VESA Local Bus Adapter Board Slots



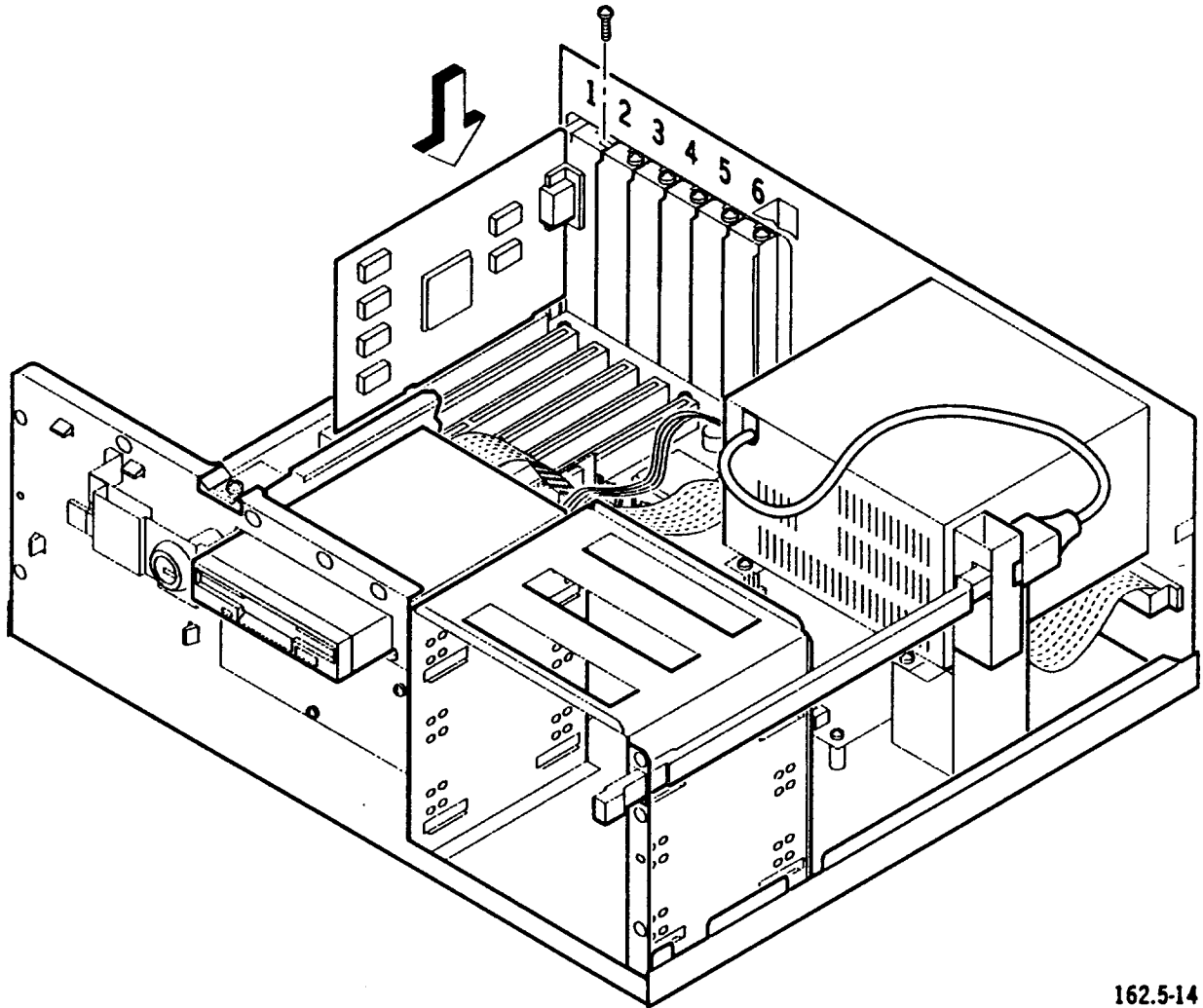
To install a feature board in a six-slot system, complete the following steps:

1. Make sure the system is turned off and unplugged from the wall.
2. Remove the system unit cover, as described in "Removing the System Unit Cover," earlier in this section. As you work, observe the ESD precautions, outlined in "Avoiding Electrostatic Discharge."
3. Remove the screw that secures the metal cover to the selected expansion slot (see Figure 5-13 for the screw and slot cover locations). Save the screw for later use. Slide the slot cover out and save it in case you ever need to remove the board.

Note: *Do not run your system without either a feature board or a slot cover in each of the expansion slots. If you operate the system unit without these items in place, your workstation can generate electromagnetic interference.*

4. Remove the feature board from its packaging. Set any necessary switches and jumpers on the board, according to the documentation provided with the board.
5. Holding the board by its edges, insert the board connectors into the expansion slot and press it firmly into place, as shown in Figure 5-14. Some boards have a tight fit, so you may need to push fairly hard.
6. Secure the board using the screw removed in step 3.

Figure 5-14. Installing a Feature Board in a Six-Slot System



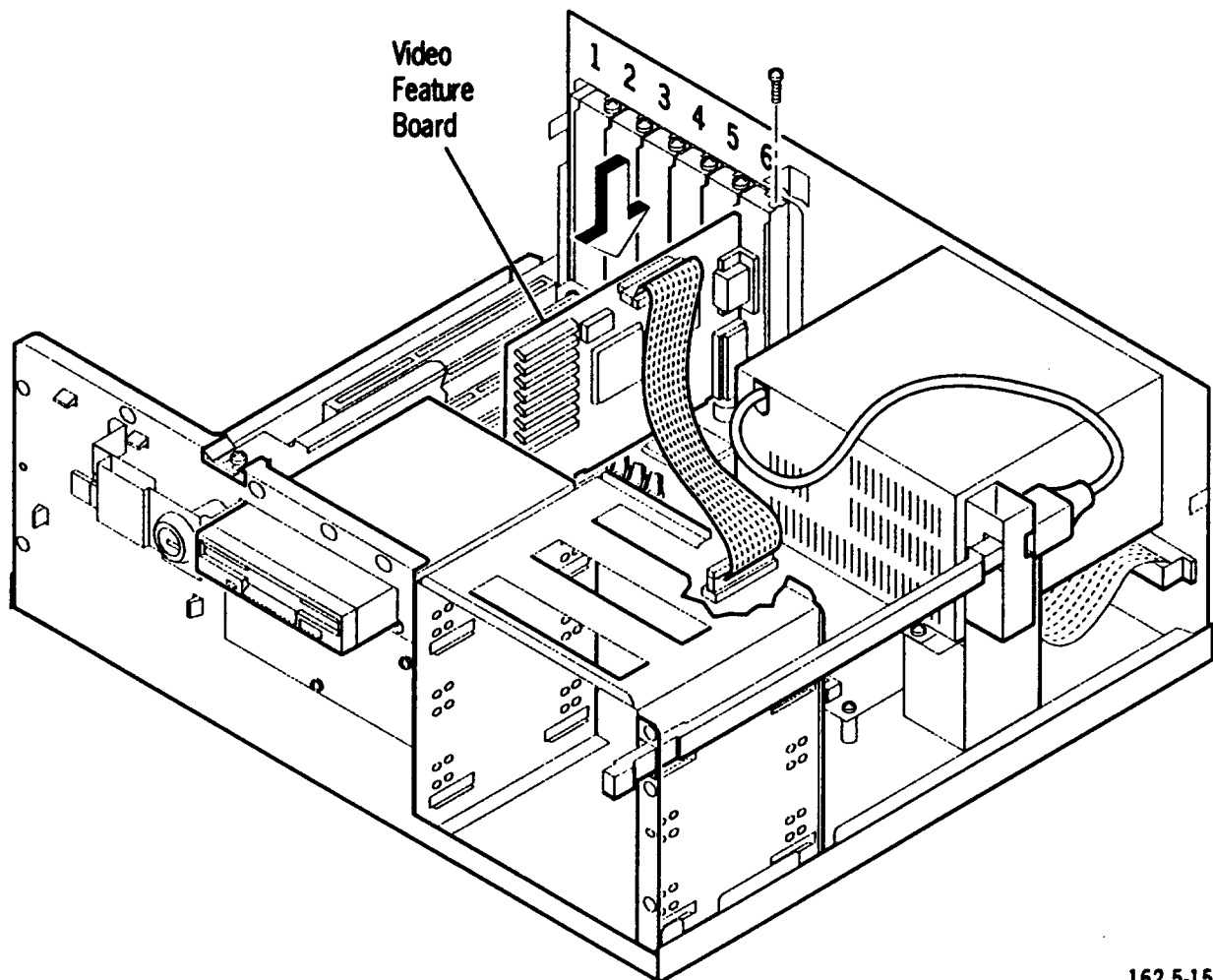
162.5-14

7. If you are installing a video accelerator or multimedia board that will be used in conjunction with the system board video controller, attach the cable that comes with the board to the video feature connector on the system board, as shown in Figure 5-15. Refer to the diagram on the inside cover of the system unit for the location of the feature connector.
8. Repeat steps 3 through 7 for any remaining feature boards.
9. If you have finished installing all the hardware that goes inside the system unit, replace the system unit cover. Remember to secure the cover using the screws you removed earlier.

When you next turn on the system, be sure to verify your hardware configuration. You can verify the configuration by running the BIOS Setup utility. Also check the documentation that came with the feature board to find out about special software requirements.

Note: *For details on running the BIOS Setup utility, see Section 3.*

Figure 5-15. Connecting the Video Accelerator or Multimedia Cable for a Six-Slot System



162.5-15

Adding Internal Drives

You can enhance your system by installing hard disk drives, floppy disk drives, tape drives, or CD-ROM drives inside the system unit. The type of drive you choose depends on the type of system you have. For example, ELI users can install IDE drives, while MPI users can install SCSI drives. The number of drives you can install depends on whether you have a three- or six-slot system. The following paragraphs explain the internal drive configuration rules and tell you how to install internal drives in your system. Also included is a discussion of procedures you may need to complete if your configuration includes SCSI drives.

Note: *Be sure to look at the drive packaging and documentation to make sure you have the right kind of drive (IDE or SCSI) for your system.*

Installing Internal Drives in Three-Slot Systems

Three-slot systems come in a variety of configurations. Some three-slot systems arrive with one floppy disk drive already installed, and some with a floppy disk drive and hard drive. Depending on the type of system you have, you can upgrade your configuration as follows:

- **Workstations with a Floppy Disk Drive** — If your system comes with a floppy disk drive, you can install one 3.5-inch hard disk drive and one 5.25-inch floppy disk, tape, CD-ROM, or hard disk drive. For MPI systems, you can use floppy disk interface drives or SCSI drives. For ELI systems, the drives you choose are typically floppy disk interface drives or IDE drives. However, if you install a SCSI feature board, you can add internal SCSI drives.
- **Workstations with a Floppy Disk and Hard Drive** — If your system comes with a floppy disk and hard drive, you can install one 5.25-inch floppy disk, tape, CD-ROM, or hard disk drive. For MPI systems, you can use a floppy disk interface drives or SCSI drive. For ELI systems, the drive you choose is typically a floppy disk interface drive or IDE drive. However, if you install a SCSI feature board, you can add internal SCSI drives.

The following paragraphs tell you how to install drives in a three-slot system.

Installing a 5.25-Inch Drive in a Three-Slot System

To install a 5.25-inch drive, complete the following steps:

Note: *You can install a 3.5-inch drive in the 5.25-inch drive slot if you mount the drive in a 5.25-inch bracket. This bracket, if available, comes with the 3.5-inch drive as a separate option.*

1. Make sure the system is turned off and unplugged from the wall.
2. Locate the hardware packet that came with your system and take out four screws. Set these screws aside for later use.
3. Complete either or both of the following steps, as appropriate.
 - If you are installing a second IDE drive, make sure the jumpers on both drives are set so that one drive is a master and the other, a slave. See the documentation that came with the IDE drive for the jumper location.
 - If you are installing a SCSI drive, make sure the SCSI ID jumpers on the drive are correctly set. Also, remove or add SCSI terminators, as appropriate. For more on these subjects, see "Special Procedures for SCSI Drives," later in this section.
4. Remove the system unit cover, as described in "Removing the System Unit Cover," earlier in this section. As you work, observe the ESD precautions, outlined in "Avoiding Electrostatic Discharge."

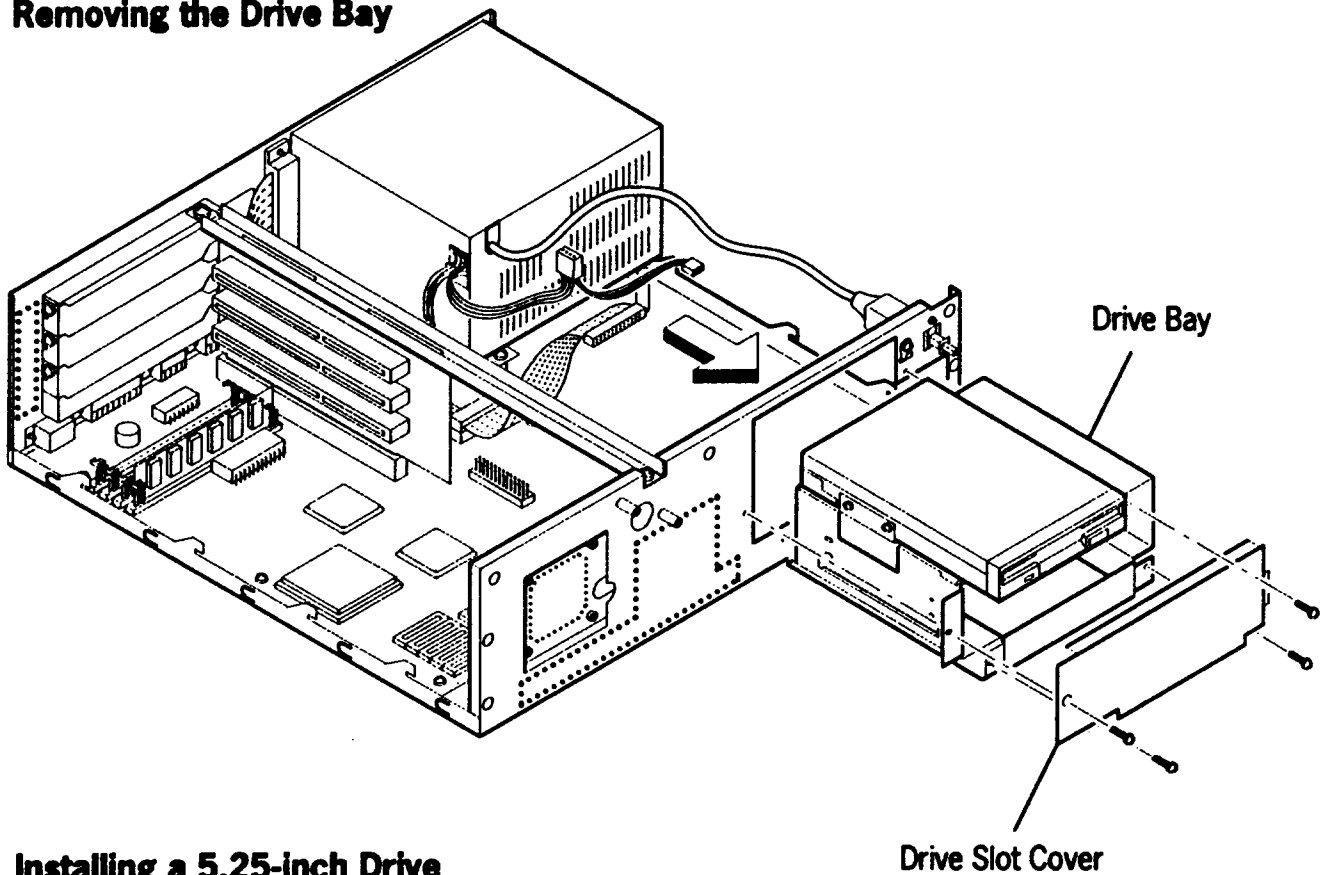
5. Facing the front of the system unit, remove the four screws that secure the drive bay to the system unit, as shown in Figure 5-16. Lift the 5.25-inch drive slot cover away from the system unit.
6. Slide the drive bay part of the way out of the system unit. If there are drives already installed in the drive bay, disconnect the power cable and interface cable from each drive.
7. Pull the drive bay the rest of the way out and place it on the work surface.
8. Insert the 5.25-inch drive into the drive bay, as shown in Figure 5-16. The front of the drive protrudes about 1 inch (2.54 cm) from the front edge of the drive bay. Secure the drive to the bay using the four screws set aside in step 2.

Note: *Be sure to slide the drive in so that it rests on top of the lip at either side of the bay. Take care not to snag the electronics on the drive as you insert it into the bay.*

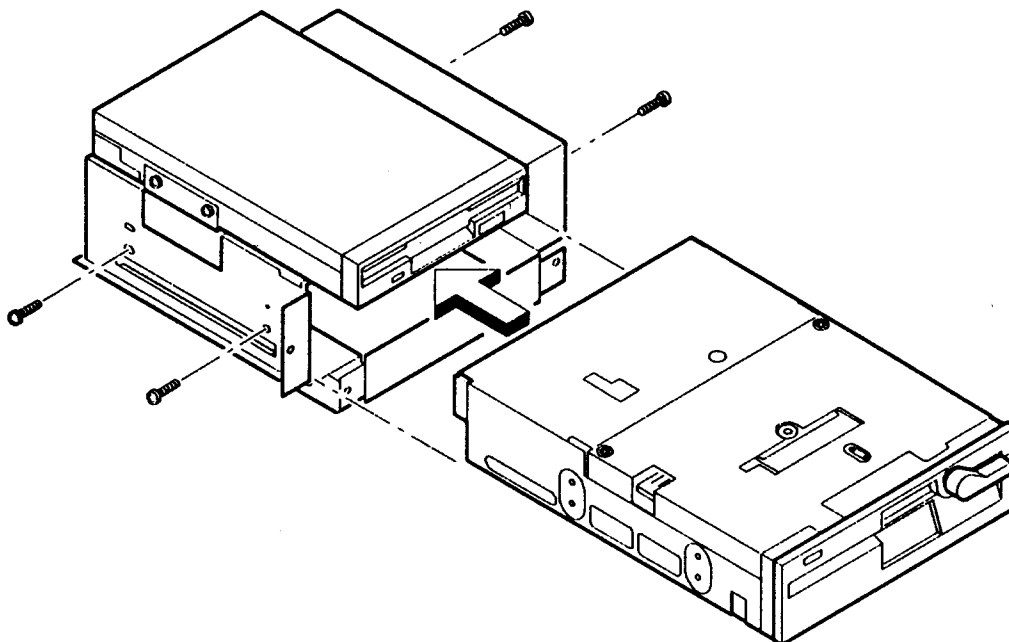
9. Insert the drive bay half way into the system unit. Connect the power cable and interface cable to the rear of the 5.25-inch drive. Also, reconnect any cables that you disconnected in step 6. Before you connect these cables, *be sure* to read "Connecting Drive Cables," later in this section.
10. Slide the drive bay all the way into the system unit and install the 5.25-inch drive slot cover. Secure the bay using the four screws removed in step 5.

Figure 5-16. Installing a 5.25-Inch Drive in a Three-Slot System

Removing the Drive Bay



Installing a 5.25-inch Drive



162.5-17

11. If you installed a drive that uses removable media (such as a floppy disk, tape, or CD-ROM drive), remove the filler panel from the system unit cover, as shown in Figure 5-17. You also need to remove the filler panel if you are using a 5.25-inch hard disk drive bracket equipped with a front bezel.

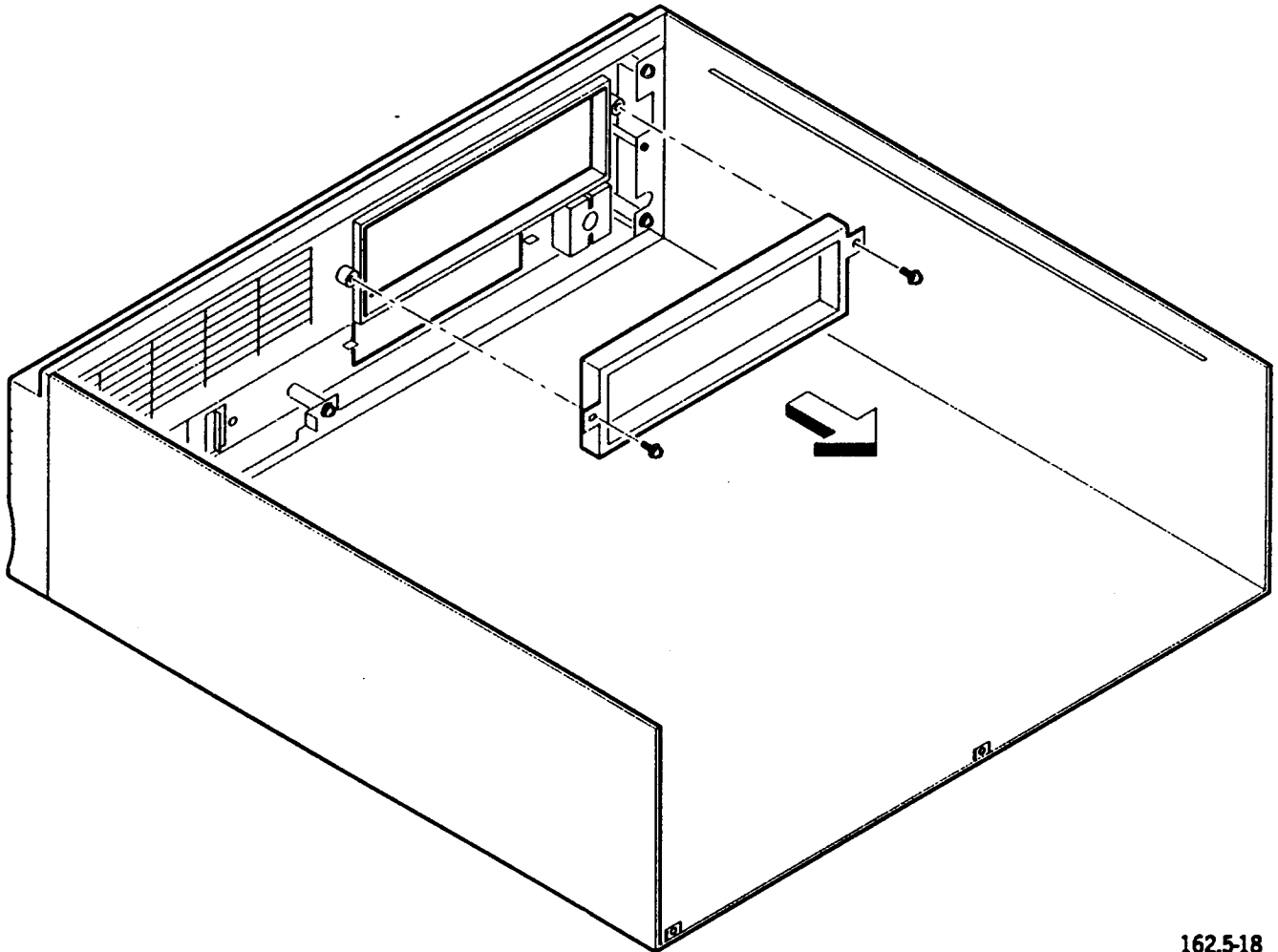
Note: *For floppy disk drives, be sure to remove the drive protect card (if present) from the floppy disk slot.*

12. If you have finished installing all the hardware that goes inside the system unit, replace the system unit cover. Remember to secure the cover using the screws you removed earlier.

When you next turn on the system, be sure to verify your drive configuration. You can verify the configuration by running the BIOS Setup utility.

Note: *For details on running the BIOS Setup utility, see Section 3.*

Figure 5-17. Removing the Filler Panel from the System Unit Cover



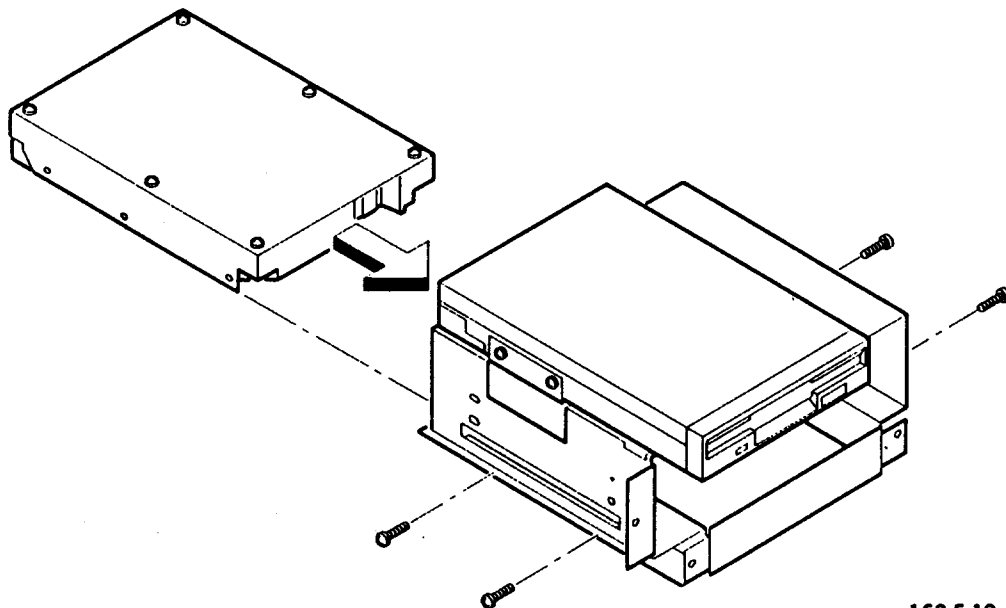
162.5-18

9. Insert the drive bay half way into the system unit. Connect the power cable and interface cable to the rear of the 3.5-inch drive. Also, reconnect any cables that you disconnected in step 6. Before you connect these cables, *be sure* to read "Connecting Drive Cables," later in this section.
10. Slide the drive bay all the way into the system unit and install the 5.25-inch drive slot cover. Secure the bay using the four screws removed in step 5.
11. If you have finished installing all the hardware that goes inside the system unit, replace the system unit cover. Remember to secure the cover using the screws you removed earlier.

When you next turn on the system, be sure to verify your drive configuration. You can verify the configuration by running the BIOS Setup utility.

Note: For details on running the BIOS Setup utility, see Section 3.

Figure 5-18. Installing a 3.5-Inch Hard Disk Drive in a Three-Slot System



Installing Internal Drives in Six-Slot Systems

Six-slot systems come in several configurations. Some six-slot systems arrive with one floppy disk drive already installed and some with a floppy disk drive and hard drive. Depending on the type of system you received, you can upgrade your drive configuration as follows:

- **Workstations with a Floppy Disk Drive** — If your system comes with a floppy disk drive, you can install one 3.5-inch hard disk drive and three 5.25-inch floppy disk, tape, CD-ROM, or hard disk drives. For MPI systems, you can use floppy disk interface drives or SCSI drives. For ELI systems, the drives you choose are typically floppy disk interface drives or IDE drives. However, if you install a SCSI feature board, you can also add internal SCSI drives.
- **Workstations with a Floppy Disk and Hard Drive** — If your system comes with a floppy disk and hard drive, you can install three 5.25-inch floppy disk, tape, CD-ROM, or hard disk drives. For MPI systems, you can use floppy disk interface drives or SCSI drives. For ELI systems, the drives you choose are typically floppy disk interface drives or IDE drives. However, if you install a SCSI feature board, you can also add internal SCSI drives.

The following paragraphs tell you how to install drives in a six-slot system.

Installing a 5.25-Inch Drive in a Six-Slot System

To install a 5.25-inch drive, complete the following steps:

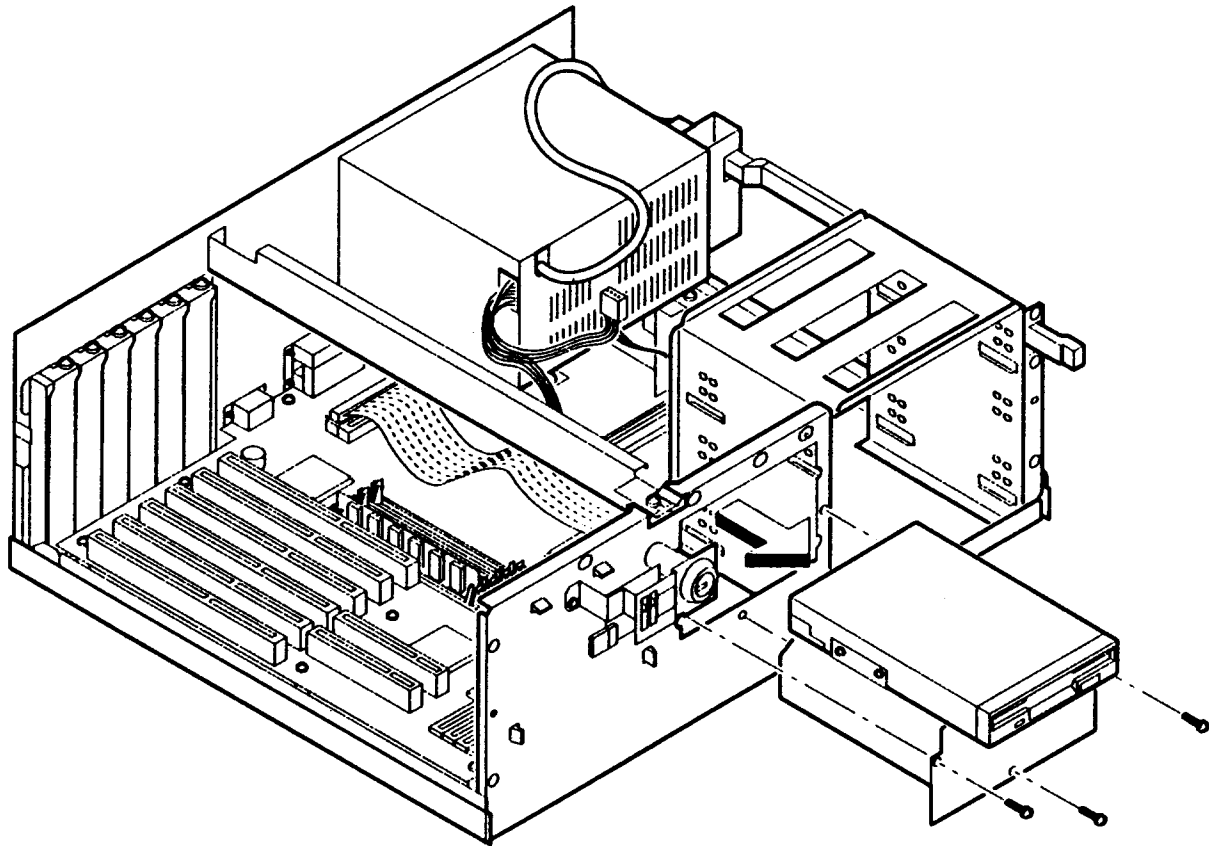
Note: *You can install a 3.5-inch drive in the 5.25-inch drive slot if you mount the drive in a 5.25-inch bracket. This bracket, if available, comes with the 3.5-inch drive as a separate option.*

1. Make sure the system is turned off and unplugged from the wall.
2. Locate the hardware packet that came with your system and take out four screws. Set these screws aside for later use.
3. Complete either or both of the following steps, as appropriate.
 - If you are installing a second IDE drive, make sure the jumpers on both drives are set so that one drive is a master and the other, a slave. See the documentation that came with the IDE drive for the jumper location.
 - If you are installing a SCSI drive, make sure the SCSI ID jumpers on the drive are correctly set. Also, remove or add SCSI terminators, as appropriate. For more on these subjects, see "Special Procedures for SCSI Drives," later in this section.

Upgrading Your System

4. Remove the system unit cover, as described in "Removing the System Unit Cover," earlier in this section. As you work, observe the ESD precautions, outlined in "Avoiding Electrostatic Discharge."
5. Disconnect the 3.5-inch floppy disk drive interface and power cables. Also disconnect the cables from the 3.5-inch hard disk drive (if present).
6. Facing the front of the system unit, remove the three screws that secure the 3.5-inch drive tray to the system unit, as shown in Figure 5-19.
7. Slide the tray out of the system unit and set it aside. You may need to wiggle the tray a bit as you remove it so that it clears the system lock housing.

Figure 5-19. Removing the 3.5-Inch Drive Tray From a Six-Slot System

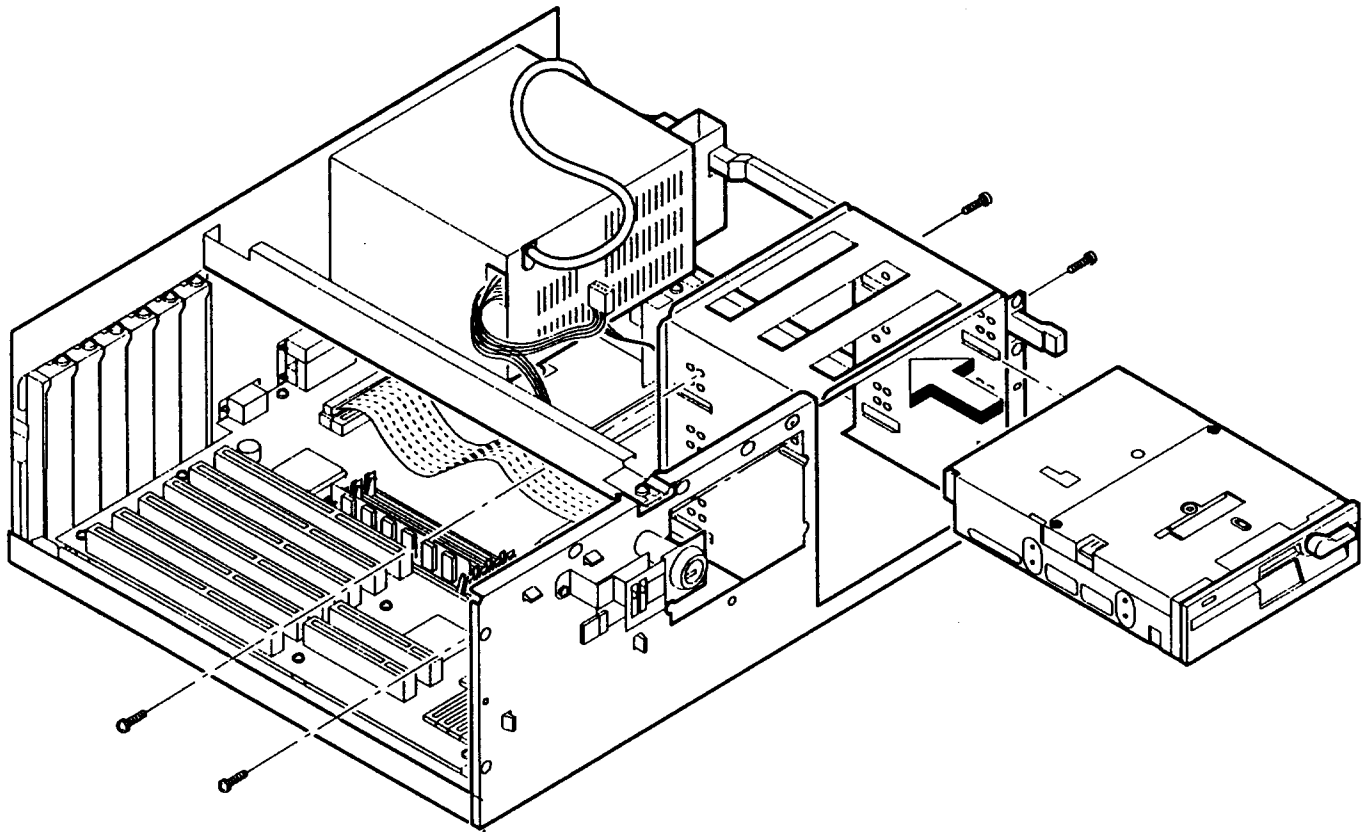


162.5-20

8. Insert the 5.25-inch drive half way into the drive bay, as shown in Figure 5-20. Connect the power cable and interface cable to the rear of the 5.25-inch drive. Before you connect these cables, *be sure to read "Connecting Drive Cables,"* later in this section.

Note: *Unisys recommends that you use the lowest of the three drive slots first. This measure makes future drive installations easier. Also, be sure to slide the drive in so that it rests on top of the lip at either side of the bay. Take care not to snag the electronics on the drive as you insert it into the bay.*

Figure 5-20. Installing a 5.25-Inch Drive in a Six-Slot System



162.5-21

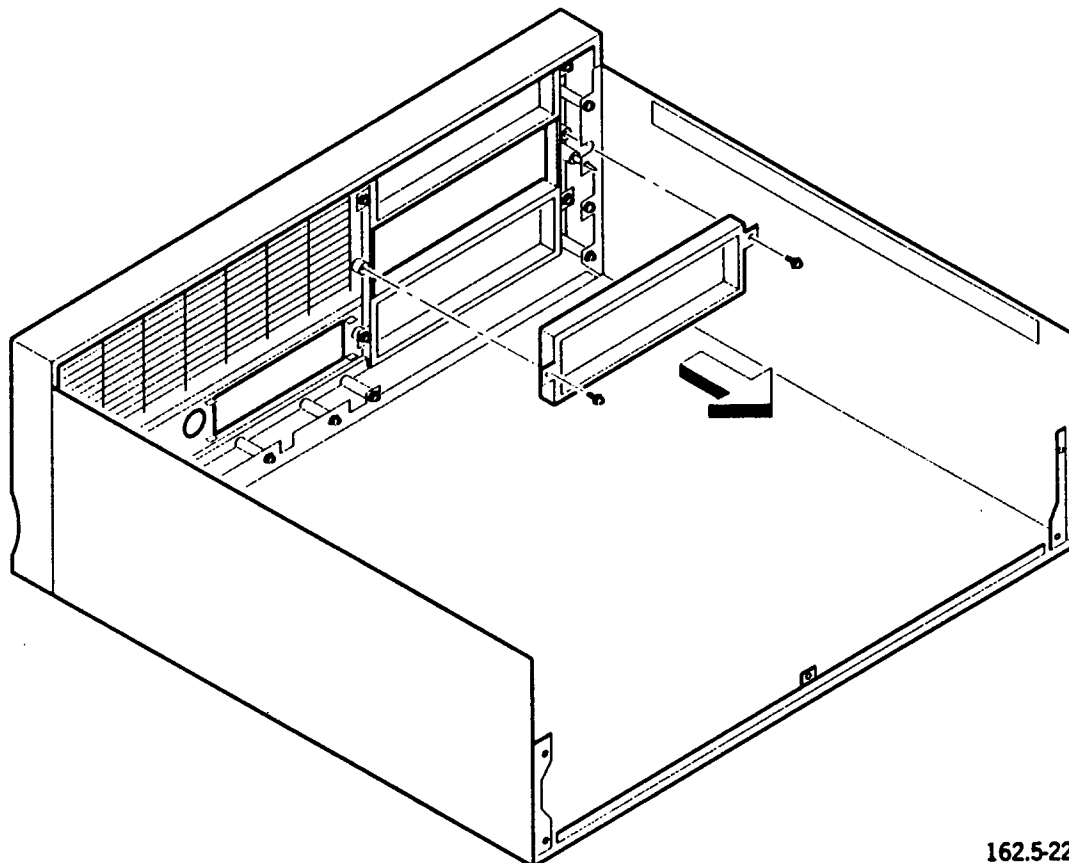
9. Slide the drive into the system unit. The front of the drive protrudes about 1.5 inch (3.8 cm) from the front edge of the drive bay. Secure the drive to the bay using the four screws set aside in step 2.
10. Slide the 3.5-inch drive tray into the system unit. Secure the tray using the three screws removed in step 6.
11. Reconnect the cables you disconnected in step 5.
12. If you installed a drive that uses removable media (such as a floppy disk, tape, or CD-ROM drive), remove the appropriate filler panel from the system unit cover, as shown in Figure 5-21. You also need to remove the filler panel if you are using a 5.25-inch hard disk drive bracket equipped with a front bezel.

Note: For floppy disk drives, be sure to remove the drive protect card (if present) from the floppy disk slot.
13. If you have finished installing all the hardware that goes inside the system unit, replace the system unit cover. Remember to secure the cover using the screws you removed earlier.

When you next turn on the system, be sure to verify your drive configuration. You can verify the configuration by running the BIOS Setup utility.

Note: For details on running the BIOS Setup utility, see Section 3.

Figure 5-21. Removing the Filler Panel from the System Unit Cover



162.5-22

Installing a 3.5-Inch Hard Disk Drive in a Six-Slot System

To install a 3.5-inch hard disk drive, complete the following steps:

1. Make sure the system is turned off and unplugged from the wall.
2. Locate the hardware packet that came with your system and take out four screws. Set these screws aside for later use.
3. Complete either or both of the following steps, as appropriate:

8. Insert the 3.5-inch drive into the tray, as shown in Figure 5-22. Secure the drive to the tray using the four screws set aside in step 2.

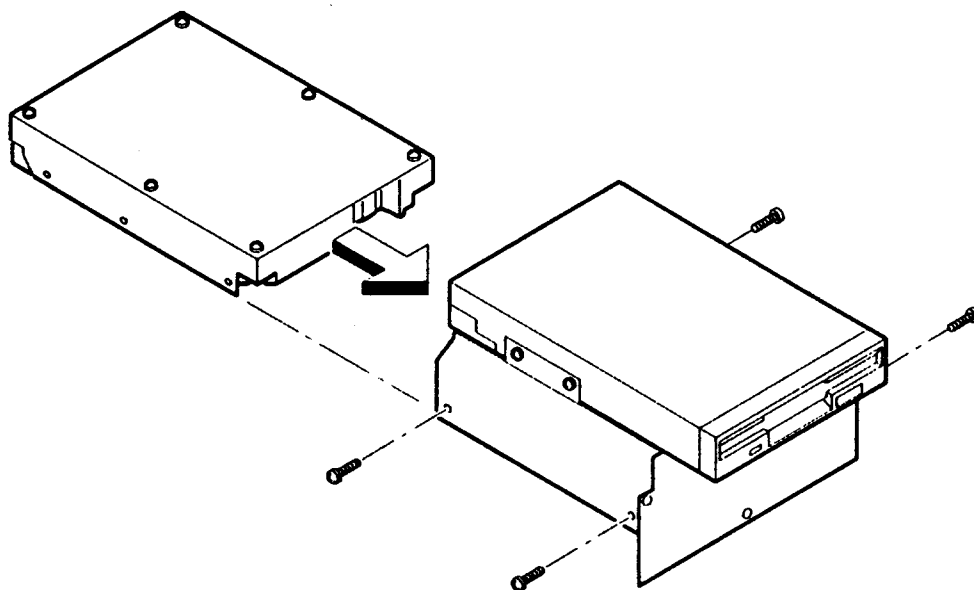
Note: *Be sure to slide the drive in so that it rests on top of the lips at either side of the tray. Take care not to snag the electronics on the drive as you insert it into the tray.*

9. Insert the drive tray into the system unit. Secure the tray using the three screws removed in step 5.
10. Connect the power cable and interface cable to the rear of the 3.5-inch drive. Also, reconnect the floppy disk drive interface and power cables. Before you connect the cables, *be sure* to read "Connecting Drive Cables," later in this section.
11. If you have finished installing all the hardware that goes inside the system unit, replace the system unit cover. Remember to secure the cover using the screws you removed earlier.

When you next turn on the system, be sure to verify your drive configuration. You can verify the configuration by running the BIOS Setup utility.

Note: *For details on running the BIOS Setup utility, see Section 3.*

Figure 5-22. Installing a 3.5-Inch Hard Disk Drive in a Six-Slot System



162.5-23

Connecting Drive Cables

Before you can operate a drive, you must connect a power cable and interface cable to the rear of the drive. Here is a brief discussion of these cables.

- **Power Cable** — Power cable connects the drive to the power supply. The type of power cable your system uses is bundled cable.
- **Interface Cable** — Interface cable connects the drive to the system board. The type of interface cable your system uses is ribbon cable. If you have an ELI workstation, your system comes with floppy disk and IDE interface cables already in place; all you need to do is connect the free end of the appropriate cable to the drive you are installing. MPI systems arrive with floppy disk and SCSI interface cables in place. Although your system is shipped with preinstalled cables, be prepared to refold some of these cables before connecting them to the drive.

Read the following paragraphs to learn how to connect power, floppy disk, IDE, and SCSI cables to your drives.

Caution

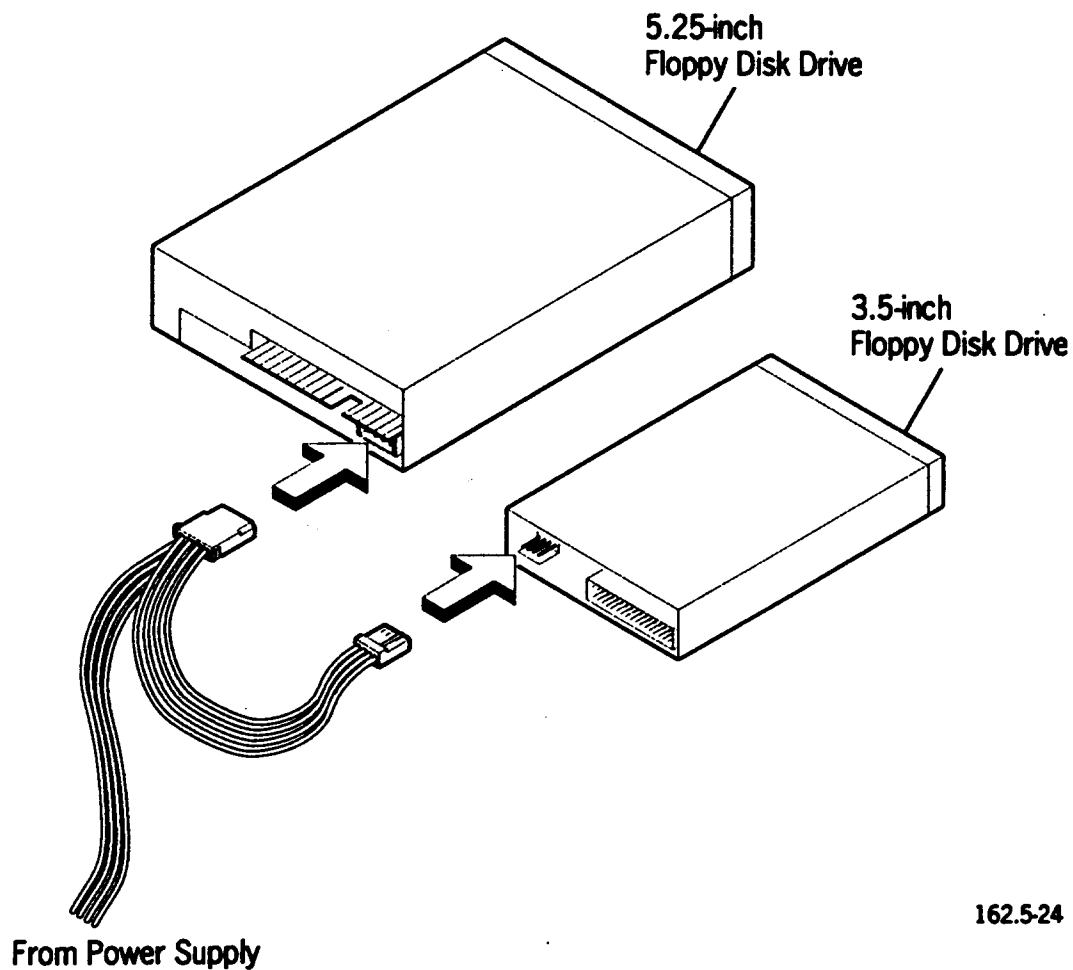
Make sure the system is turned off and unplugged from the wall before connecting cables to the drives.

Connecting Drives to the Power Cable

Connecting a drive to system power is very straightforward. Simply locate a free power connector on one of the two power cables and connect it to the drive, as shown in Figure 5-23.

Note: *The connector that fits the 3.5-inch floppy disk drive is smaller than the connector for any of the other drives.*

Figure 5-23. Connecting Power Cables



162.5-24

Connecting Drives to the Floppy Disk Cable

A floppy disk interface cable is used to connect floppy disk drives and certain tape drives to the floppy disk controller on the system board. If you have a three-slot system, this cable has three connectors. For six-slot systems, the cable has four connectors. The first connector is always attached to the system board. The next connector is reserved for the 3.5-inch floppy disk drive. In most systems, this drive is shipped in place, with the floppy disk interface cable already attached.

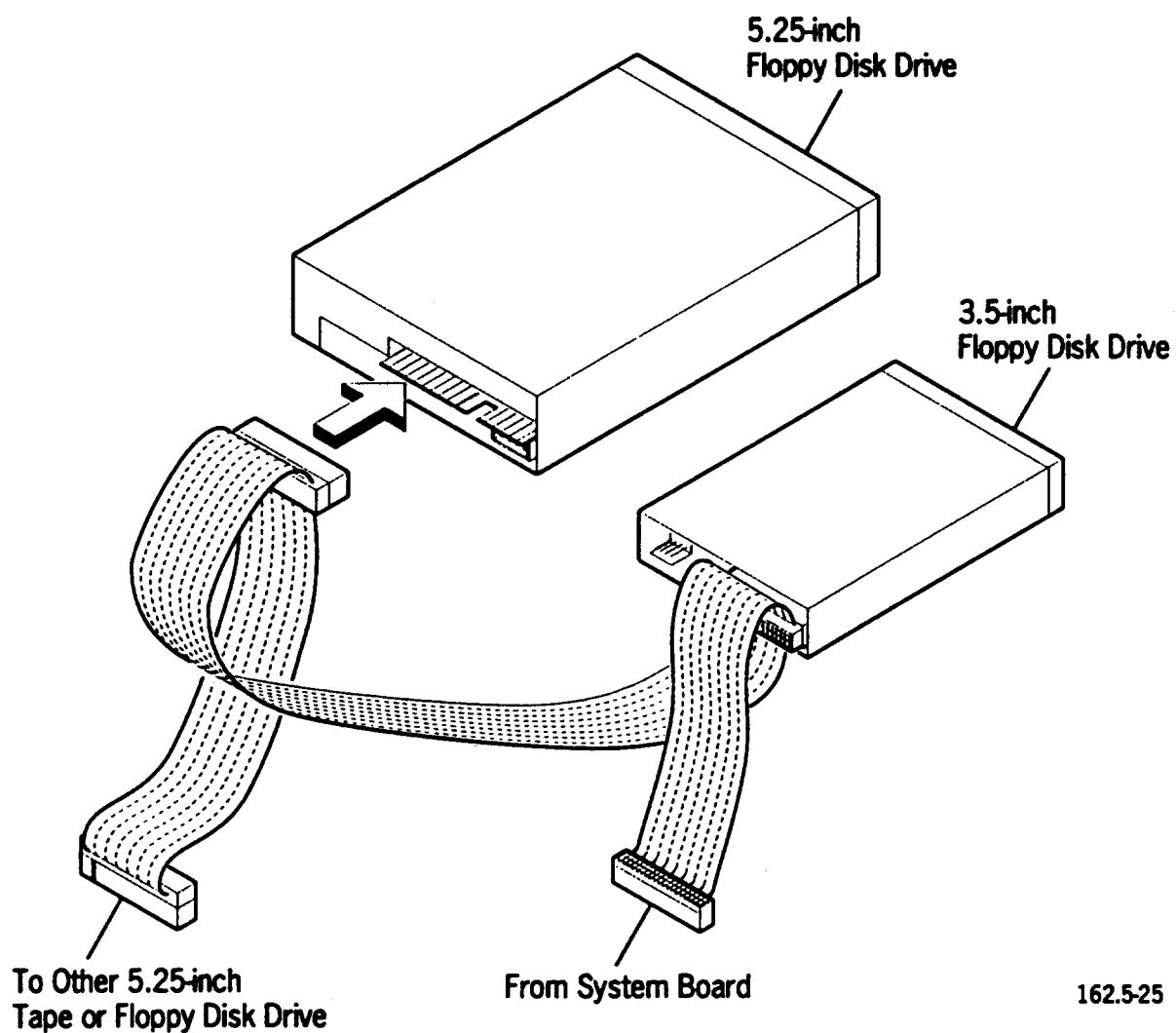
To attach the floppy disk cable to a drive, complete these steps:

1. Use the configuration map on the system unit cover to locate the floppy disk connector. The cable attached to this connector is the floppy disk interface cable.
2. Connect the floppy disk cable to the drive using one of the following two methods, as appropriate. The cable connectors are keyed, so be sure you have them correctly oriented before trying to insert them. If you need to remove the cable clamp to attach a cable, be sure to replace the cable clamp when you are finished.
 - If your system did not come with a preinstalled 3.5-inch floppy disk drive and you are upgrading the system to include this drive, plug the first free connector on the cable into the 3.5-inch floppy disk drive, as shown in Figure 5-24.
 - For all other floppy disk interface drives, plug one of the spare connectors into the drive you are adding. Be sure to study the cable bends shown in Figure 5-24.
3. Check to make sure that the cable bundle does not block the vents on the power supply. If necessary, stow the cable bundle underneath the power supply, making sure you do not snag any system board components.

Caution

If the cables are positioned so that they interfere with the airflow through the power supply vents, the system unit can experience thermal problems or damaged components.

Figure 5-24. Connecting Drives to the Floppy Disk Controller



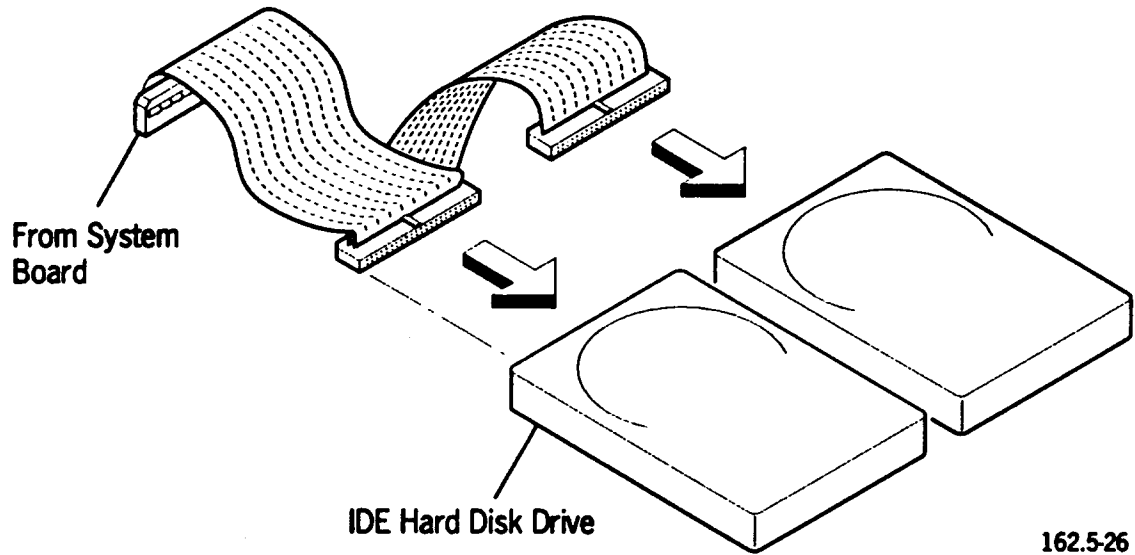
Connecting Drives to the IDE Cable

IDE interface cable is used to connect hard disk drives to the IDE controller on the system board. The IDE cable has three connectors. The first connector is always attached to the system board. If your system came with a preinstalled IDE disk drive, the next connector is attached to that drive.

To attach the IDE cable to a drive, complete these steps:

1. Use the configuration map on the system unit cover to locate the IDE connector. The cable attached to this connector is the IDE cable.
2. Connect the IDE cable to the drive using one of the following two methods, as appropriate. The cable connectors are keyed, so be sure you have them correctly oriented before trying to insert them. If you need to remove the cable clamp to attach a cable, be sure to replace the cable clamp when you are finished.
 - If your system did not come with a preinstalled IDE drive, plug the first free connector on the cable into the drive you are adding as

Figure 5-25. Connecting Drives to the IDE Controller



Connecting Drives to the SCSI Cable

SCSI interface cable is used to connect hard disk drives to the SCSI controller on the system board. If you have a three-slot system, this cable has four connectors. For six-slot systems, the cable has five connectors. The bulkhead connector is attached to the rear of the system unit so that you can configure external SCSI drives. The first connector is always attached to the system board. If your system came with a preinstalled SCSI disk drive, the last connector is attached to that drive.

To attach the SCSI cable to a drive, complete these steps:

1. Use the configuration map on the system unit cover to locate the SCSI connector. The cable attached to this connector is the SCSI cable.
2. Connect the SCSI cable to the drive using one of the following two methods, as appropriate. The cable connectors are keyed, so be sure you have them correctly oriented before trying to insert them. If you need to remove the cable clamp to attach a cable, be sure to replace the cable clamp when you are finished.
 - If your system did not come with a preinstalled SCSI drive, plug the last free connector on the cable into the drive you are adding.
 - If your system came with a preinstalled SCSI drive, plug one of the spare connectors into the drive you are adding. Be sure to study the cable bends shown in Figure 5-26.

Note: *If you are adding SCSI drives to your system, you may need to change the SCSI termination scheme. For more on SCSI termination, see "SCSI Termination," later in this section.*

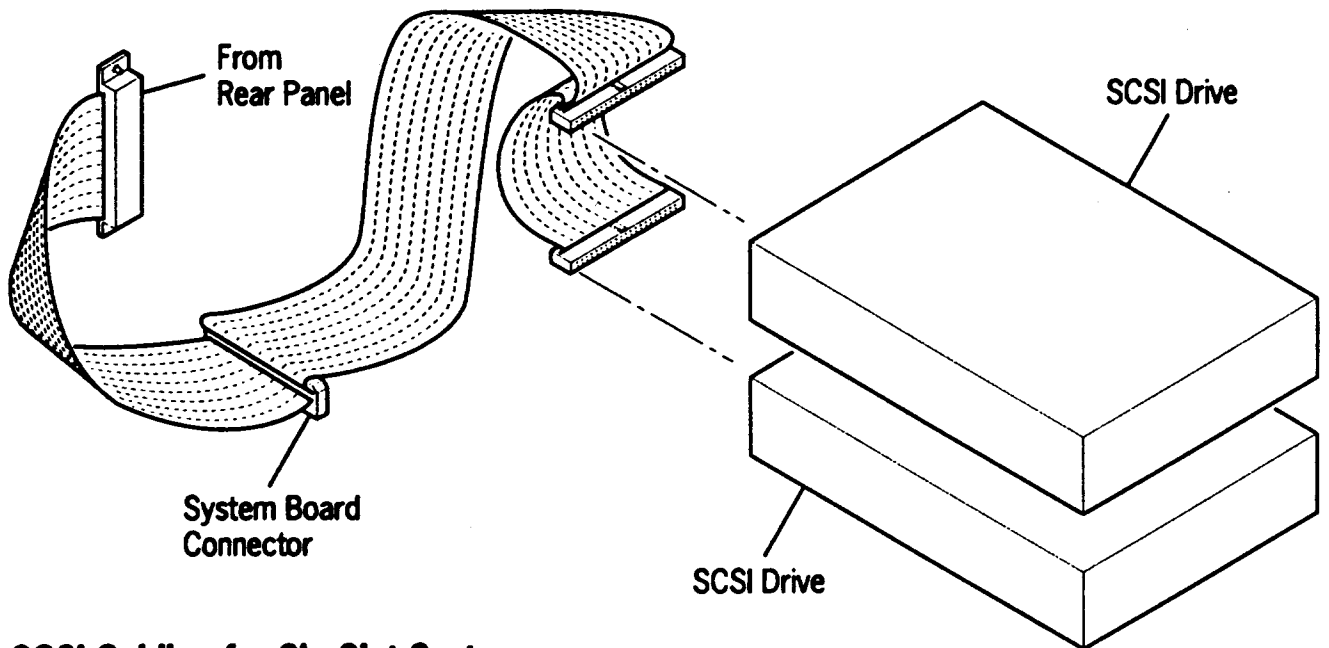
3. Check to make sure that the cable bundle does not block the vents on the power supply. If necessary, stow the cable bundle underneath the power supply, making sure not to snag any system board components.

Caution

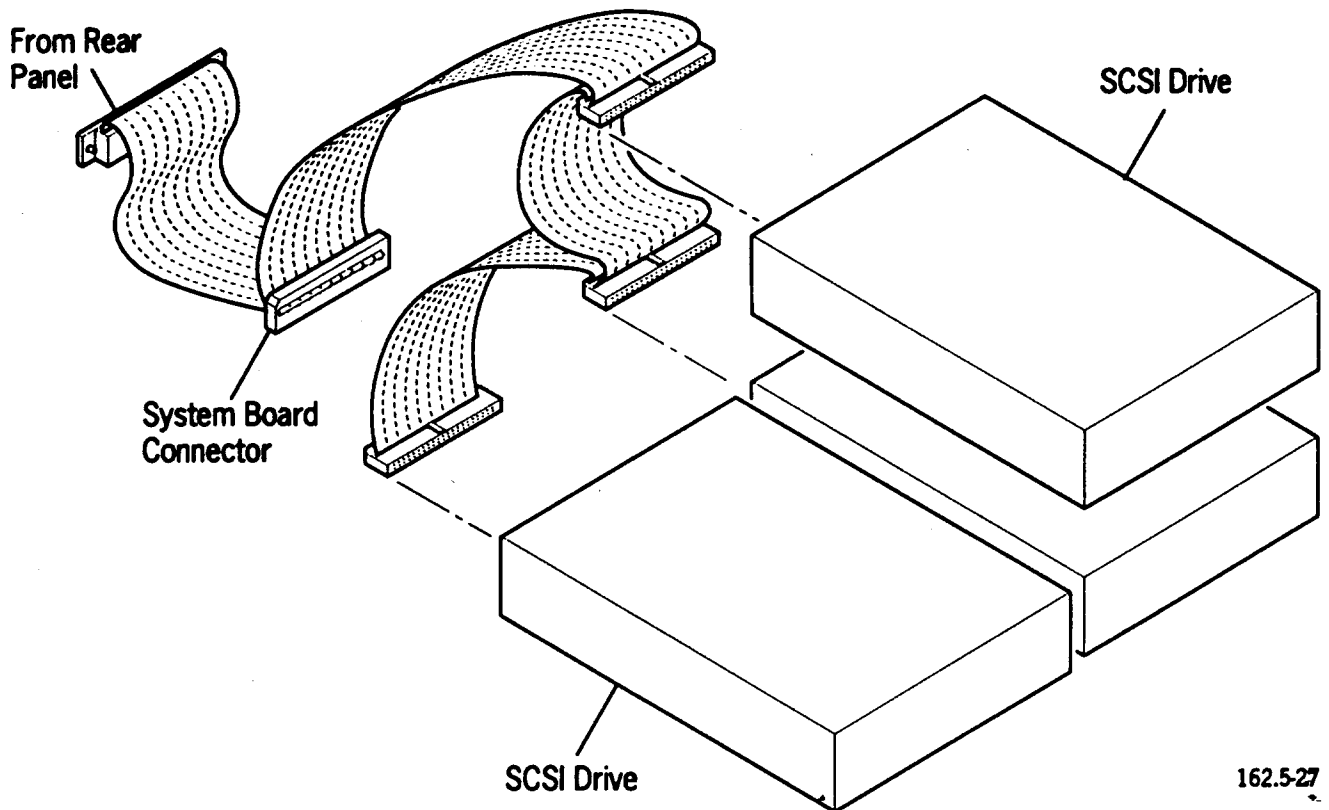
If the cables are positioned so that they interfere with the airflow through the power supply vents, the system unit can experience thermal problems or damaged components.

Figure 5-26. Connecting Drives to the SCSI Controller

SCSI Cabling for Three-Slot Systems



SCSI Cabling for Six-Slot Systems



162.5-27

Special Procedures for SCSI Drives

If you add SCSI drives to your system, you need to plan two aspects of your configuration before you install the drives. The first of these is the SCSI identifier (ID) scheme for your system and the second is the SCSI termination scheme. Read the following paragraphs for more on these subjects.

Note: *Before you consider your SCSI installation complete, be sure to check the system board SCSI jumpers, install SCSI device drivers, and verify your SCSI configuration by running the BIOS Setup utility. To learn more about these subjects, see Section 3.*

SCSI IDs

Each SCSI drive in your configuration requires a unique identifier. This identifier, known as a SCSI ID, allows the system to distinguish one device from the next and route commands accordingly.

You assign SCSI IDs by setting three SCSI ID jumpers or switches on the printed circuit board for each drive. Typically, these components are labeled A0, A1, and A2 or ID0, ID1, and ID2. To learn the jumper and switch settings that correspond with particular SCSI IDs, see Table 5-2.

If you installed SCSI device drivers, the SCSI IDs you can use range from 0 through 6, with SCSI ID 7 reserved for the SCSI controller. Without SCSI device drivers, DOS only recognizes SCSI IDs 0 and 1. Although you can assign IDs as you wish, you may want to use the ID scheme defined in Table 5-2; this table outlines the typical approach for DOS-based systems.

Note: *Remember, SCSI IDs must be unique for each device; do not assign the same SCSI ID to two drives.*

Table 5-2. SCSI ID Assignments

SCSI ID	Jumper and Switch Settings	Recommended SCSI ID Settings for DOS-Based Systems (First-Time Use)
0	A0: Off A1: Off A2: Off	First hard disk drive (the system boots from this drive unless there is an IDE hard disk drive installed)
1	A0: On A1: Off A2: Off	Additional hard disk drive
2	A0: Off A1: On A2: Off	Additional hard disk drive or removable drive
3	A0: On A1: On A2: Off	Additional hard disk drive or removable drive
4	A0: Off A1: Off A2: On	CD-ROM or WORM drive
5	A0: On A1: Off A2: On	CD-ROM or WORM drive
6	A0: Off A1: On A2: On	SCSI tape drive
7	Not Applicable	Reserved for the SCSI controller

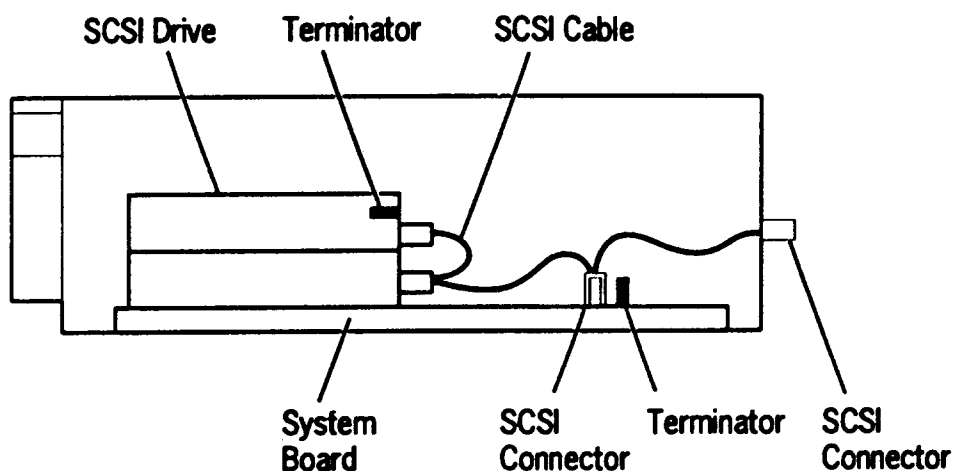
SCSI Termination

For your SCSI drives to function correctly, you must make sure that the first and last devices in the configuration are terminated using standard SCSI terminators. You also need to remove the terminators from *all* other devices in the SCSI string. Here are some guidelines that will help you ensure that your SCSI configuration is properly terminated. For an overview of the various termination schemes, see Figure 5-27.

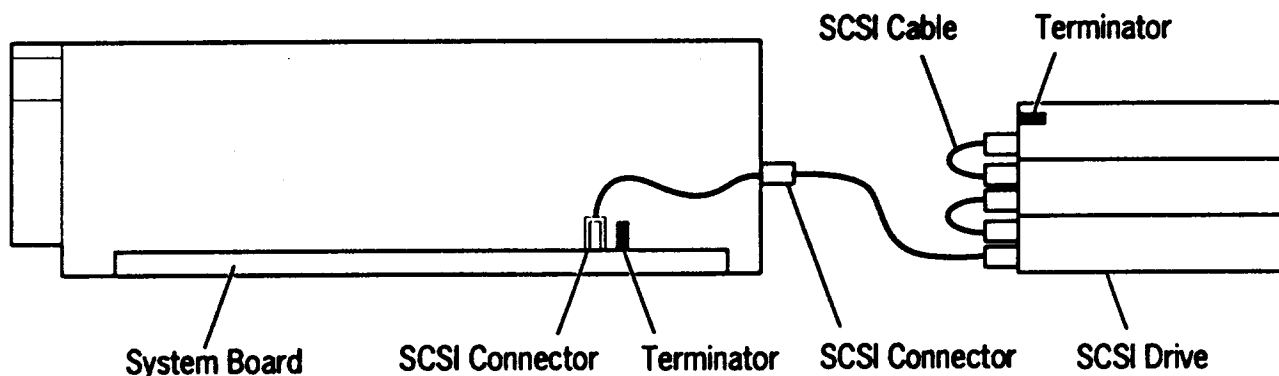
- **Configurations with Internal Drives Only** — In this case, the first device in the SCSI string is the SCSI controller. Since the terminators for the controller are already installed on the system board, you do not need to terminate this device. The last device in the string is the drive that uses the last connector on the internal SCSI cable. Be sure this drive has terminators.
- **Configurations with External Drives Only** — In this case, the first device in the SCSI string is the SCSI controller. Since the terminators for the controller are already installed on the system board, you do not need to terminate this device. The last device in the string is the drive that uses the last connector on the external SCSI cable. Be sure this drive has terminators.
- **Configurations with Internal and External Drives** — In this case, the first device in the SCSI string is the drive that uses the last connector on the internal SCSI cable. The last device is the drive that uses the last connector on the external SCSI cable. Be sure both of these drives have terminators. Also, remove the SCSI terminators from the system board; for the location of these terminators, see the configuration map on the system unit cover.

Figure 5-27. Terminating SCSI Configurations

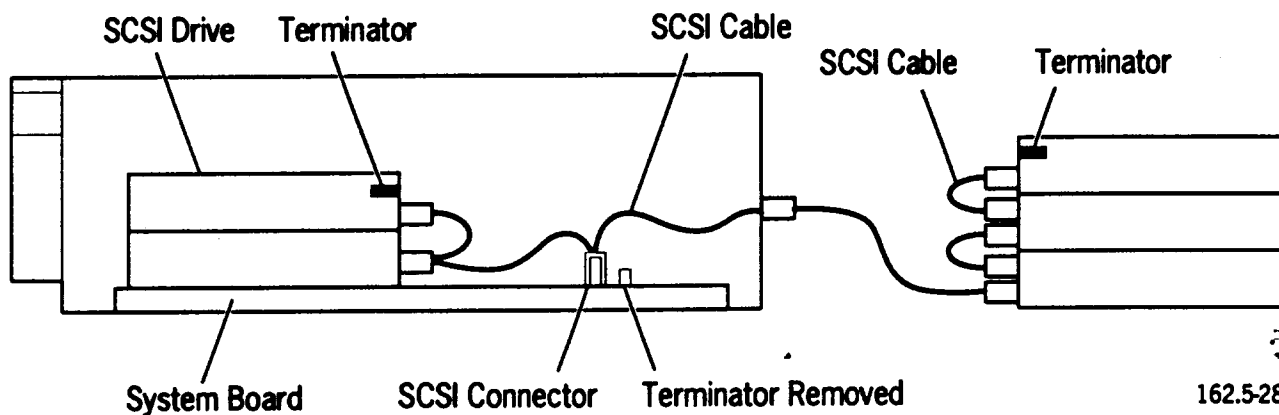
Internal SCSI Drives Only



External SCSI Drives Only



Internal and External SCSI Drives



162.5-28

As you work with your termination scheme, remember to remove the terminators from *all* drives except for the last drive on the internal SCSI cable and the last drive on the external SCSI cable. Be aware that many SCSI drives, including the preinstalled 3.5-inch hard disk drive, come with terminators already in place. For the drives you install inside your system, the terminators are located the SCSI interface connector. These drives typically use two or three SIP-style terminators. If you have free-standing SCSI drives that attach to the rear of your workstation, you can find the terminator (if present) in one of the interface connectors at the back of the drive.

Note: *You may need a small pair of needlenose pliers to remove the terminators. Be sure to pull the terminators straight out of the sockets so you do not damage the pins. Store all terminators in a safe place in case you need to use them in the future.*

Appendix A

Workstation Specifications

This appendix provides you with some of the specifications you should observe when choosing a site for your equipment. These specifications define the climatic, mechanical, and electrical limits for your workstation as a whole. If you select a site that does not meet these requirements, your workstation can experience problems.

In addition to physical specifications, Appendix A furnishes information on system mapping, interrupt assignments, and DMA channels. Appendix A is organized as follows:

- Environmental specifications
 - Operating environment
 - Nonoperating environment
 - Shipping specifications
- Electrical specifications
- System mapping
 - Memory map
 - I/O address map
 - Interrupt assignments
 - DMA channels

Environmental Specifications

The following specifications define the environmental limits within which your equipment can operate. These specifications also provide guidelines for inactive workstations. If you need to ship a device to another site, pay close attention to the shipping specifications. The discussion of shipping specifications assumes that you repack your equipment in its original container using the original shipping material.

Operating Environment

<i>Temperature</i>	+55.4° F to +95° F (+13° C to +35° C)
<i>Thermal change</i>	18° F per hour (10° C per hour)
<i>Relative humidity</i>	10% to 80% noncondensing
<i>Altitude</i>	Sea level to 8,000 ft. (2,438.4 m)
<i>Maximum vibration</i>	0.02 in. (0.05 cm) displacement from 5 to 16 Hz; 0.25 G from 16 to 300 Hz with a sweep rate of 0.5 octaves per minute. <i>Note: For 120- and 240-megabyte SCSI hard disks: 0.1 G acceleration from 5 to 300 Hz with a sweep rate of 0.5 octaves per minute (Read Only).</i>
<i>Shock</i>	4 G's amplitude with a 10 ms duration, half sine wave.

Nonoperating Environment

<i>Temperature</i>	-40° F to +149° F (-40° C to +65° C)
<i>Thermal change</i>	54° F per hour (30° C per hour)
<i>Relative humidity</i>	0% to 95% noncondensing
<i>Altitude</i>	Sea level to 14,000 ft. (4,267.2 m)
<i>Maximum vibration</i>	0.1 in. (0.254 cm) displacement from 5 to 12 Hz; 0.75 G from 12 to 300 Hz with a sweep rate of 0.5 octaves per minute.
<i>Shock</i>	20 G's amplitude with a 10 ms duration, half sine wave.

Shipping Specifications

<i>Temperature</i>	-40° F to +149° F (-40° C to +65° C)
<i>Thermal change</i>	108° F per hour (60° C per hour)
<i>Relative humidity</i>	0% to 95%
<i>Altitude</i>	Sea level to 14,000 ft. (4,267.2 m)
<i>Maximum vibration</i>	0.5 G's input with a sweep rate of 5 to 200 Hz; 0.5 G's dwell for 15 minutes at the four maximum resonant frequencies in three axes.
<i>Shock</i>	<p>Packaged units with a shipping weight of 20 lbs (9.1 kg) or less can withstand a drop of 36 in. (91.4 cm).</p> <p>Packaged units with a shipping weight of 40 lbs (18.1 kg) or less can withstand a drop of 30 in. (72.2 cm).</p> <p>Packaged units with a shipping weight of 60 lbs (27.2 kg) or less can withstand a drop of 24 in. (61 cm).</p>

Electrical Specifications

The overall system unit rating is 115/230 volts, 50/60 Hz, 5.0/2.5 amperes (three-slot systems) or 115/230 volts, 50/60 Hz, 7.0/3.5 amperes (six-slot systems). Listed below are electrical specifications reflecting test measurements and ranges.

***Note:** Your system is designed to attenuate radio frequency interference to acceptable levels. If you change or modify your system without Unisys' expressed approval, your system may generate radio interference that could void your authority to operate your equipment.*

<i>115-volt Range</i>	Tested at 85-135 volts, 47-63 Hz
<i>230-volt Range</i>	Tested at 180-270 volts, 47-63 Hz
<i>Power consumption</i>	Three-slot system unit: 207 W, fully loaded and operational. Six-slot system unit: 285 W, fully loaded and operational.
<i>Heat dissipation</i>	Three-slot system unit: 708 Btu/hour (178 kcal/hour) Six-slot system unit: 974 Btu/hour (245 kcal/hour)
<i>AC convenience outlet rating</i>	115 volts at 2 amperes 230 volts at 1 ampere

System Mapping

The following paragraphs provide information on system mapping. Among the maps provided are memory maps, I/O address maps, interrupt assignments, and DMA channels.

Memory Map

Table A-1 provides a memory map for your system. This table is arranged in numerical order.

Table A-1. Memory Map

Hexadecimal Address	Function
000000 – 09FFFF	640KB system read/write memory
0A0000 – 0BFFFE	128KB video RAM reserved as a graphics display buffer
0BFFFF – 0C7FFE	32KB video RAM reserved for a video feature board BIOS
0C7FFF – 0DFFFE	96KB reserved for an extension ROM BIOS
0DFFFF – 0EFFFF	Duplicate code assignment (address FE0000)
0EFFFF – 0FFFFE	64KB reserved for system BIOS
0FFFFF – FDFFFE	I/O channel memory
FDFFFF – FE7FFE	32KB reserved for integrated VGA BIOS
FE7FFF – FFFFFFFF	64KB reserved for system ROM (protected mode)

I/O Address Map

Table A-2 provides an I/O address map for your system. This table is arranged in numerical order.

Table A-2. I/O Address Map

Hexadecimal Range	System Function
000 – 01F	Device
020 – 03F	DMA Controller 1
040 – 05F	Interrupt Controller 1
060 – 06F	System Timer/Counter
070 – 07F	Keyboard Controller 1
080 – 09F	RTC and NMI Registers
0A0 – 0BF	DMA Page Register
0C0 – 0DF	Interrupt Controller 2
0F0	Clear Math Coprocessor Busy *
0F1	Reset Math Coprocessor *
0F2 – 0F7	Reserved
0F8 – 0FF	Reserved for Math Coprocessor *
100 – 1EF	Reserved
1F0 – 1FF	Fixed Disk
200 – 277	Reserved for Game Port
278 – 27E	Reserved for Parallel Port (LPT2)
27F – 2F7	Available for Expansion
2F8 – 2FF	Reserved for Serial Port 2
300 – 377	Available for Expansion
378 – 37F	Reserved for Parallel Port (LPT1)
380 – 3AF	Available for Expansion
3B0 – 3EF	Video System
3F0 – 3F7	Floppy Controller
3F8 – 3FF	Reserved for Serial Port 1

* *If you add a math coprocessor to your 25-MHz or 33-MHz SX system unit, be sure to use a 80487 SX coprocessor chip.*

Interrupt Assignments

Table A-3 lists the normal interrupt assignments for your system. This table is arranged in numerical order.

Note: *Feature boards can share interrupt lines, as long as the boards obey sharing rules (if the interrupts are edge-triggered, only one board can be active at a time; the rest must be high impedance).*

Table A-3. Interrupt Assignments

Interrupt Assignments	System Function
IRQ0	Timer/Counter 0 *
IRQ1	Keyboard *
IRQ2	Interrupt Controller 2 Cascade Input
IRQ3	Serial Port COM2 or COM4
IRQ4	Serial Port COM 1 or COM3
IRQ5	Available for I/O Expansion **
IRQ6	Floppy Disk Controller
IRQ7	Parallel Port LPT1
IRQ8	Real-Time Clock
IRQ9	Available for I/O Expansion
IRQ10	Available for I/O Expansion
IRQ11	SCSI Controller
IRQ12	Mouse
IRQ13	Math Coprocessor ***
IRQ14	IDE Hard Disk Controller
IRQ15	Available for I/O Expansion

* *These interrupts are not available on the ISA bus.*

** *Also used for Parallel Port 2 (LPT2).*

*** *If you add a math coprocessor to your 25-MHz or 33-MHz SX system unit, be sure to use a 80487 SX coprocessor chip.*

System DMA Channels

Table A-4 lists the DMA channels for your system. This table is arranged in numerical order. DMA channels 0 through 3 are used for 8-bit transfers, while DMA channels 5 through 7 are used for 16-bit DMA transfers.

Table A-4. DMA Channels and Functions

DMA Channel *	System Function
DRQ0, DACK0	SCSI Controller **
DRQ1, DACK1	Spare
DRQ2, DACK2	Floppy Disk Controller
DRQ3, DACK3	Spare
4	Cascade ***
DRQ5, DACK5	Spare
DRQ6, DACK6	Spare
DRQ7, DACK7	Spare

* *DACK signals are asserted low.*

** *As an alternative, you can use DMA channel 5 or 6 for the SCSI controller.*

*** *This function is not available for the ISA bus.*

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