Silicon Graphics® Tezro™ Visual Workstation Hardware User's Guide: Tower Configuration

Record of Revision

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About This Guide

Welcome to the user's guide for the Silicon Graphics® Tezro™ visual workstation. Your new workstation offers VPro graphics and a high-bandwidth architecture in a convenient free-standing tower chassis. The workstation is available in a variety of configurations and can be upgraded to meet your future needs.

Note: This User's Guide has been translated and is available to download from the SGI Technical Publications Library at http://docs.sgi.com.
Enter the keywords `Tezro visual workstation` + `<language>` to find the version you need.

This guide shows you how to set up, use, and troubleshoot your system. This guide is provided for all end-users and SGI technical support staff. Most of the hardware tasks are relatively simple and require no previous computer knowledge. A few tasks are more difficult; they are easier to perform if you have some computer hardware experience.

Chapter Descriptions

The following topics are covered in this guide:

- Chapter 1, "Installation and Operation Procedures," provides instructions for unpacking and setting up your new workstation. It also explains how to power the workstation on, log in, access programs, and power off the workstation.

- Chapter 2, "System Overview," describes the parts of the system and gives an overview of how they work together. It also provides configuration information and describes optional components.

- Chapter 3, "Maintenance and Upgrade Procedures," provides instructions for installing and removing parts of the workstation. If the part you wish to add or replace does not appear in this chapter, please contact your SGI service representative.

- Chapter 4, "Troubleshooting and Diagnostics," explains how to find problems with your system and resolve them. It also includes instructions for running the system diagnostics, which can help you find problems.

- Appendix A, "Technical Specifications and Pinouts," provides specifications for the size, weight, and power consumption of the system. It also lists environmental specifications and connector and cable pinouts.

- Appendix B, "Regulatory Specifications," lists all regulatory information related to use of the workstation in the United States and other countries and provides a list of safety instructions to follow when installing, operating, or servicing the system.

Related Publications

For complete information on installing software, see the online *Personal System Administration Guide*. It is located on your desktop in **Toolchest > Help > Online Books**. For more advanced information, see the online *IRIX Admin: Software Installation & Licensing Guide*. For system administration information, see the **SGI_Admin** section of the online bookshelf.

It is always a good idea to back up your system. For instructions on backing up your system, see the online *Personal System Administration Guide*.

Obtaining Publications

You can obtain SGI documentation, release notes, or man pages in the following ways:

- See the SGI Technical Publications Library at http://docs.sgi.com. Various formats are available. This library contains the most recent and most comprehensive set of online books, release notes, man pages, and other information.

- If it is installed on your SGI system, you can use InfoSearch, an online tool that provides a more limited set of online books, release notes, and man pages. With an IRIX system, select **Help** from the Toolchest, and then select **InfoSearch**. Or you can type **infosearch** on a command line.

- You can also view release notes by typing either **grelnotes** or **relnotes** on a command line.

- You can also view man pages by typing **man** *<title>* on a command line.

SGI systems include a set of IRIX man pages, formatted in the standard UNIX "man page" style. Important system configuration files and commands are documented on man pages. These are found online on the internal system disk (or CD-ROM) and are displayed using the man command. For example, to display the man page for the Add_disk command, type the following on a command line:

man Add_disk

References in the documentation to these pages include the name of the command and the section number in which the command is found. For example, "Add_disk(1)" refers to the Add_disk command and indicates that it is found in section 1 of the IRIX reference.

For additional information about displaying man pages using the man command, see man(1).

In addition, the apropos command locates man pages based on keywords. For example, to display a list of man pages that describe disks, type the following on a command line:

apropos disk

For information about setting up and using apropos, see apropos(1) and makewhatis(1M).

Conventions

The following conventions are used throughout this publication:

Convention	Meaning
Command	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
variable	Italic typeface denotes variable entries and words or concepts being defined. Italic typeface also is used for book titles.
user input	This fixed-space font denotes literal items that the user enters in interactive sessions. (Output is shown in nonbold, fixed-space font.)
[ ]	Brackets enclose optional portions of a command or directive line.
...	Ellipses indicate that a preceding element can be repeated.

`man page(`*x*`)`	Man page section identifiers appear in parentheses after man page names.
GUI element	This font denotes the names of graphical user interface (GUI) elements such as windows, screens, dialog boxes, menus, toolbars, icons, buttons, boxes, fields, and lists.

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If you have comments about the technical accuracy, content, or organization of this document, contact SGI. Be sure to include the title and document number of the manual with your comments. (Online, the document number is located in the front matter of the manual. In printed manuals, the document number is located at the bottom of each page.)

You can contact SGI in any of the following ways:

- Send e-mail to the following address:

  techpubs@sgi.com

- Use the Feedback option on the Technical Publications Library webpage: http://docs.sgi.com

- Contact your customer service representative and ask that an incident be filed in the SGI incident tracking system.

- Send mail to the following address:

  Technical Publications
  SGI
  1600 Amphitheatre Parkway., M/S 535
  Mountain View, CA 94043-1351

- Send a fax to the attention of "Technical Publications" at +1 650 932 0801.

SGI values your comments and will respond to them promptly.

Installation and Operation Procedures

This chapter shows you how to set up and use your Silicon Graphics® Tezro™ visual workstation in the following sections:

- "Setting Up the Workstation" on page 1
- "Using the Workstation" on page 11

Setting Up the Workstation

This section covers the following topics:

- "Checking Your Shipment" on page 2
- "Lifting the Workstation" on page 4
- "Getting Acquainted" on page 5
- "Cabling the Workstation" on page 8

Checking Your Shipment

Figure 1-1 shows the basic components that ship with your workstation. If parts of your shipment are damaged or missing, contact your support provider.

Workstation

Mouse

CDs

Keyboard

Monitor

Wrist strap

Power cables - 10 ft. each

Monitor cable - 3 meters
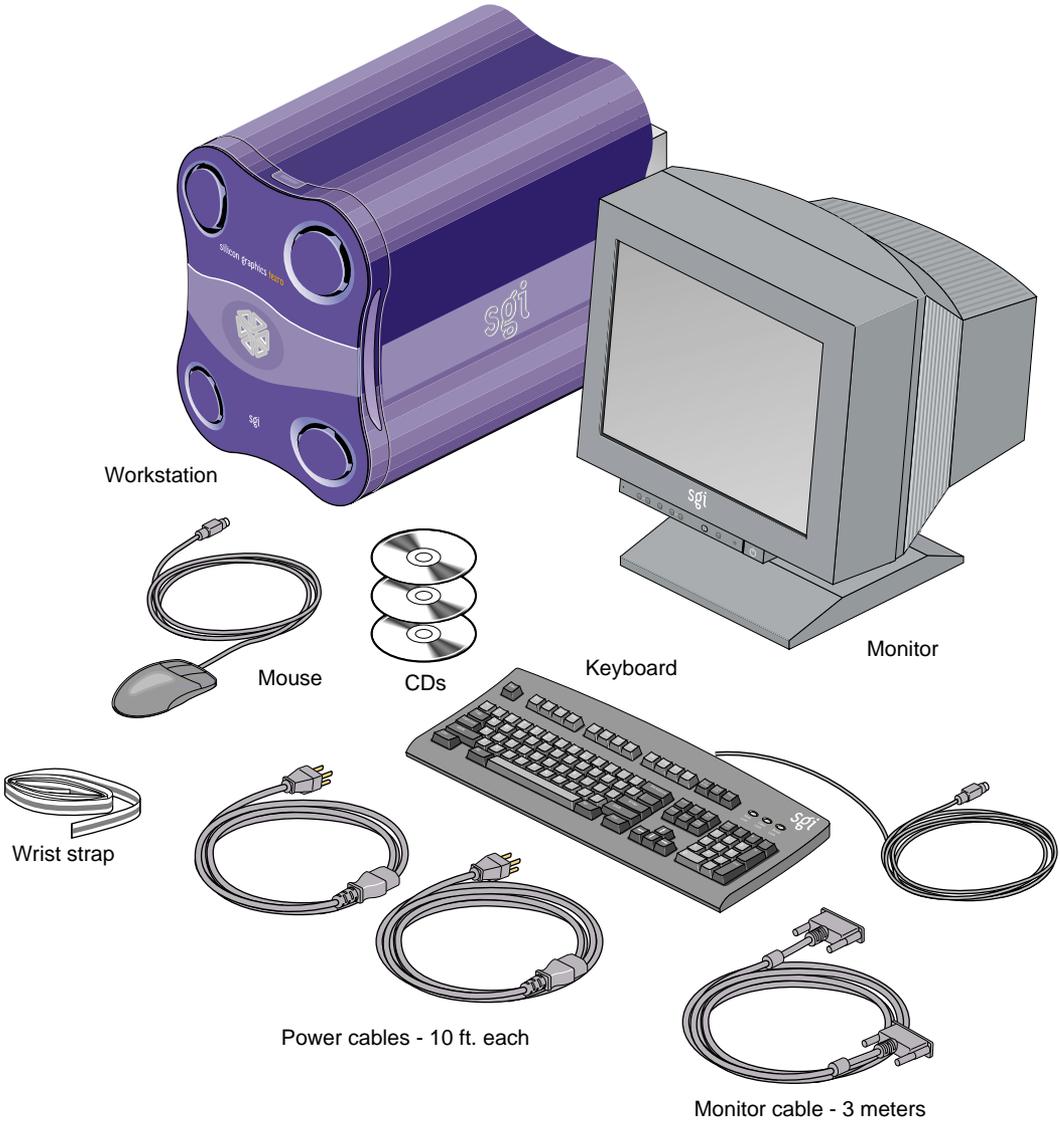
Figure 1-1   Workstation Shipment Contents

Lifting the Workstation

The base workstation configuration weighs 60 lb. (27 kg). SGI highly recommends that two people lift the unit when it must be moved. Lift the unit by placing your hands under the bottom edges of the chassis, as shown in Figure 1-2.
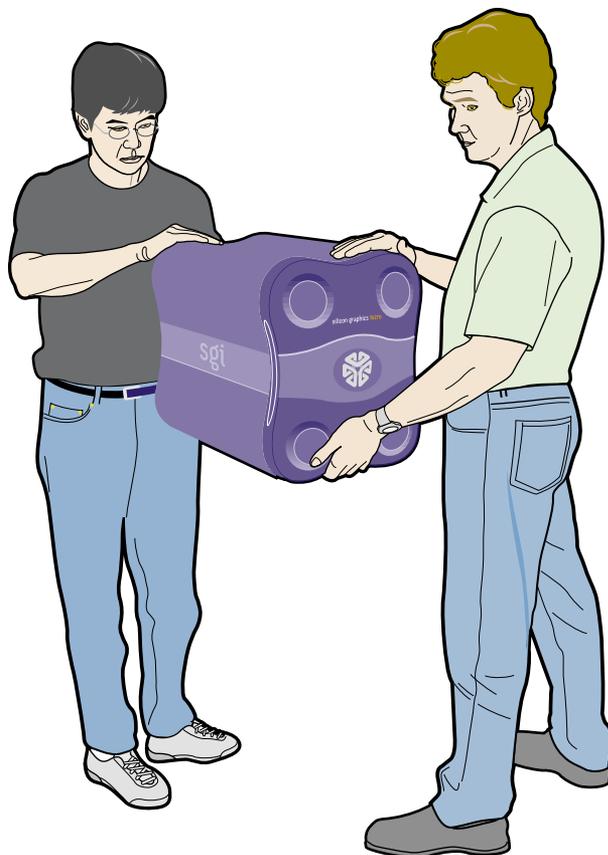
Figure 1-2   Lifting the Workstation

Getting Acquainted

To become familiar with your workstation, refer to the following figures:

- Figure 1-3, which shows the front view of the workstation.

- Figure 1-4, which shows the rear view of the workstation.

After you have set up your workstation and logged in, refer to the following resources for more information:

- From the **Toolchest**, select **System > System Manager** for information on the workstation's hardware and software.

- From the **Toolchest,** select **System > System Manager > About This System** to learn about your system's serial number, IP address, operating system, and more.

Door release

Door

Status LEDs

DVD ROM drive

L1 display

SCSI drives

Reset switch

Power on/off
button

silicon graphics tezro

sgi
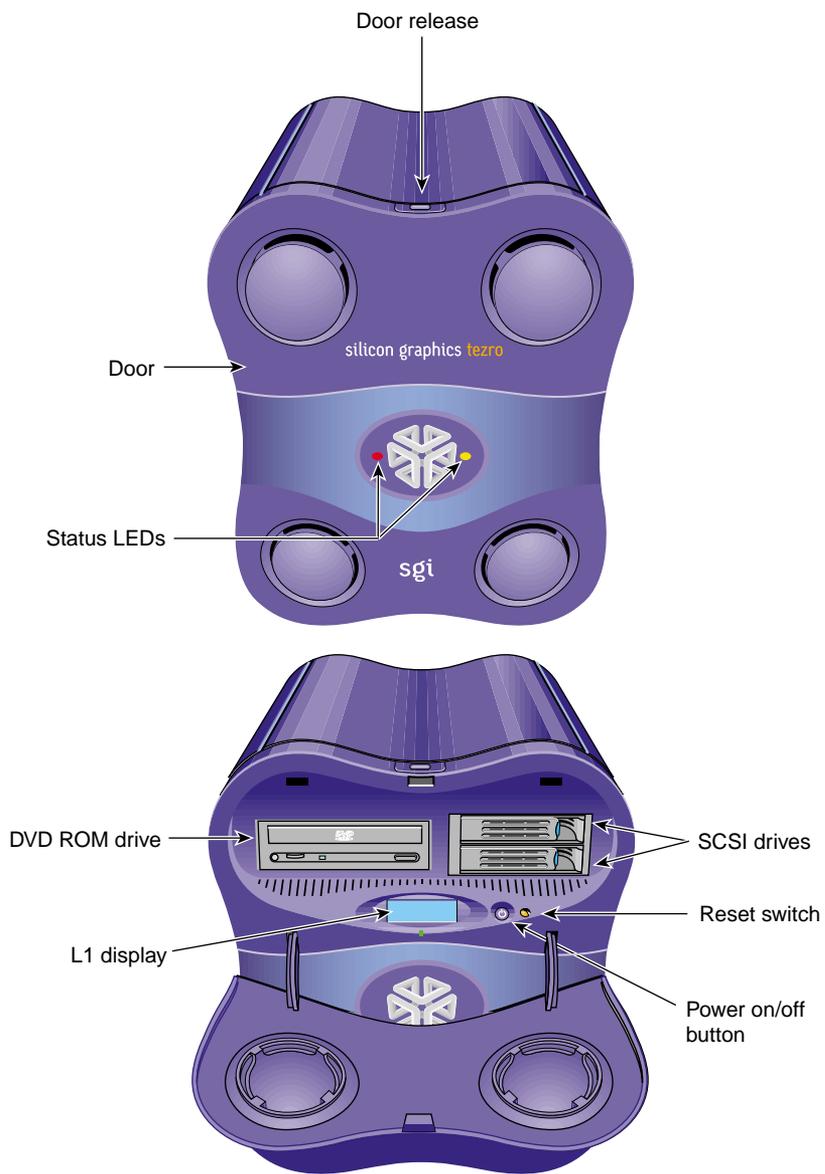
Figure 1-3   Front View of the Workstation
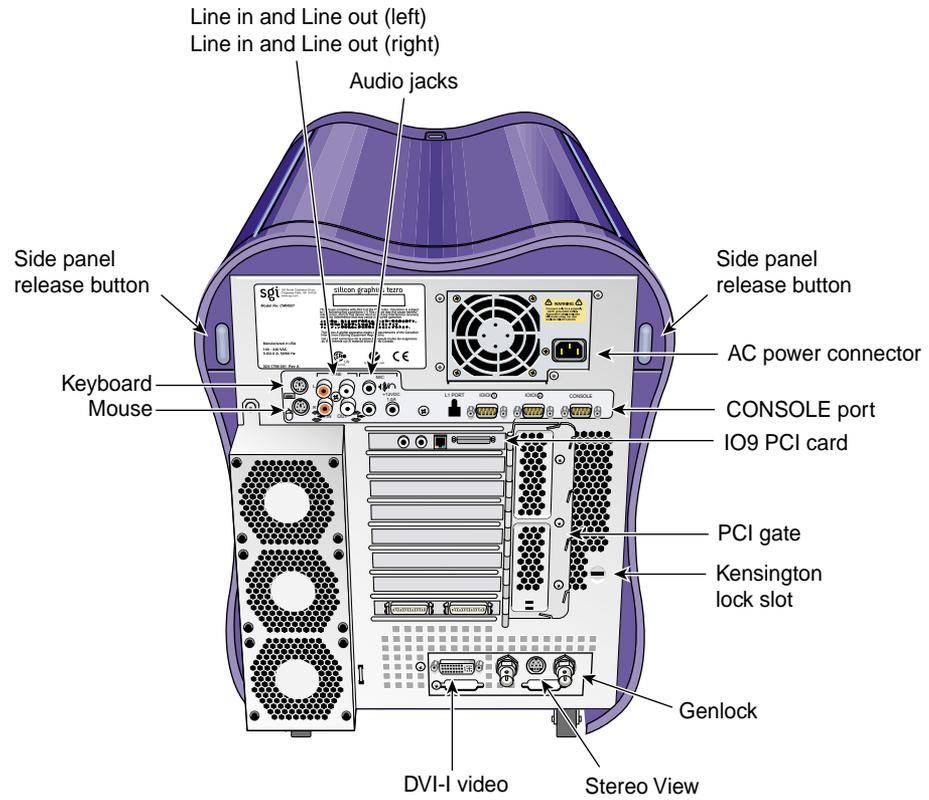
Figure 1-4   Rear View of the Workstation

Cabling the Workstation

To set up the workstation, follow these steps:

1. Connect the keyboard and mouse cables, as shown in Figure 1-5.
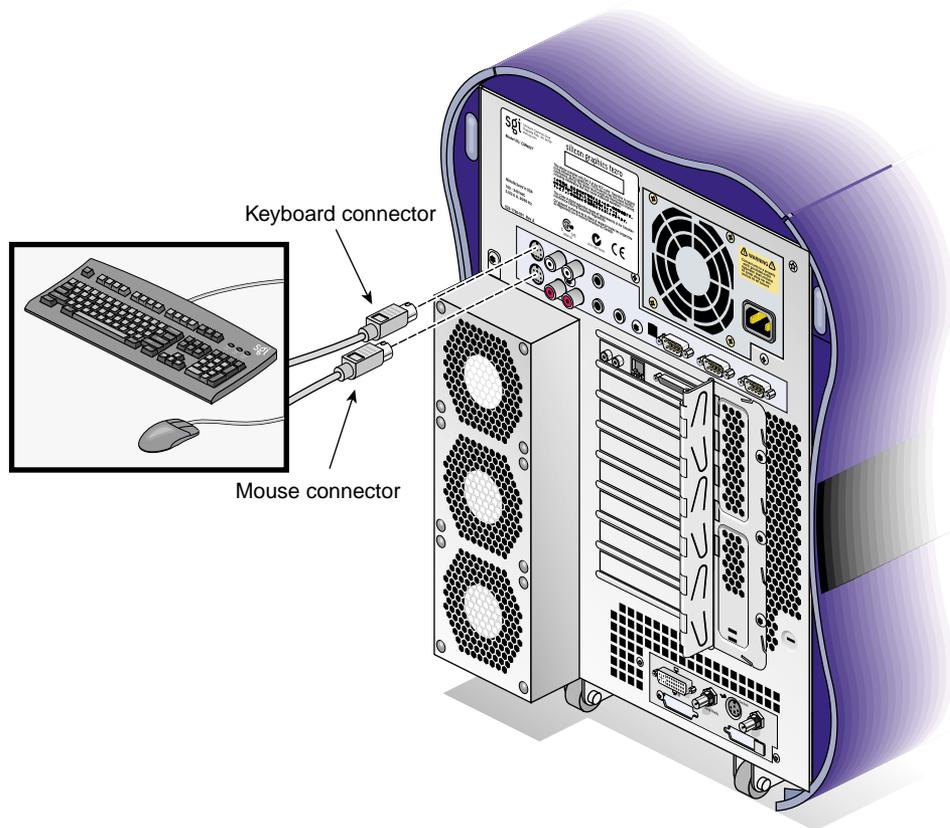
Figure 1-5   Connecting the Keyboard and Mouse Cables

2. Connect the Ethernet cable to the Ethernet port on the IO9 card, as shown in Figure 1-6.

Ethernet connector
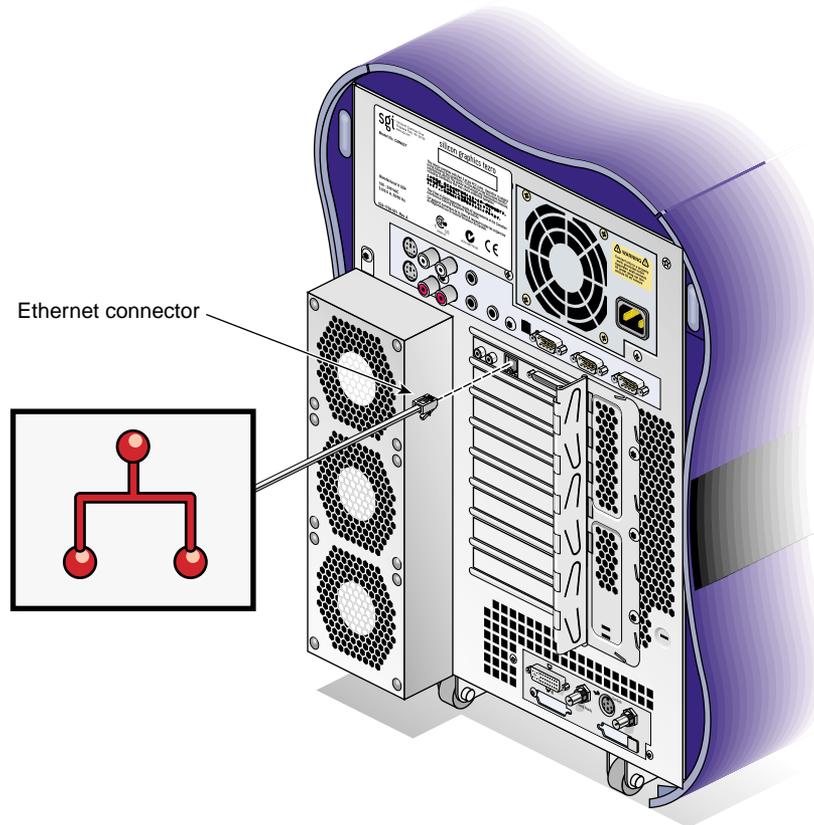
Figure 1-6   Connecting the Ethernet Cable

3. Connect the monitor cable, as follows (see Figure 1-7):

    • Connect the monitor-to-graphics cable to the monitor.

    • Connect the monitor-to-graphics cable to the DVI-I video connector on the back of your workstation.

Note: The workstation can be connected to a variety of monitors. Your monitor and monitor cable may differ from those shown. If your monitor has multiple inputs, ensure that the source switch is set to the correct input port.
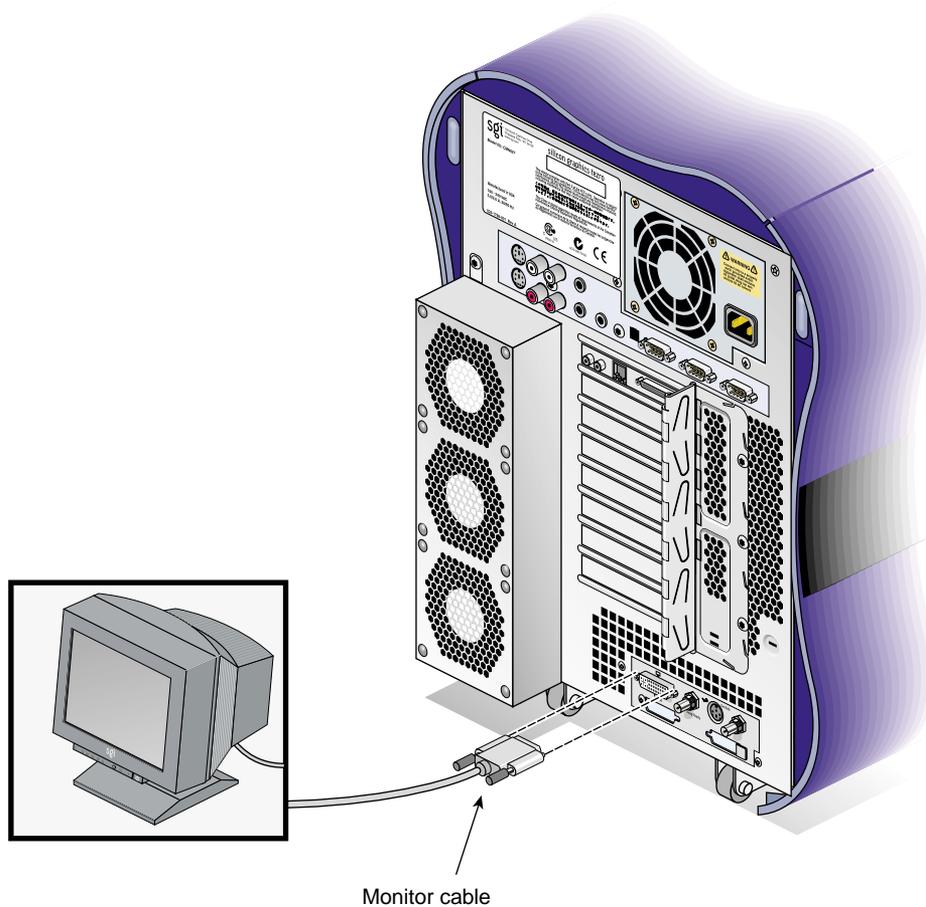
Monitor cable

Figure 1-7   Connecting the Monitor Cable

4. Connect the power cables to your workstation and monitor. Then plug them into approved electrical outlets (see Figure 1-8).
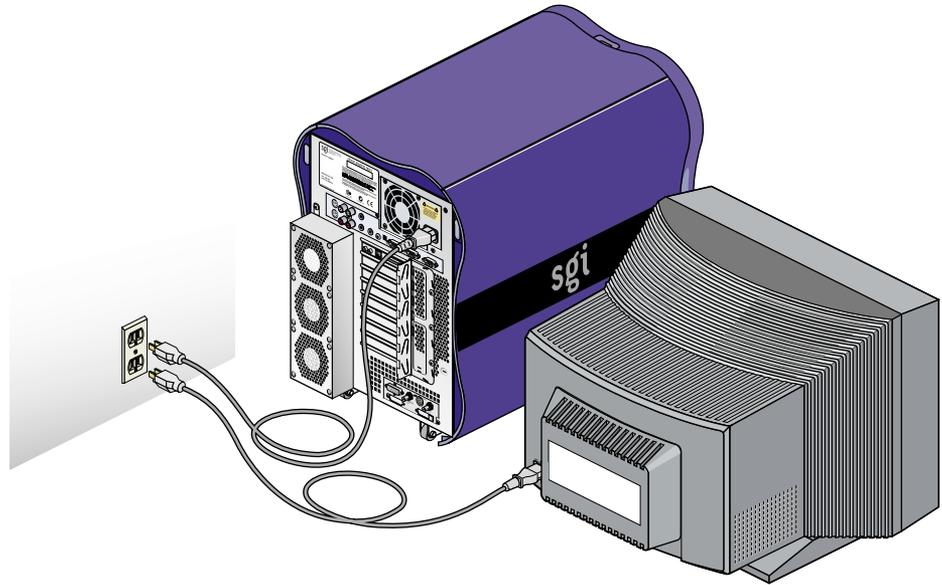
Figure 1-8   Connecting the Workstation and Monitor Power Cables

You have finished setting up your workstation. Proceed to the next section.

Using the Workstation

This section provides information about using your Silicon Graphics Tezro visual workstation. The topics covered include:

- "Logging In to the Workstation" on page 11
- "Using the IRIX Interactive Desktop" on page 13
- "Powering Off the Workstation" on page 15
- "Restarting from the Toolchest" on page 19

Logging In to the Workstation

Press the power buttons on your monitor and workstation as shown in Figure 1-9.
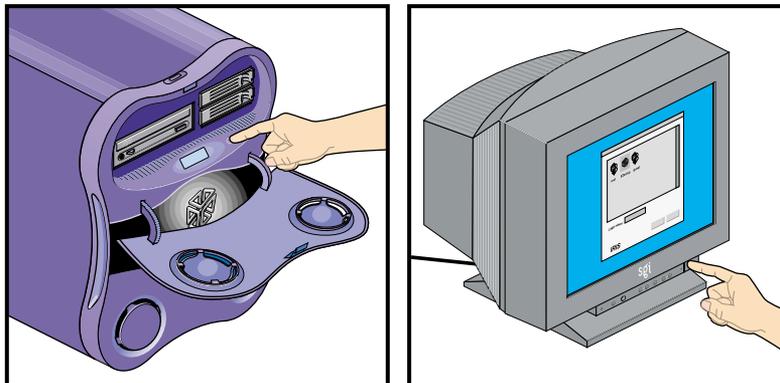
Figure 1-9   Powering On the Workstation and Monitor

A green LED flashing below the L1 display on the front of the workstation indicates that the system is booting. The monitor may remain blank for a few moments.

If your system is booting for the first time, you will see a login screen similar to the example shown in Figure 1-10.

Figure 1-10   Login Screen

If you have a login account, double-click the icon with your login name. If you do not have a login account, double-click **EZsetup** and then follow the instructions for creating a personal login account and setting up the networking software. Then you can begin using the IRIX interactive desktop to create a personal work area and communicate with other users on your network.

Using the IRIX Interactive Desktop

After you have logged in, you are ready to use the IRIX Interactive Desktop. By default, several icons appear on your desktop: a folder icon representing your home directory, a dumpster icon, and icons for any peripherals you installed, examples of which are shown in Figure 1-11.

The peripheral icons show the current state of the respective devices. For example, if you insert a music CD into the DVD-ROM drive, the icon changes. When you double-click the icon, it opens CD Player, a utility that allows you to play music from a compact disc.

Figure 1-11   Peripheral Icons

The Toolchest, located at the top left corner of your screen, provides access to system functions, applications, hardware and software information, and documentation, as shown in Figure 1-12.

Note: For a complete description of the Toolchest, select **Help > InfoSearch** from the Toolchest, and type `Desktop Users Guide`.

Figure 1-12   Toolchest Menu

System Manager

From the Toolchest, select **System > System Manager** to display the System Manager, which shows your workstation's hardware and software information.

Online Documentation

From the Toolchest, select **Help** to display the library of online documentation. If your workstation is turned off and you cannot access online documentation, this printed guide contains all the information you need. You can also access this guide and most manuals, man pages, and release notes in the SGI Technical Publications Library at http://docs.sgi.com, and through InfoSearch, as described in the next section.

InfoSearch

From the Toolchest, select **Help > InfoSearch** and type the name of the desired book or topic to search online books, man pages, and release notes that cover end-user, developer, and system administrator information.

The Console Window

The small box next to the Toolchest is the **Console** window, as shown in Figure 1-13. It appears as a small box because it is minimized. You can open it to its full size by clicking it. Many system status and error messages appear in this window.

Figure 1-13   Console Window

If you click in the **Console** window, an IRIX shell appears, where you can type IRIX commands. For information on IRIX commands, select **Help > Online Books**. This will launch the InfoSearch tool, which allows you to read documentation stored on your workstation. Enter "**Desktop User's Guide**" in the Keyword search box. IRIX commands are covered in Appendix A.

Powering Off the Workstation

You can shut down and power off your workstation in either of two ways, which are explained in the following sections:

- "Powering Off with the Power Button" on page 15
- "Powering Off from the Toolchest" on page 17

Powering Off with the Power Button

To power off your workstation with the power button, follow these steps:

1. Open the door on the front of your workstation.
2. Press the power button, as shown in Figure 1-14.
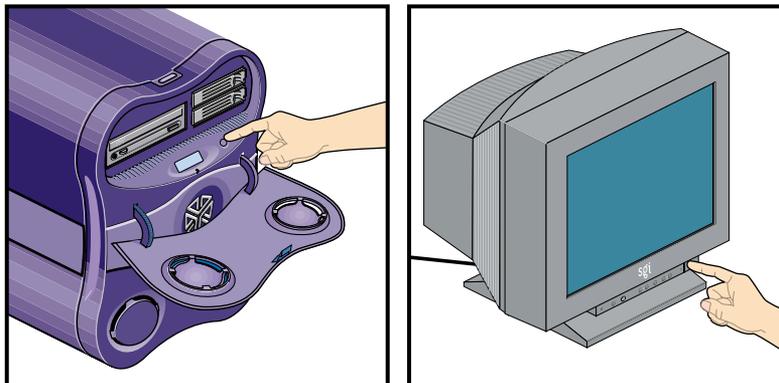
Figure 1-14   Powering Off the Workstation

Within a few seconds, a shutdown notifier appears, as shown in Figure 1-15. Within a minute, the system powers off automatically.

Figure 1-15   System Shutdown Notifier

3. Turn off your monitor by pressing the monitor power button.

    If your system does not power off and you do not see any activity for several minutes, press the power button again.

    Note: If you press the power button a second time, the system should power off immediately, but this method does not perform a clean shutdown. Avoid using this method unless the system does not respond for several minutes after you first press the power button.

    If pressing the power button a second time does not work, use a pen to press the reset switch, shown in Figure 1-16. If the system still fails to power off, unplug the power cable from the rear of your workstation and contact your service provider.
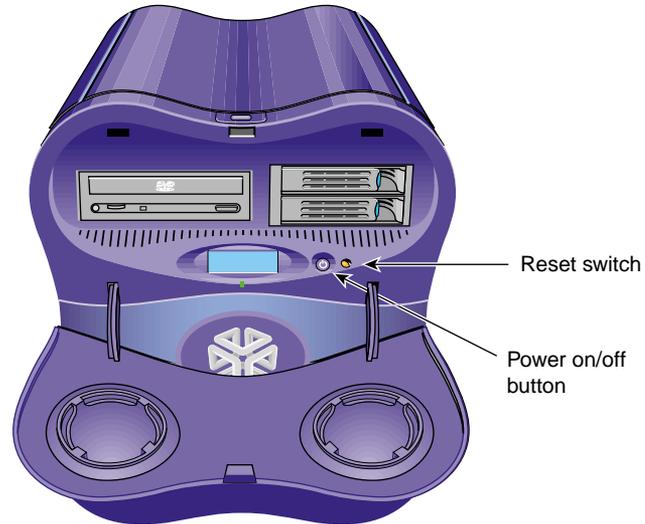
Figure 1-16   Power Button and Reset Switch

Powering Off from the Toolchest

If you have root level access to the workstation, you can shut down your system from the Toolchest. as follows:

1.   From the Toolchest, select **System > System Shutdown**.

After a few seconds, a shutdown caution message appears, as shown in Figure 1-17.
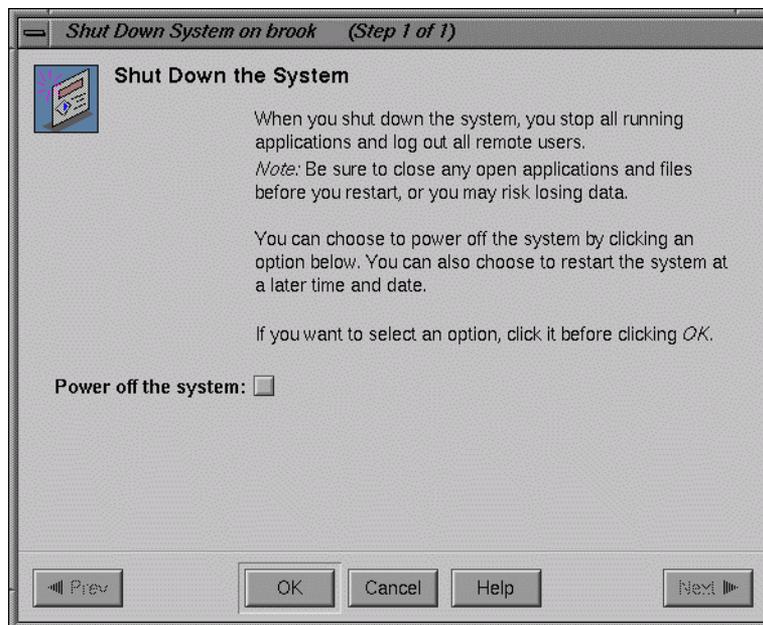
Figure 1-17   Shutdown Caution Message

2.   Click the **Power off the system** check box.

The **Shut Down System** window appears. At this point, you can shut down and power off the system or configure it to restart at a designated time, as shown in Figure 1-18.
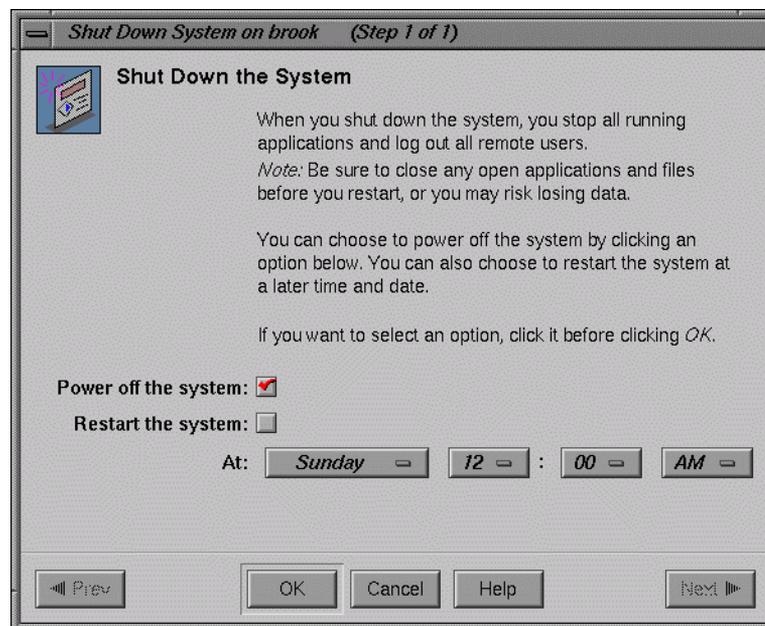
Figure 1-18   Shutdown System Window

3. Click **OK** to shut down and power off the system.

    The shutdown notifier appears, as shown in Figure 1-19. After a few seconds, the system powers off.
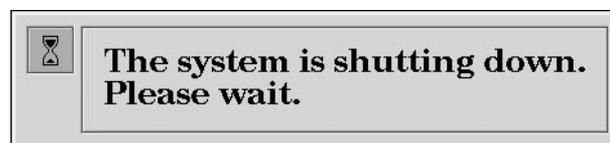
Figure 1-19   System Shutdown Notifier

Restarting from the Toolchest

If you have root level access to the workstation, you can restart the system from the Toolchest.

1. From the Toolchest, select **System > Restart**.

    After a few seconds the restart notifier appears, as shown in Figure 1-20.

Figure 1-20   Restart Notifier

2. Click **OK** in the restart notifier.

    The shutdown notifier appears, as shown in Figure 1-21.

The system is shutting down. Please wait.
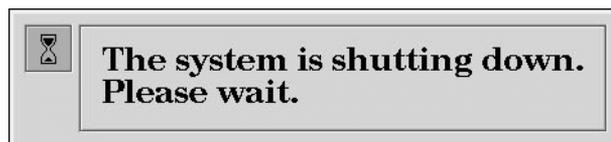
Figure 1-21   System Shutdown Notifier

    After a brief delay, the power off/restart notifier appears, as shown in Figure 1-22.

Okay to power off the system now. Press any key to restart.
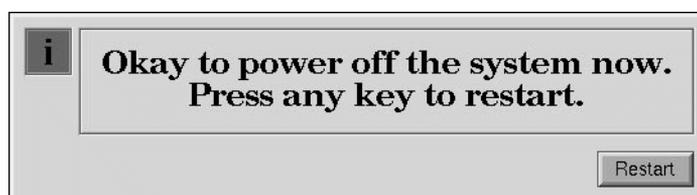
Restart

Figure 1-22   Power Off/Restart Notifier

3. Click **Restart**.

The restart notifier informs you that the system is coming up (restarting), as shown in Figure 1-23.

The system is coming up.

Figure 1-23   Restart Notifier

System Overview

The Silicon Graphics® Tezro™ visual workstation is a high-power, high-performance system. It features VPro™ graphics, 64-bit MIPS processors, and a high-bandwidth architecture in a convenient free-standing tower chassis. This chapter provides general information about the components of the workstation in the following sections:

System Enclosure

The Silicon Graphics Tezro visual workstation is installed in the system enclosure as shown in Figure 2-1 and Figure 2-2. The enclosure provides structure and protection for the internal components.
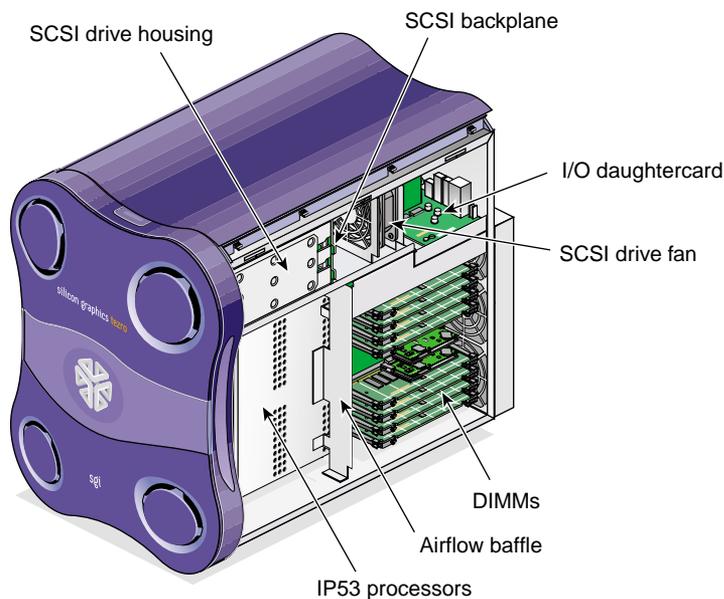
Figure 2-1   System Enclosure Layout (Right-front view)
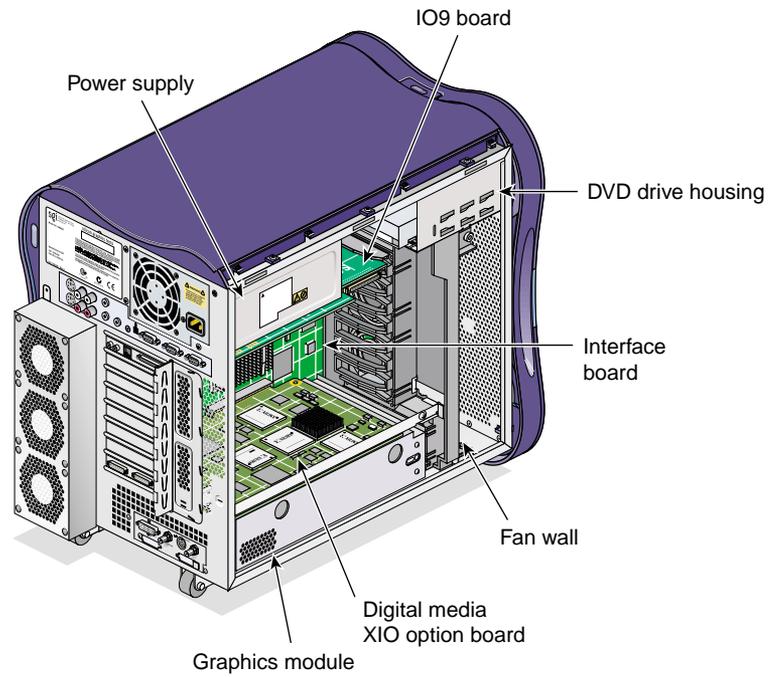
Figure 2-2   System Enclosure Layout (Left-rear View)

System Node Board

The workstation is powered by an IP53 system node board (see Figure 2-3). The system node board provides a mounting point and connectivity for the processor(s) and memory DIMMs. The node board connects to the interface board via two connectors on its underside.

DIMMs

Processors (under cover)

Interface board
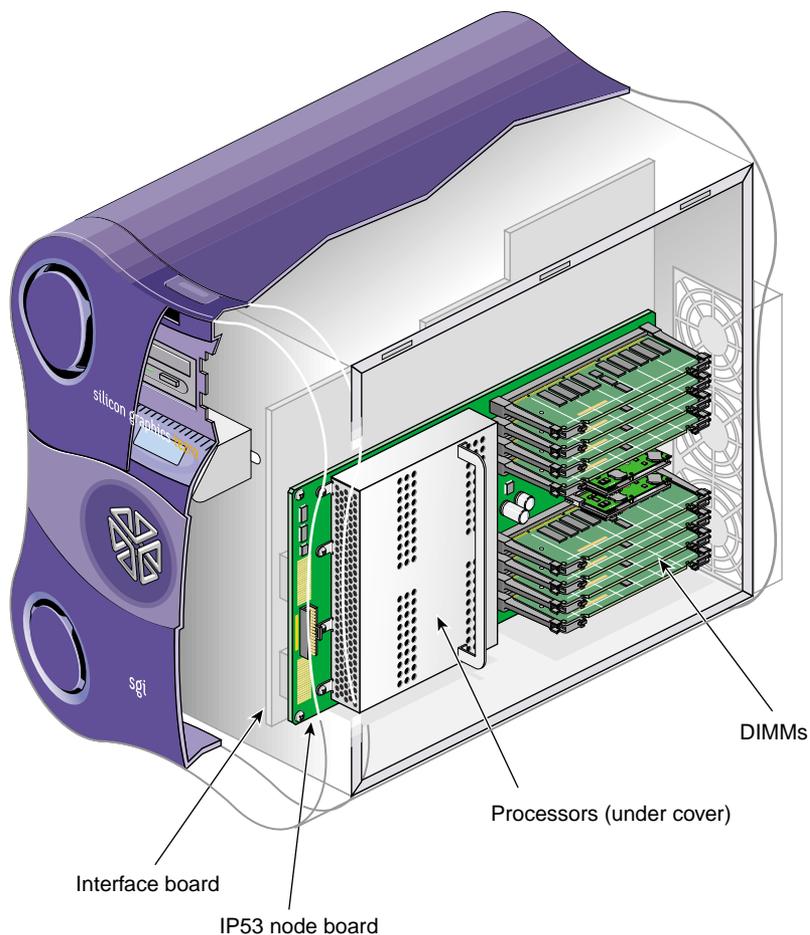
IP53 node board

Figure 2-3   IP53 System Node Board

Processors

The workstation is available with 1, 2, or 4 R16000 MIPS processors. These processors are available in several different clock speeds. Each processor has a total of 64 KB onboard cache memory and 4-MB of external cache memory. The processors are mounted on the system node board under a protective cover.

Memory DIMMs

The workstation is configured with a minimum of 512 MB of memory and a maximum of 8 GB of memory. Your system uses double data rate synchronous dynamic random-access memory (DDR SDRAM). The DIMMs used in your workstation are compatible with the DIMMs used in Origin 300, Origin 3000, and Onyx 3000 systems. The DIMMs used in your workstation are **not** compatible with the DIMMs used in Octane, Octane2, O2, O2+, Origin 200, Origin 2000, or Onyx2 systems.

The memory DIMMS are installed in eight DIMM slots on the system node board. The DIMM slots are numbered 0 through 7 (see Figure 2-4). The slots are grouped into four pairs of two DIMMs. The DIMM pairs are numbered as follows:

- DIMM pair 1: slots 0 and 1

- DIMM pair 2: slots 2 and 3

- DIMM pair 3: slots 4 and 5

- DIMM pair 4: slots 6 and 7
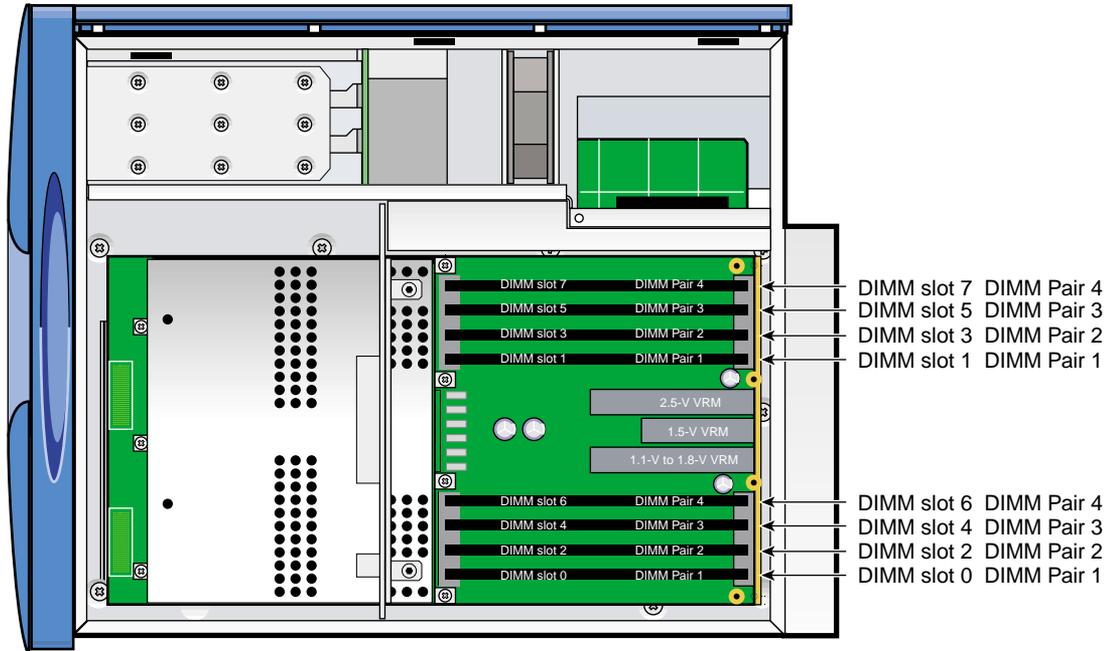
Figure 2-4   DIMM Sockets and Pairs

The following configuration rules apply to the memory banks and DIMMs in your system:

- DIMM pair 1 must be present.

- DIMMs in the same DIMM pair must be the same density. For example, if DIMM 0 is 512 MB, then DIMM 1 must be 512 MB.

- DIMMs must be installed in pairs.

- The minimum amount of memory that should be installed in a 1-processor workstation is 512 MB; the minimum for a 2- or 4-processor workstation is 1 GB.

For information on removing or installing memory DIMMs, see "Installing or Removing a Memory DIMM" on page 63.

Interface Board

The interface board connects the processors and memory mounted on the node board to the graphics and I/O components of the system. It also provides card slots for the PCI and graphics boards and distributes power to the system components. The interface board has the following connectors (see Figure 2-5):

- **XIO Slot connectors**
  There are two XIO slots: one for the VPro graphics board, and one for the DMediaPro DM3-to-VBOB board

- **PCI Slot connectors**
  There are eight PCI-X slots divided into three buses. For more information on the PCI slots and buses, see "PCI Buses" on page 38.

The interface board also supplies connectivity and power to many of the system components through the following connectors (see Figure 2-5):

- **L1 display connector**

- **LED connector**

- **Power input connectors**

- **Fan wall connector**

Note: Figure 2-5 depicts the interface board in a 2- or 4-processor workstation. The interface board in a 1-processor workstation has 4 PCI-X slots (3 available) and 1 XIO slot.

Power input
connector

LED
connector

L1 display
connector

PCI slots

Fan wall
connector

XIO slot
for optional XIO
boards

XIO slot for
VPro graphics board
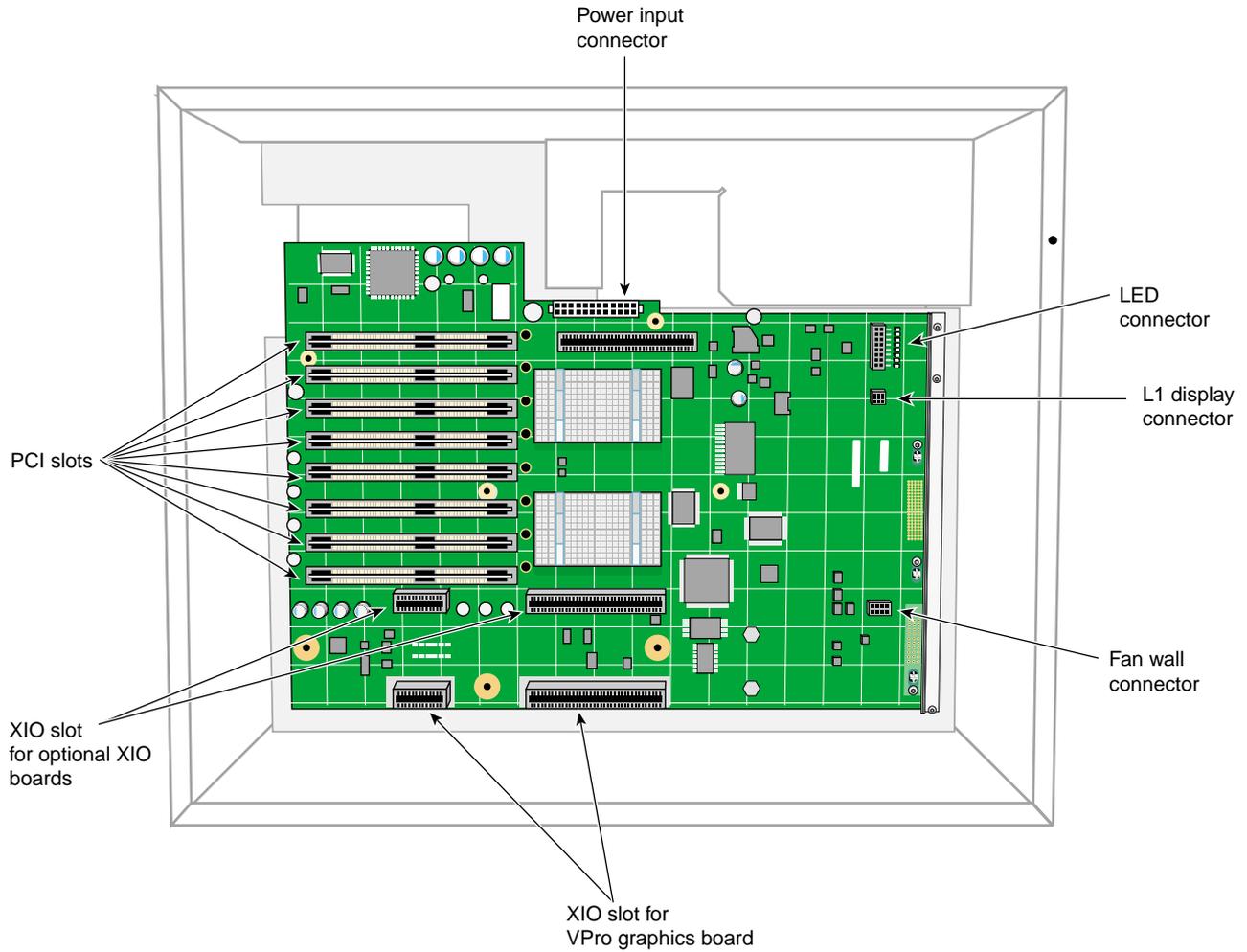
Figure 2-5   Interface Board Connectors

IO9 Board

The IO9 board is the full-length PCI board that is installed in PCI bus 1, slot 1. It provides the following I/O connectors and interfaces for the workstation (see Figure 2-6):

- An internal IDE connector for the internal DVD-ROM drive

- An internal SCSI connector for the hard disk drives

- An external SCSI connector for optional external drives

- Real time interrupt in and out (RTI input and RTI output) connectors

- A 10/100BaseT Ethernet connector (RJ45)

The IO9 board also contains the non-volatile RAM and time-of-day clock for the system.

For technical specifications and pinouts of these connectors, see Appendix A, "Technical Specifications and Pinouts".
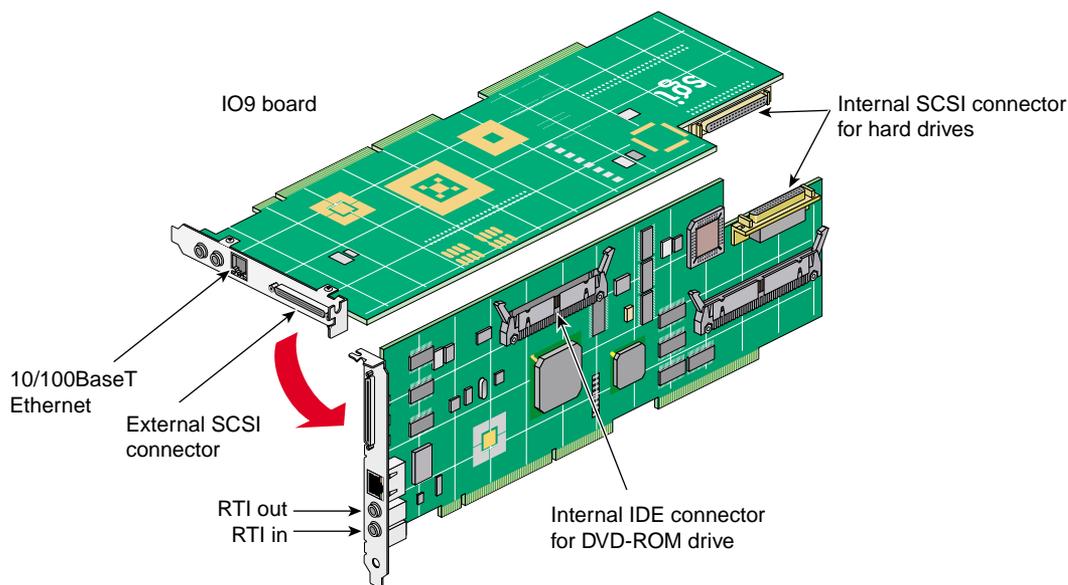
Figure 2-6   IO9 Board

I/O Daughtercard

The I/O daughtercard is the long narrow board that is mounted on the rear of the enclosure just below the power supply. This card acts as an extension of the IO9 board; it provides the following connectors (see Figure 2-7):

- Two PS2 ports for keyboard and mouse
- Four RCA audio jacks (2 inputs, 2 outputs)
- Power port for external speakers (2.5 mm jack)
- Two 3.5 mm stereo audio jacks (one input, one output)
- Two serial ports (DB9)
- One L1 diagnostic port (USB-B)
- One console port (DB9)
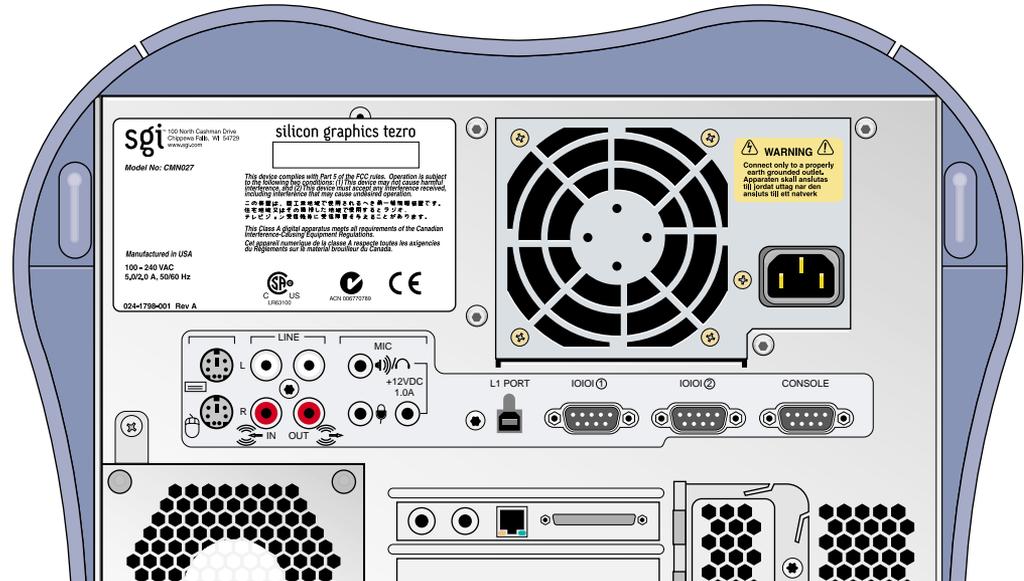
Figure 2-7   I/O Daughtercard

For technical specifications and pinout of these connectors, refer to Appendix A, "Technical Specifications and Pinouts".

Internal Hard Disk Drives

The Silicon Graphics Tezro visual workstation supports one or two internal SCSI hard disk drives. These drives provide the unit with large amounts of storage and quick access times.

The hard disk drives in the workstation are sled mounted (see Figure 2-8). The drive sleds provide a safe and easy way to install and remove the drives. The drive sleds also

provides a positive, locking connection to the SCSI backplane, which connects the disk drives to the IO9 board (see Figure 2-9).
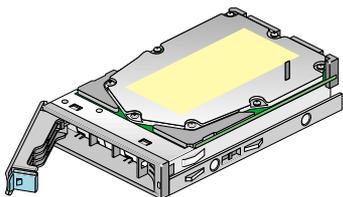
Figure 2-8   Hard Disk Drive Sled
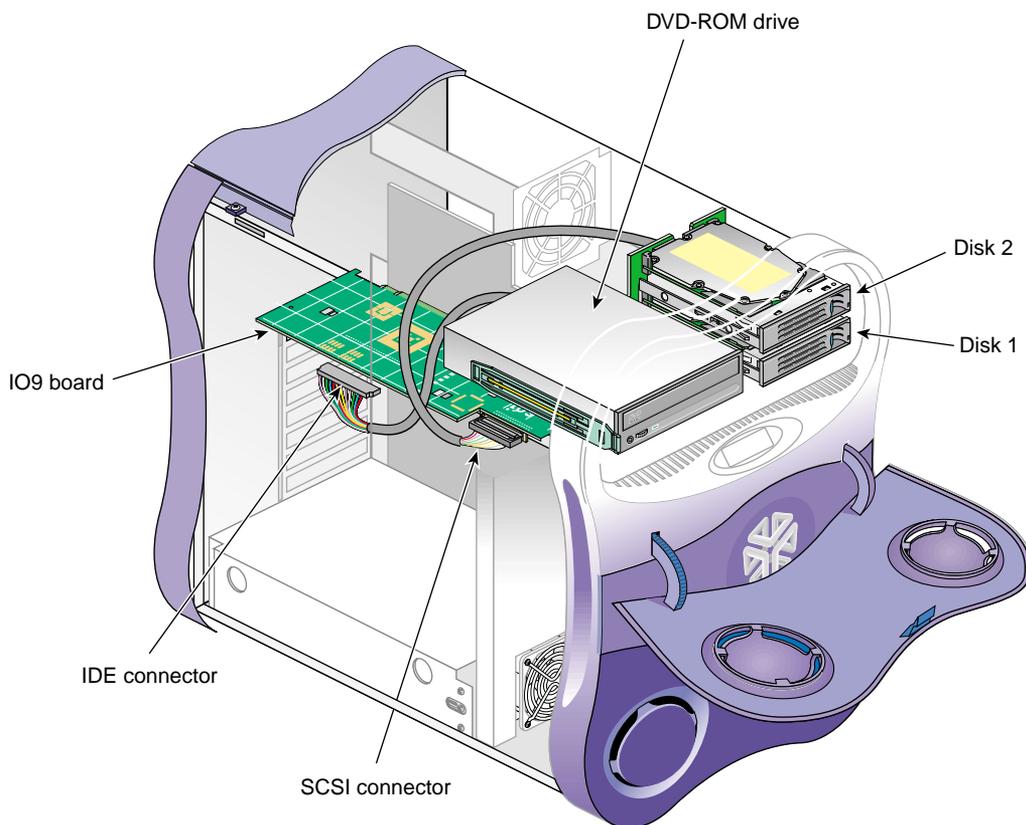
Figure 2-9   Internal Hard Disk Drive Locations

The disks are numbered 1 and 2, with 1 being the bottom disk and 2 being the top. The SCSI ID number of each disk must correspond with these drive numbers. Disk 1 is the system disk, which has the IRIX operating system installed on it. Your workstation will not function without the system disk.

For information on removing or installing an internal hard disk drive, refer to "Installing or Removing Internal Hard Disk Drives" on page 67.

DVD-ROM Drive

Your workstation supports an optional internal DVD-ROM drive.

The drive is installed in the 5.25-in. drive bay, as shown in Figure 2-9.

For information about installing and removing the DVD-ROM drive, refer to "Installing or Removing the DVD-ROM Drive" on page 71.

Graphics Module

The graphics module is located near the bottom of your workstation, as shown in Figure 2-10. It is made up of a metal cover, the VPro graphics board and the optional Dual Channel Display daughterboard. The metal shell protects the graphics board and optional daughterboard and shields them from electrical interference.

The VPro graphics board has the following features:

- 128 MB of onboard SDRAM
- Analog RGB and TMDS video on a single DVI-I monitor port
- Additional ports for Swap Ready, Stereo View, and Genlock signals

The optional Dual Channel Display (DCD-2) daughterboard supplies two additional DVI-I monitor ports. The daughterboard connects to the underside of the VPro graphics board and allows you to display data across two monitors at once. For more information about the optional Dual Channel Display daughterboard, contact your SGI sales representative.
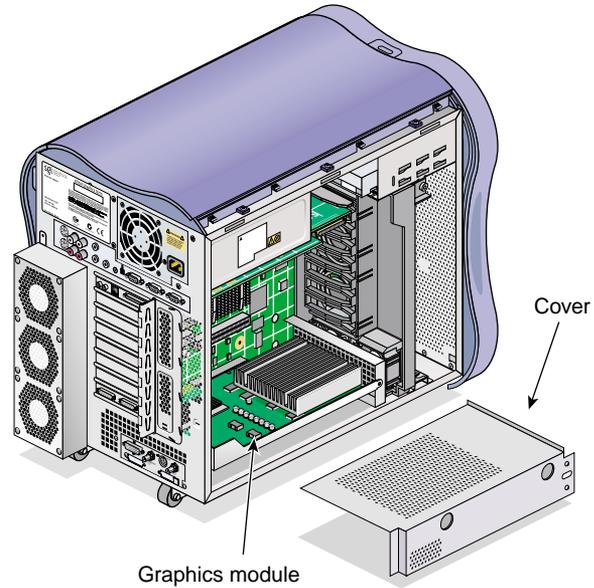
Figure 2-10   Locating the Graphics Module

Figure 2-11 shows the I/O ports of the VPro graphics board and optional Dual Channel Display daughterboard.

Labels on figure: Stereo View, Genlock, DVI-I video, Swap Ready, DCD right, DCD left
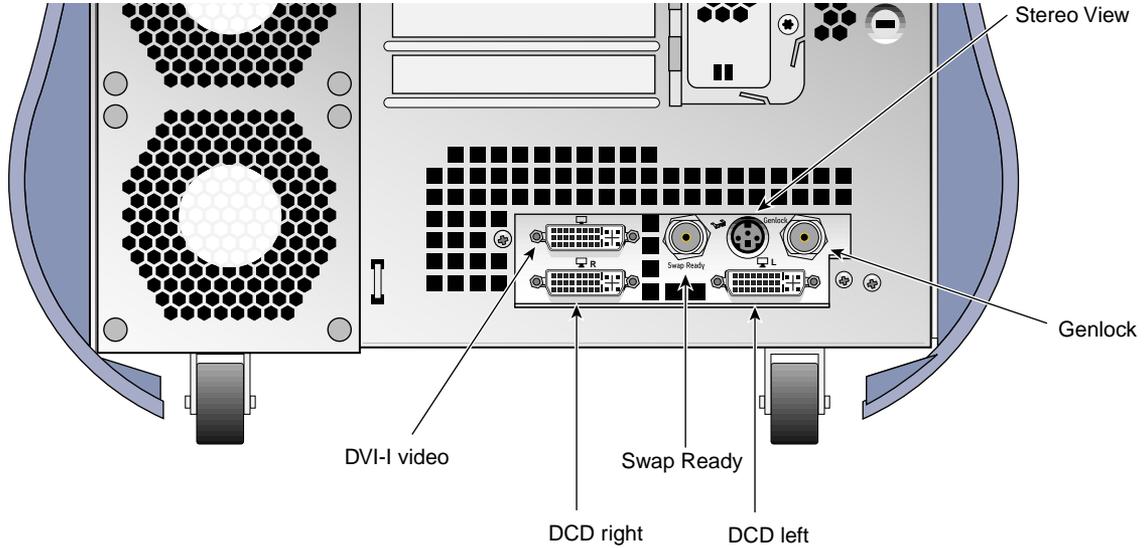
Figure 2-11   VPro Graphics and Dual Channel Display I/O Ports

For more information on the VPro graphics board and Dual Channel Display (DCD-2)
I/O ports, refer to "VPro Graphics Board I/O Port Specifications" in Appendix A.

PCI Buses

The 2- and 4-processor workstations have eight 64-bit, 3.3-V PCI-X slots which are divided into four buses. The1-processor workstation has four 64-bit, 3.3-V PCI-X slots which are divided into two buses. The IO9 board always occupies bus 1, slot 1, leaving the remaining slots available for other boards. Each bus can support card speeds of up to 100 MHz. The slots are divided into buses, as shown in Figure 2-12.

Note: Figure 2-12 shows a 2- or 4-processor workstation. Buses 3 and 4 are not present in 1 processor workstations.

- PCI Bus 1 has one slot, which always contains the IO9 board.

- PCI Bus 2 has three slots.

- PCI Buses 3 and 4 each have two slots.

- Bus 4, slot 2 shares a chassis opening with the second XIO slot. If you intend to install a second XIO board, such as the DM3 Digital Media board, you cannot install a PCI board in this slot.

Follow these rules when installing PCI and PCI-X boards on the PCI-X buses:

- Avoid placing high and low speed cards one the same bus. This forces the high speed card to run at the same speed as the slower card. For example, placing a 100-MHz board on the same bus as a 33-MHz board forces the 100-MHz board to run at the slower speed.

- Avoid placing storage and network boards on the same bus. These types of boards use large amounts of bandwidth, and placing both types on the same bus can cause the system to exceed the bandwidth of the bus.

- Spread the PCI boards across the buses as evenly as possible. For example, if you have three PCI boards and three available PCI buses, install one board on each bus. If you must install more than one board on a bus, group the boards by speed.

PCI bus 1 slot 1
PCI bus 2 slot 1
PCI bus 2 slot 2
PCI bus 2 slot 3
PCI bus 3 slot 1
PCI bus 3 slot 2
PCI bus 4 slot 1
PCI bus 4 slot 2
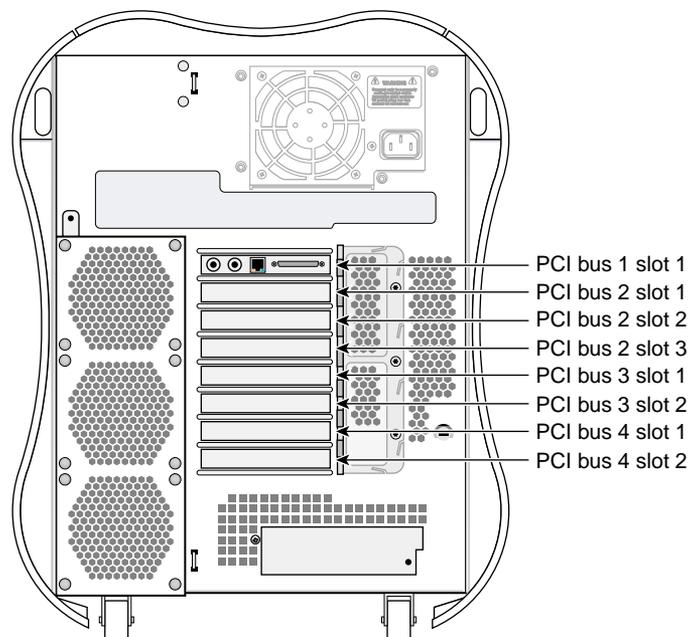
Figure 2-12   PCI Buses and Slots

For a list of available PCI boards see "PCI Boards" on page 42 or contact your SGI sales representative.

Power Supply

The power supply for the workstation is located in the top rear quadrant of the chassis, as shown in Figure 2-13.
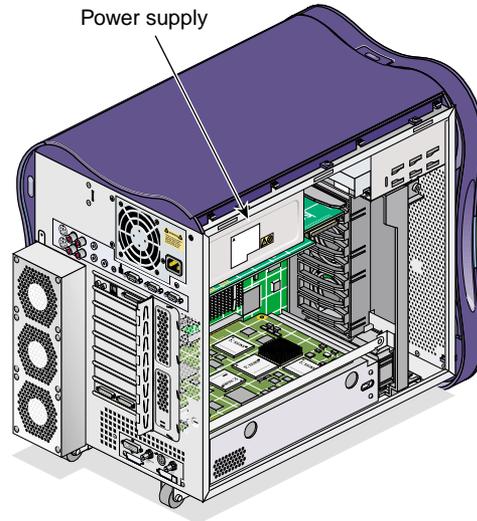
Figure 2-13   Power Supply Location

The power supply provides up to 550 watts of power to the node and interface boards, internal hard disk drives, DVD-ROM drive, and other optional components installed in the enclosure. For detailed information about the power supply specifications, refer to Appendix A, "Technical Specifications and Pinouts".

Cooling System

The workstation uses a total of eight fans to cool the internal components. The following components make up the cooling system (see Figure 2-14):

- **Fan Wall**
  The fan wall is a plastic housing that contains two 60-mm (2.4-in.) fans and two 80-mm (3.1-in.) fans. These fans provide cooling for the interface board, PCI boards, and the graphics module.

- **Disk Drive Fan**
  The disk drive fan is an 80-mm fan that mounts directly behind the disk drives.

- **Rear Fan Assembly**
  The rear fan assembly is made up of a sheet metal enclosure and three 80-mm fans. These fans provide cooling for the system node board and memory DIMMs. The rear fan assembly is mounted to the rear of the enclosure with hooks and a screw.

Note: The power supply is cooled by its own internal fan.
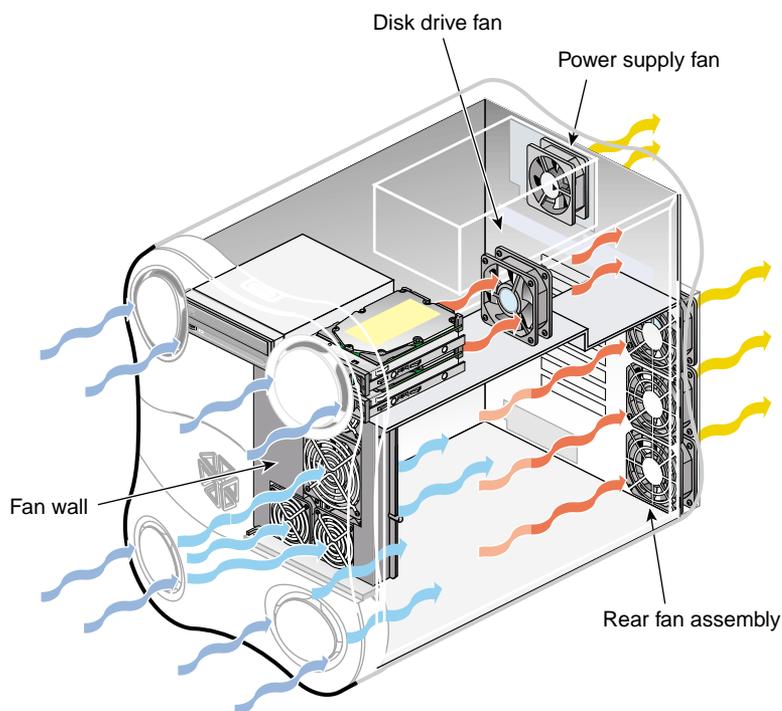
Figure 2-14   Cooling System Components

Optional Components, Peripherals, and Upgrades

Various optional components, peripherals, and upgrades are available for your
workstation. The following sections describe some of these options:

For more information about upgrading your system contact your SGI sales
representative.

PCI Boards

A wide variety of PCI options are available for you workstation, including networking,
audio, and video boards. The following boards a sample of the available options:

- Dual port Ultra3 SCSI LVD or single-ended SCSI adapter

- Single-port 1-gigabit Fibre Channel board with optical or copper connector

- Single- and dual-port 2-gigabit Fibre Channel boards with optical connectors

- 33- and 64-MHz, 64-bit single port ATM boards

- 1-port copper gigabit Ethernet adapter

- 1-port 1000Base-SX gigabit Ethernet adapter

- 8-channel Digital Audio I/O board

- DMedia DM3-to-VBOB board (2-or 4-processor workstations only)

For a complete list of available boards, contact your sales representative.

Memory Upgrades

The following memory upgrades are available for the workstation:

- 512-MB DIMM pair (1-processor workstations only)

- 1-GB DIMM pair

- 2-GB DIMM pair

Note: The workstation supports a maximum of eight memory DIMMs totalling 8 GB. Memory DIMMs must be installed in pairs of the same size.

Processor Upgrades

The workstation is available with 1, 2, or 4 processors. The processors are available with several different clock speeds. Processor upgrades are accomplished by replacing the entire system node board. 2-processor workstations can be upgraded to 4-processor workstations by replacing the node board.

Note: 1-processor workstations cannot be upgraded with 2- or 4-processor node boards.

Graphics Options

A variety of graphics options are available for you workstation. The following boards are a sample of the available options:

- **Dual-Channel Display (DCD-2) daughterboard**
  This board attaches to the VPro graphics board and allows data to be displayed across two monitors. It has two DVI-I video ports.

- **DMediaPro DM5 HD & SD Graphics to Video Output Option**
  This board allows direct output from graphics to video. The board is available with or without the video break-out box (VBOB) option.

- **DMediaPro DM3 HD & SD Graphics Video I/O XIO**
  This board allows direct input and output between graphics and video. The video break-out box (VBOB) is included with this board.

For a complete list of available graphics options, contact your sales representative.

Storage Upgrades

The following storage upgrades are available for the workstation:

- 18-GB internal Ultra SCSI hard disk drive, 15000 RPM
- 73-GB internal Ultra SCSI hard disk drive, 10000 RPM
- External SCSI DAT drive
- Internal DVD-ROM drive

The workstation can also be connected to a storage array, such as the SGI Total Performance 9100, SGI Total Performance 9300, or SGI Total Performance 9400. These disk arrays offer large storage capacities in both RAID and JBOD configurations.

In addition to the items listed above, there are a variety of other storage solutions available from SGI. For more, information, contact your SGI sales representative.

Displays

The following displays are available with the workstation:

- 21-in. SGI CRT monitor
- 24-in. SGI CRT monitor (wide-aspect-ratio)
- Silicon Graphics F180 (18.1-in. flat panel monitor)
- Silicon Graphics F220 (22-in. wide-aspect-ratio flat panel monitor)

Peripherals

The following peripherals are available with the workstation:

- 3-button mouse
- beeping keyboard
- Speakers
- Magellan Spaceball programmable trackball

For a complete list of available components, contact your SGI sales representative or see the following webpage:
http://www.sgi.com/peripherals/workstation/

Maintenance and Upgrade Procedures

This chapter provides safety information and instructions for adding or removing components from your Silicon Graphics® Tezro™ visual workstation. These topics are covered in the following sections:

Caution: For your own safety and to avoid damage to your equipment, do not attempt to install or remove components that are not listed in this chapter.

Safety Instructions

Read and follow these instructions carefully before servicing your workstation.

1. Follow all warnings and instructions marked on the system and noted in this and other documentation included with this system.

2. Unplug the system from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

3. Do not use the workstation near water.

4. Do not place the system on an unstable cart, stand, or table. It may fall, causing serious damage to the system.

5. Slots and openings on the workstation are provided for ventilation. To ensure reliable operation of the system and to protect it from overheating, these openings must not be blocked or covered. This system should never be placed near or over a radiator or heat register, or in a built-in installation, unless proper ventilation is provided.

6. This system should be operated from the type of power indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.

7. Do not allow anything to rest on the power cord. Do not locate this system where people will walk on the cord.

8. Never push objects of any kind into this system through cabinet slots as they may touch dangerous voltage points or short out parts, which could result in a fire or electric shock. Never spill liquid of any kind on the system.

9. Do not attempt to service this system yourself except as noted in this guide. Opening or removing covers of node and switch internal components may expose you to dangerous voltage points or other risks. Refer all servicing to qualified service personnel.

10. Unplug this system from the wall outlet and refer servicing to qualified service personnel under the following conditions:

    • When the power cord or plug is damaged or frayed.

    • If liquid has been spilled into the system.

    • If the system has been exposed to rain or water.

    • If the system does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating

instructions since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the system to normal condition.

- If the system has been dropped or the cabinet has been damaged.

- If the system exhibits a distinct change in performance, indicating a need for service.

11. Use only the proper type of power supply cord set (provided with the system) for this unit.

12. Only qualified service personnel should replace the soldered lithium battery(s) in the workstation. Please see "Lithium Battery Compliance Statement" on page 147 for more information.

Ordering Parts

Replacement parts are available directly from your local service provider. Contact the SGI support office for more information.

Required Tools

All of the procedures in this chapter can be performed with the following tools:

- Wrist grounding strap

- T15 Torx driver

- Small flat-blade screwdriver

- Small phillips-blade screwdriver

Preparing the Workstation for Service

This section shows you how to open the workstation for service and protect the components from static damage. The following topics are covered:

- "Powering Off and Disconnecting the Workstation" on page 50

- "Removing the Enclosure Panels" on page 51

- "Installing or Removing Internal Parts" on page 56

Powering Off and Disconnecting the Workstation

Follow these steps to power off and remove cables from your workstation:

1. If you are logged in to the workstation, log out. Then, press the power buttons to power off your workstation and monitor (see Figure 3-1).
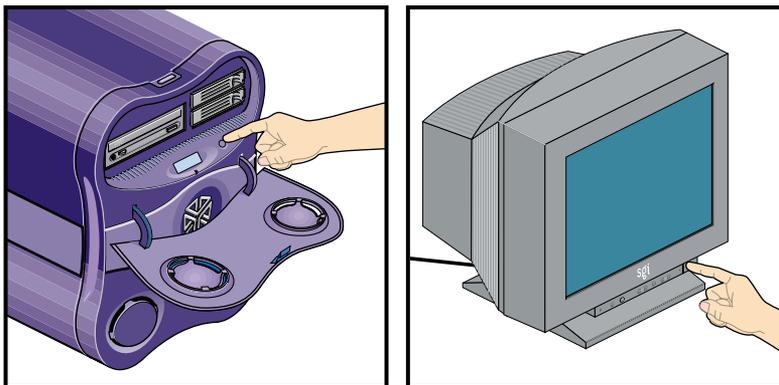
Figure 3-1   Powering Off the System

2. Disconnect all of the cables from the rear of the workstation. Be sure to note where each cable is connected, so that you can reconnect them correctly when you have finished servicing the system.

Note: You do not need to disconnect the cables or move the workstation for some procedures. Refer to the individual procedures for detailed instructions on preparing the system.

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3. Move the workstation to a sturdy, flat surface. Always use two people to move the workstation (see Figure 3-2).
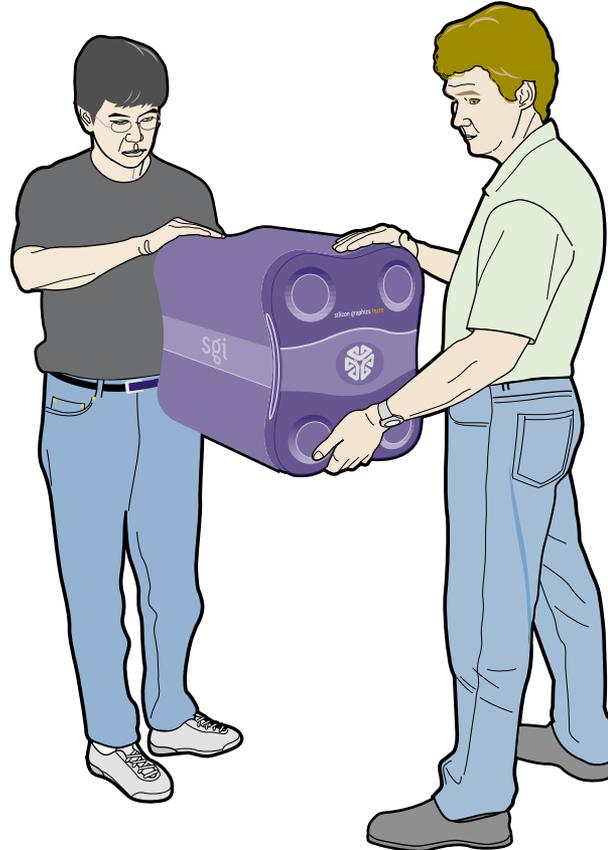
Figure 3-2   Moving the Workstation

Removing the Enclosure Panels

This section shows you how to open the enclosure in the following sections.

- "Determining Which Enclosure Panels to Remove" on page 52
- "Removing the Left or Right Side Panel" on page 52
- "Removing the Enclosure Bezel" on page 54

Determining Which Enclosure Panels to Remove

To determine which side(s) of the enclosure you need to remove to access specific components, see Table 3-1. If a part appears in two columns, you must remove both panels in order to access that component.

Note: Table 3-1 assumes that you are looking at the front of the workstation.

Table 3-1   Component Access by Enclosure Panel

Right Side Panel	Left Side Panel	Front Side Panel (Bezel)
Memory DIMMS	IO9 board	L1 display
Hard Disk Drive Fan	XIO boards	L1 display cable
Rear Fan Assembly	L1 display cable	LED cable
	LED cable	
	PCI boards	
	DVD-ROM drive	
	Fan wall	

After you have determined which side(s) of the enclosure you need to open, proceed to the appropriate section.

Removing the Left or Right Side Panel

Follow these steps to open the left or right side of the enclosure:

1. Press the panel release button on the rear of the enclosure. Then swing the top edge of the panel away from the enclosure (see Figure 3-3).

2. Lift the panel until the hooks on the bottom edge clear the lip on the base of the enclosure. Then swing the bottom edge of the panel away from the enclosure and place it in a safe location (see Figure 3-3).
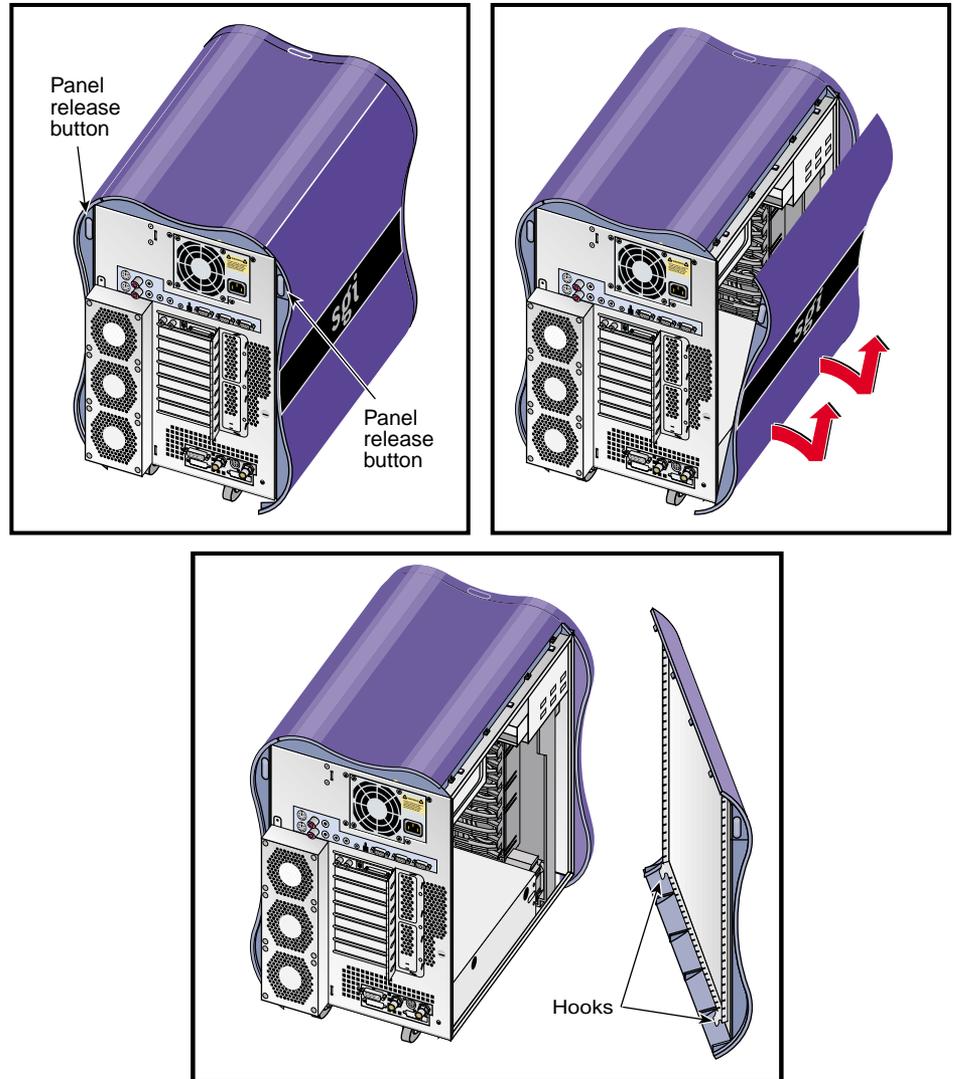
Figure 3-3   Removing the Enclosure Side Panel

If you only need to remove the left or right side panel, proceed to "Installing or Removing Internal Parts" on page 56. If you need to remove the bezel of the workstation, proceed to the next section.

Removing the Enclosure Bezel

The front of the enclosure is covered by a decorative plastic bezel. The bezel is made up of two pieces: the bezel frame and the drive shroud. The bezel frame covers the front of the enclosure. The drive shroud mounts inside the bezel frame and covers the area adjacent to the DVD-ROM drive and hard disk drives.

Follow these steps to remove the bezel from the front of the enclosure:

1. Open the door on the front of the bezel.Use a small flat-bladed screwdriver to press down in the two slots at the top of the drive shroud.

2. Tilt the top of the drive shroud toward you. Then lift the shroud off of the three tabs that are supporting it and place it in a secure location.

3. Remove the five screws that were covered by the drive shroud. Place these screws in a secure location.

4. Tilt the top of the bezel frame toward you. Then reach behind the bezel frame and disconnect the LED cable by squeezing the spring clips on the LED cable connector and gently pulling. Lift the bezel off of the enclosure and place it in a secure location.
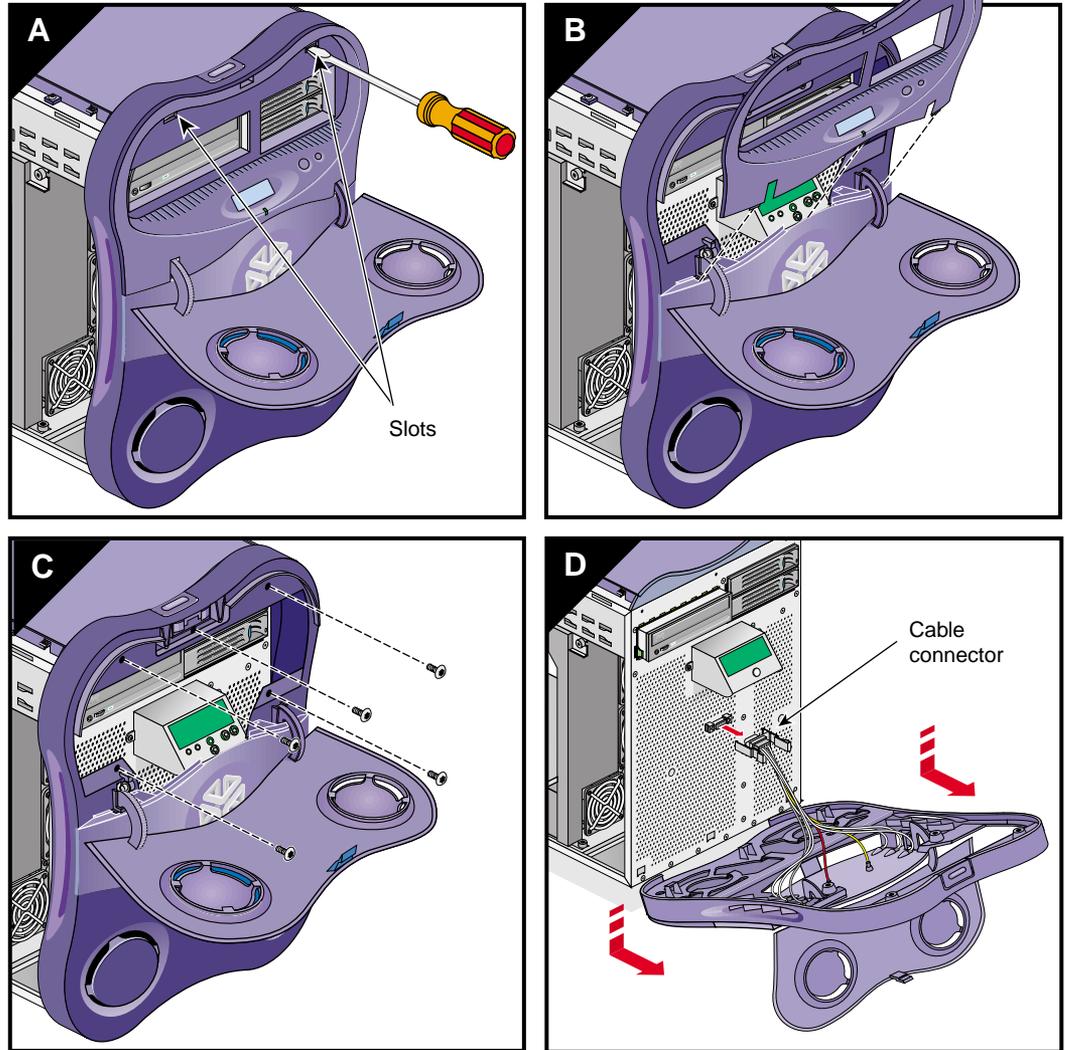
Figure 3-4   Removing the Bezel

Proceed to the next section to install or remove internal components.

Installing or Removing Internal Parts

> ⚠ **Warning:** **The heat sinks on the interface board get very hot. Wait 5 minutes after powering off your workstation before you touch any internal components. Touching the heat sinks could result in burns if a cooling-off period is not observed.**

Caution: The components inside your workstation are extremely sensitive to static electricity. Always wear the wrist strap when you work with parts inside your workstation. Follow these steps to use the wrist strap:

1. Unroll the first two folds of the strap.

2. Wrap the exposed adhesive side firmly around your wrist, unroll the rest of the strap, and then peel the liner from the copper foil at the opposite end.

3. Attach the copper foil to an exposed electrical ground, such as a metal part of the chassis.

After you attach the wrist strap, you can install or remove internal parts of the workstation. Table 3-2 contains a list of all of the internal components that you can install or remove and the procedure associated with each one.

Caution: Do not attempt to install or remove components that are not listed in Table 3-2. Components not listed in Table 3-2 must be installed or removed by a qualified SGI field engineer.

Table 3-2   Customer-replaceable Components and Service Procedures

Component	Procedure
Memory DIMMs	"Installing or Removing a Memory DIMM" on page 63
Internal hard disk drives	"Installing or Removing Internal Hard Disk Drives" on page 67
DVD-ROM Drive	"Installing or Removing the DVD-ROM Drive" on page 71

Table 3-2   Customer-replaceable Components and Service Procedures **(continued)**

Component	Procedure
PCI and XIO Boards:	
IO9 board	"Replacing the IO9 Board" on page 76
XIO boards	"Installing or Removing XIO Boards" on page 81
PCI boards	"Installing or Removing PCI Boards" on page 88
Fans:	
Fan wall	"Replacing the Fan Wall" on page 94
Hard disk drive fan	"Replacing the Hard Disk Drive Fan" on page 95
Rear fan assembly	"Replacing the Rear Fan Assembly" on page 98
Internal Cables:	
L1 display cable	"Replacing the L1 Display Cable" on page 100
LED cable	"Replacing the LED Cable" on page 103
DVD-ROM drive cable	"Replacing the DVD-ROM Drive Cable" on page 105
Enclosure Components:	
Enclosure Bezel Assembly	"Replacing the Bezel Assembly" on page 107
Enclosure Side Plastics	"Replacing the Side Plastics" on page 107
Enclosure Top Plastics	"Replacing the Top Plastics" on page 107
L1 Controller Display	"Replacing the L1 Display" on page 108

When you are finished installing or removing internal components, proceed to the next section.

Returning the Workstation to Service

The following sections contain instructions for returning the workstation to service:

- "Installing the Bezel" on page 58
- "Installing the Side Panels" on page 60
- "Cabling and Powering on the Workstation" on page 61

Installing the Bezel

Follow these instructions to install the bezel.

1. Align the tabs on the lower portion of the bezel with the holes in the enclosure. Insert the tabs into the holes and press the bezel against the enclosure to ensure that it is properly seated.

2. Lift the bezel slightly to align the screw holes with the mounting holes in the enclosure. Then install the five screws that secure the bezel to the enclosure.

3. Align the three tabs on the lower edge of the drive shroud with the corresponding holes on the face of the enclosure. Then swing upper edge of the drive shroud toward the enclosure and press the two tabs on the upper edge into their holes. Press the shroud against the enclosure to ensure that it is properly seated.
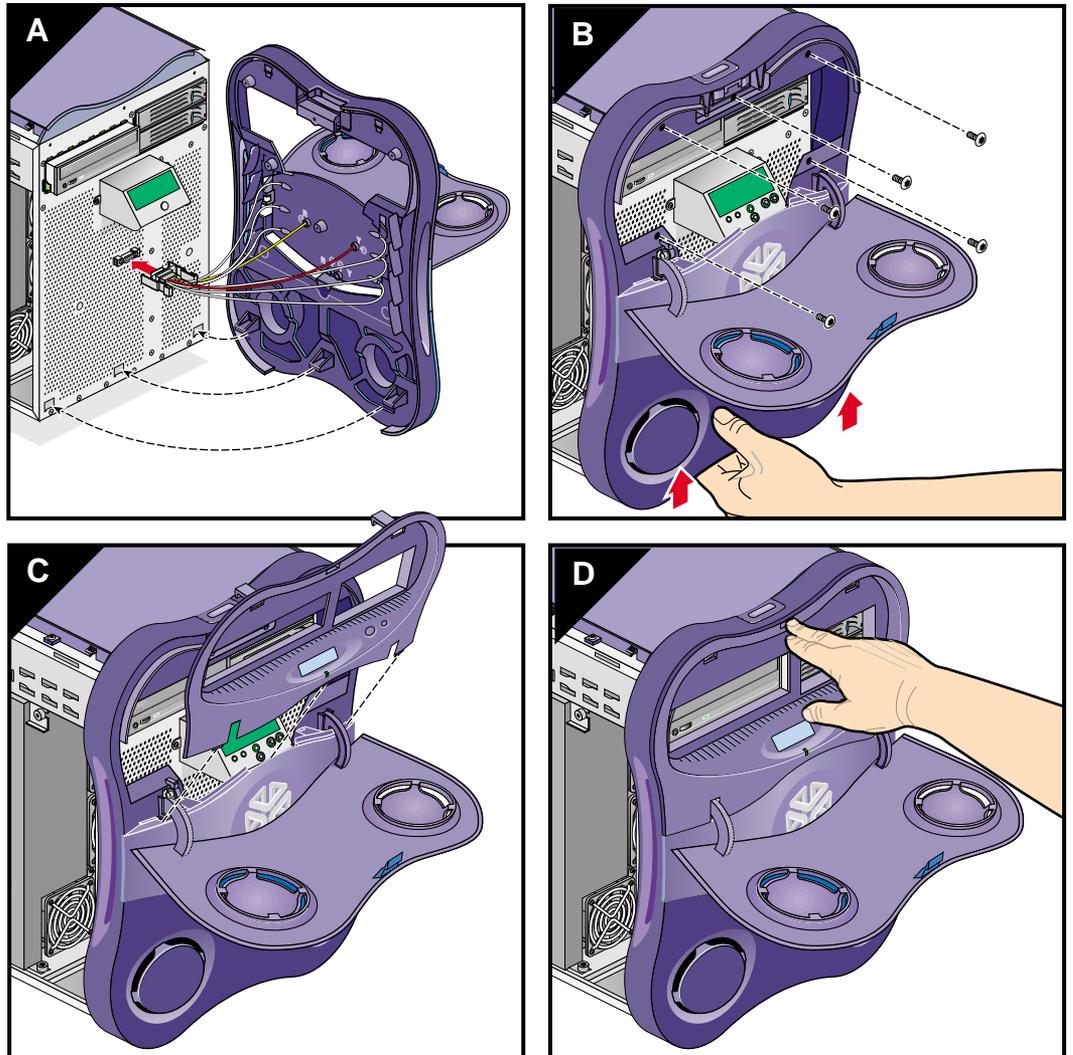
Figure 3-5   Installing the Bezel

Installing the Side Panels

Follow these steps to install a side panel (see Figure 3-6):

1. Align the hooks on bottom edge of the side panel over the lip on the bottom edge of the enclosure.

2. Swing the side of the panel up. Press the top edge of the panel against the enclosure to ensure that it is properly seated.
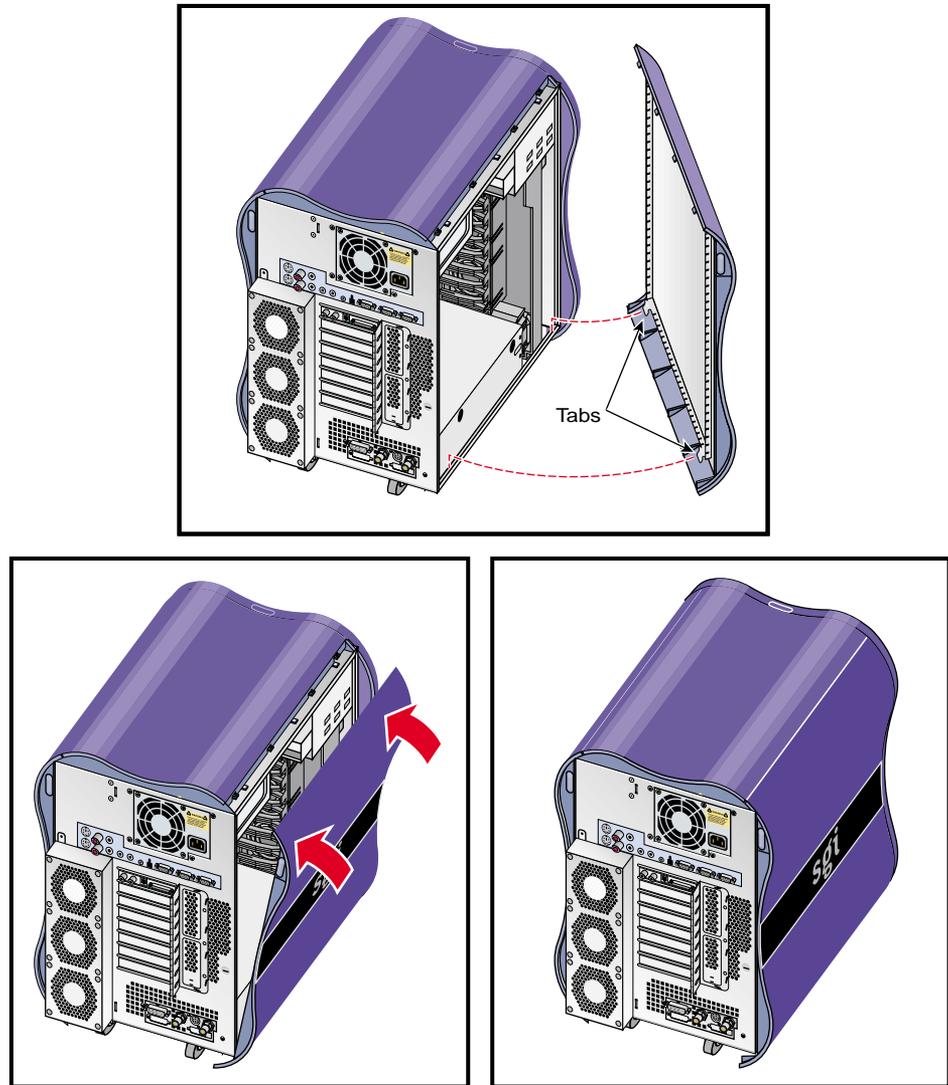
Figure 3-6   Replacing the Side Panel

Cabling and Powering on the Workstation

Follow these steps to cable and power on the workstation.

1. Reconnect all of the system cables to the rear of the enclosure (see Figure 3-7).
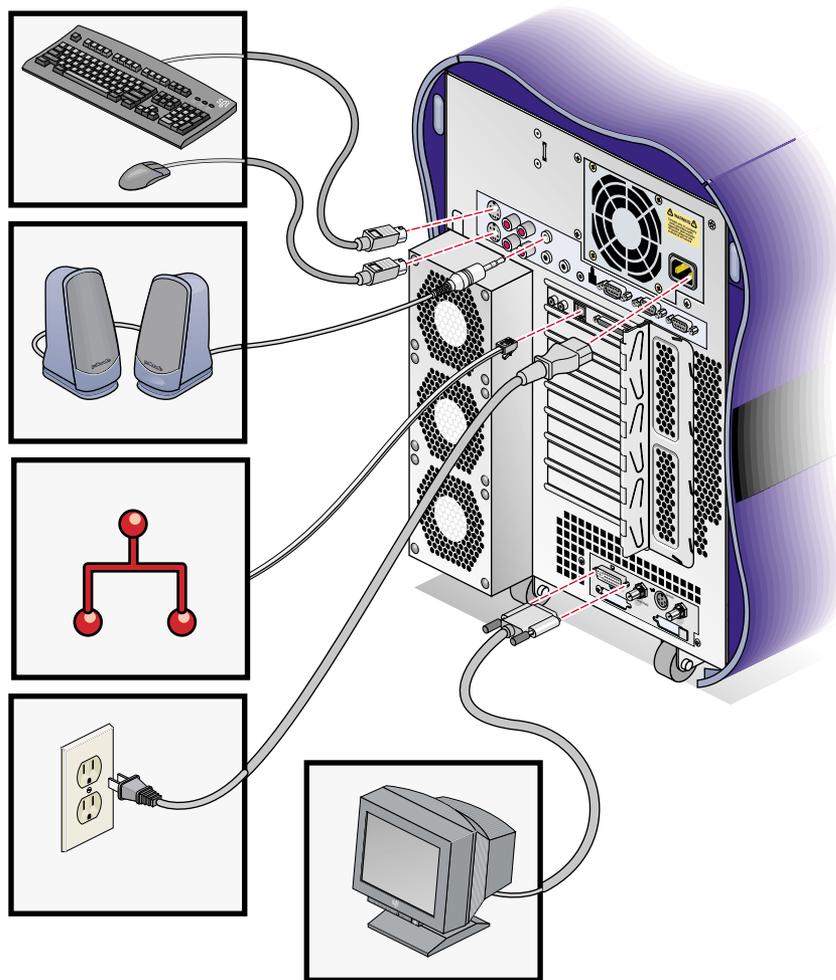
Figure 3-7   Reconnecting the Cables to the Workstation

2. Press the power buttons on your workstation and monitor.

3. If your workstation does not boot correctly, see Chapter 4, "Troubleshooting and Diagnostics."

This completes the procedure for returning the workstation to service.

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Installing or Removing a Memory DIMM

The Silicon Graphics® Tezro™ visual workstation is configured with a minimum of 512 MB of memory and a maximum of 8 GB of memory. The memory is contained in dual in-line memory modules (DIMMs) which are installed in eight DIMM sockets on the system node board. The sockets are divided into four DIMM pairs. The instructions in the following sections assume that you know the correct slots in which to install the memory DIMMs. For information about DIMM configurations and placement rules, refer to "Memory DIMMs" in Chapter 2.

Note: If you have not already done so, remove the right side of the enclosure to access the DIMMS. Refer to "Preparing the Workstation for Service" on page 49.

Instructions are provided in the following sections:

- "Removing a DIMM" on page 64
- "Installing a DIMM" on page 65
- "Verifying Memory Installation" on page 66

Removing a DIMM

To remove a DIMM, follow these steps:

1. Locate the DIMM that you want to remove.

2. Pull up on the latches at the end of the DIMM socket (see Figure 3-8). The DIMM will partially eject from the socket.

3. Lift the DIMM up and out of the enclosure.

4. Place the DIMM in an antistatic bag and store it in a secure location.

> **Note:** Both sockets in a DIMM bank must be either empty or populated. If you remove one DIMM and do not plan to replace it immediately, also remove the other DIMM in the bank and replace it when you install a new DIMM.
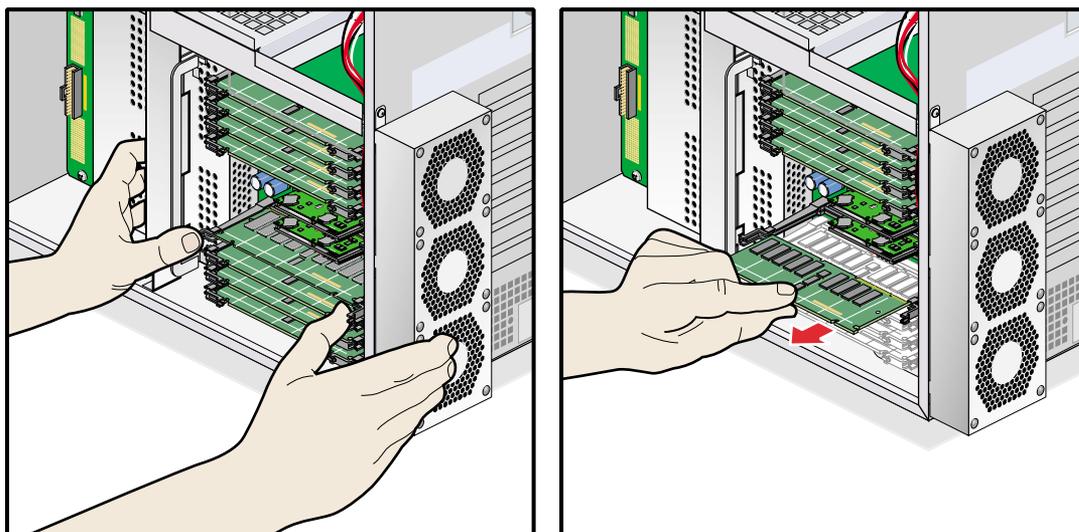
Figure 3-8   Removing a DIMM

5. Install a new DIMM or return the system to service, as follows:

   • To replace the DIMM immediately, proceed to the next section, "Installing a DIMM" on page 65.

   • To return the system to service, see "Returning the Workstation to Service" on page 57.

Note: The workstation will not function if there are no memory DIMMs installed. Two memory DIMMs of equal size must be installed in DIMM pair number 1.

Installing a DIMM

To install a DIMM, follow these steps:

Caution: DIMMs are sensitive to static electricity. Be sure to wear the anti-static wrist strap while you complete these steps.

1. Rotate the ejector latches on each end of the socket so that they stick straight out, as shown in Figure 3-9.
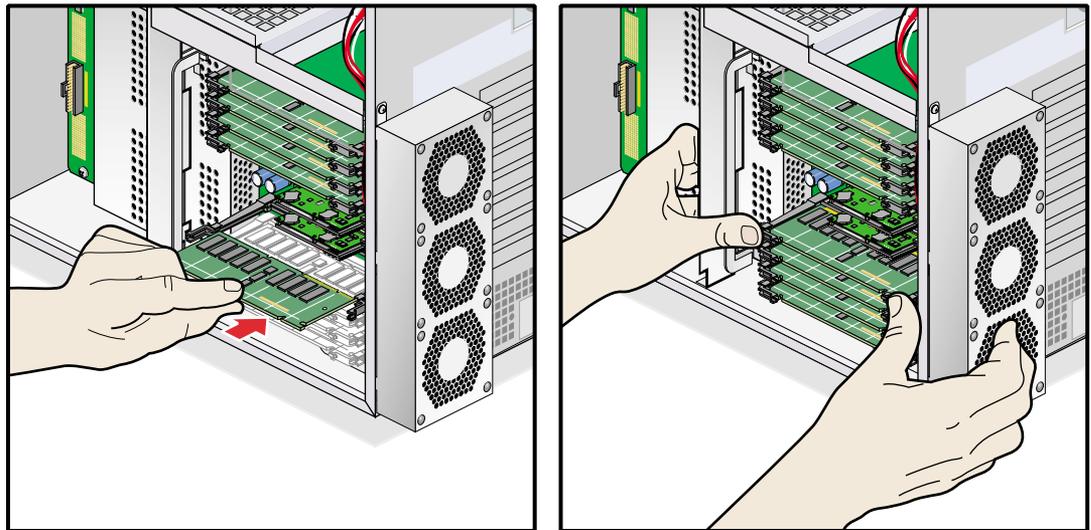
Figure 3-9   Installing a DIMM

2. Align the DIMM with the socket. Make sure that the notches on the bottom of the DIMM align with the protrusions in the bottom of the socket (see Figure 3-10).
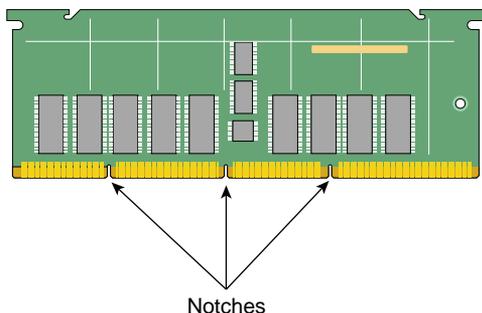
Figure 3-10   Locating the Notches on a DIMM

3. Seat the DIMM in the socket and press down. If you have seated the DIMM correctly, the ejector latches will swing up and click into place in the notches on the ends of the DIMM.

4. If necessary, repeat steps 1 through 3 to install a second DIMM.

5. Ensure that both sockets in the DIMM bank are full. DIMMs must be installed in pairs.

This completes the memory DIMM installation. To return the workstation to service, see "Returning the Workstation to Service" on page 57. After you have returned the system to service, you may verify that the memory you installed is working correctly by following the steps in the next section.

Verifying Memory Installation

To verify the memory installation, follow these steps:

1. After you power on the system, select **System Manager > Hardware and Devices > About This System** from the Toolchest and check the amount of memory displayed for **Main Memory**. The displayed memory should equal the original amount of memory minus any memory you removed, plus the amount of memory you installed.

2. If the amount of memory is incorrect, power off the system and check the following:

    •   Check the angle of the DIMMs. They should be upright and completely seated.

    •   Ensure that each bank is populated with two DIMMs, and that they are the same size. You must have an even number of DIMMs installed.

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Installing or Removing Internal Hard Disk Drives

The Silicon Graphics Tezro visual workstation can have one or two internal hard disk drives. These drives are sled mounted and can easily be installed and removed. The following sections contain instructions for installing and removing hard disk drives:

- "Installing an Internal Hard Disk Drive" on page 67
- "Removing an Internal Hard Disk Drive" on page 69

Note: You do not need to prepare the system for service to install or remove hard disk drives. If you are replacing the drive in the upper bay, ensure that it is spun down before you remove it. If you are replacing the system disk in the lower drive bay, you must power down the system.

Installing an Internal Hard Disk Drive

To install a disk drive, follow these steps:

1. Open the bezel door. If there is an empty drive sled in the drive bay, remove it. To remove the drive sled, press in on the right side of the locking handle; the handle will unlatch from the enclosure. Swing the handle all the way open; then slide the drive sled out of the enclosure.

2. Move the handle on the drive you are installing to the fully open position. Then position the drive sled so that it engages the drive bay guide rails (see Figure 3-11).

Note: If there is only one disk drive in your system, it must be located in the lower drive bay.

3. Gently push the drive sled into the drive bay until the locking handle engages with left side of the bay opening. Then swing the locking handle towards the enclosure until it latches (see Figure 3-11).
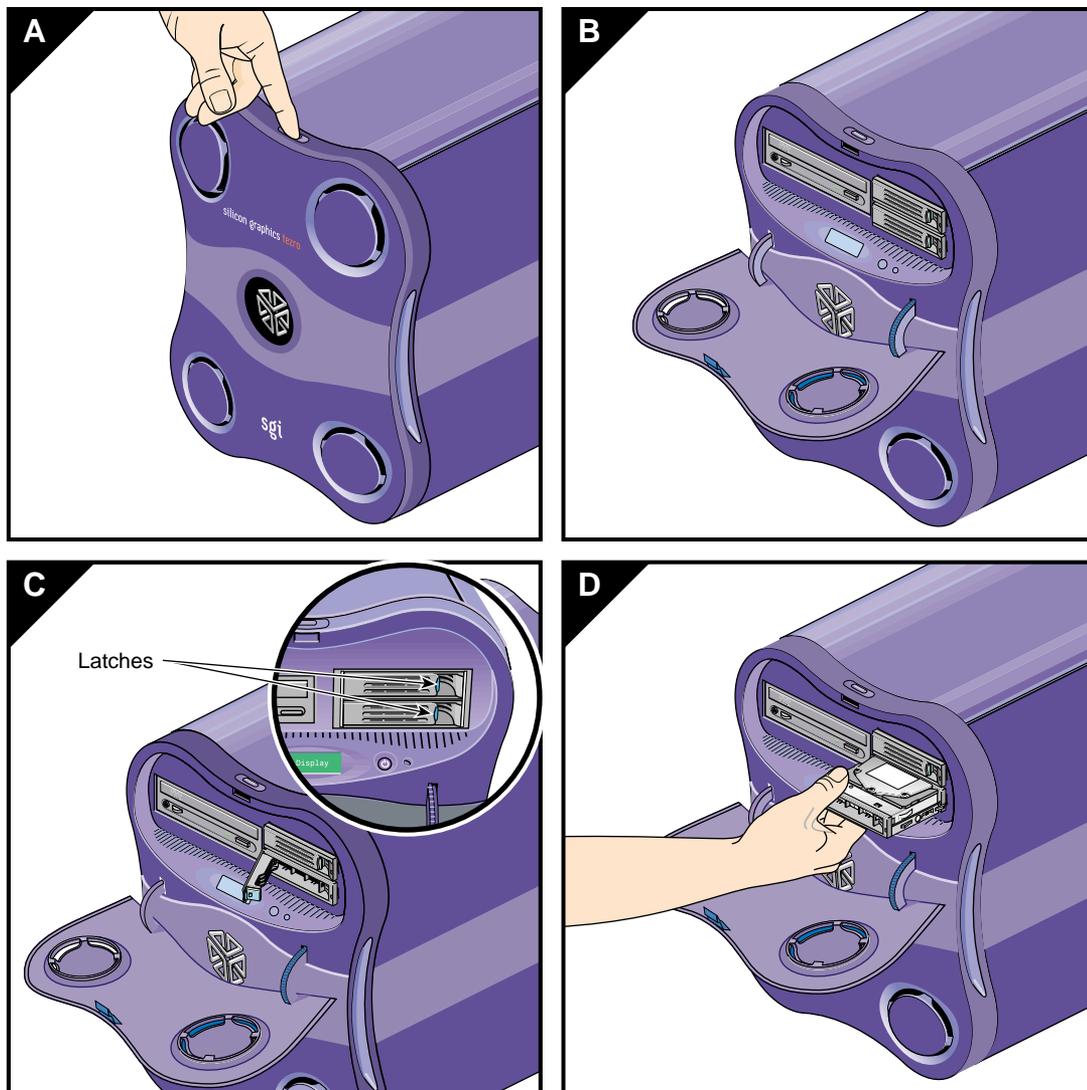
Figure 3-11   Installing an Internal Hard Disk Drive

Removing an Internal Hard Disk Drive

1. Open the bezel door.

Note: If you are removing the drive in the upper drive bay, ensure that the drive has spun down before you remove it. If you are removing the drive in the lower drive bay, you must power down the workstation.

---

2. Press in on the right side of the locking handle; the handle will unlatch from the enclosure (see Figure 3-11).

3. Swing the locking handle away from the enclosure until it is fully open. Then carefully slide the drive sled out of the drive bay. Do not pull the drive sled out by the locking handle (see Figure 3-11).

4. If you are not installing a replacement drive, install an empty drive sled to ensure proper airflow.
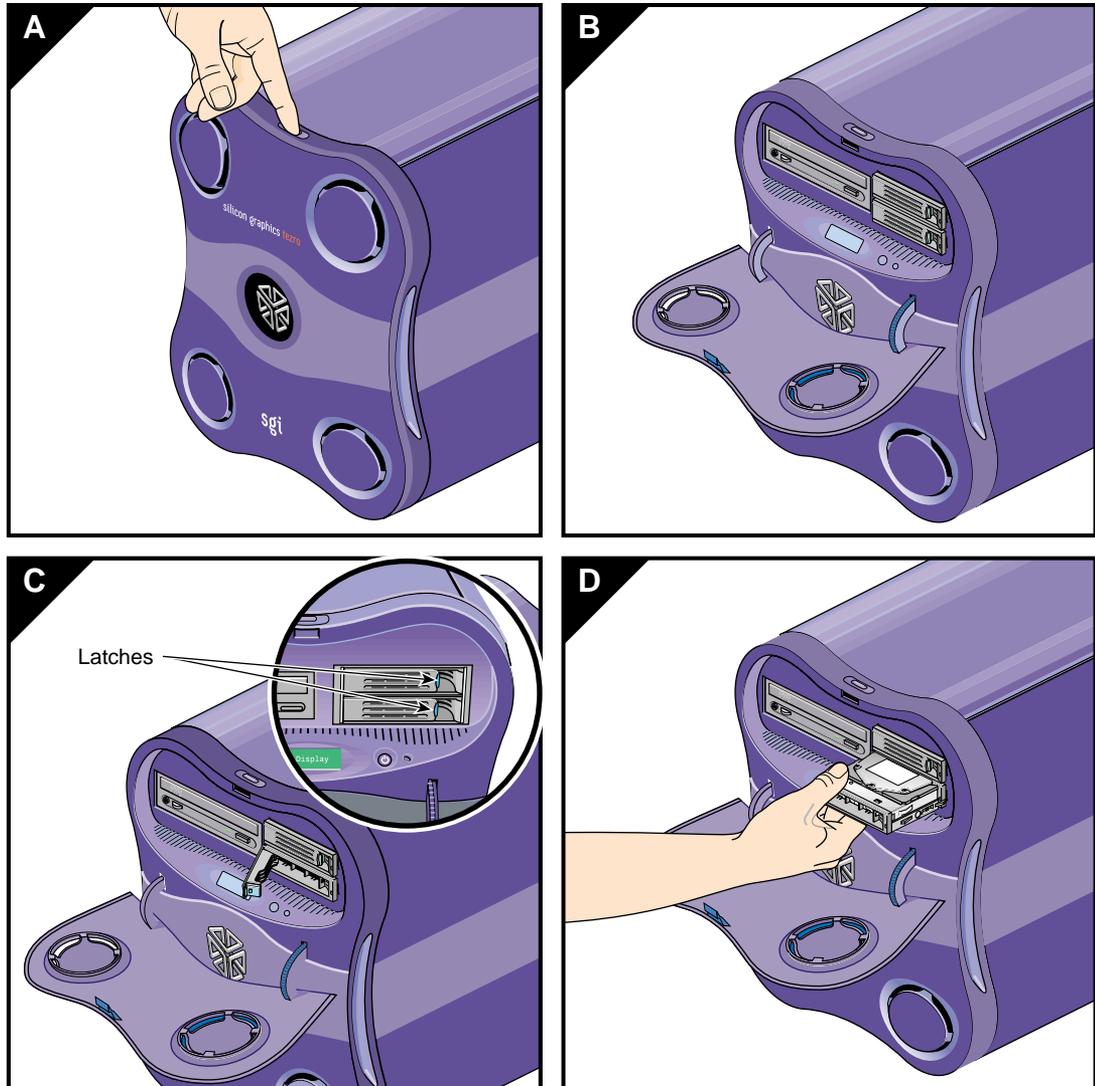
Figure 3-12   Removing an Internal Hard Disk Drive

Installing or Removing the DVD-ROM Drive

The Silicon Graphics Tezro visual workstation supports an internal DVD-ROM drive which is installed in the 5.25-in. drive bay. This drive bay is located on the upper left portion of the front of the enclosure. The following sections contain instructions for installing and removing the DVD-ROM drive:

- "Installing the DVD-ROM Drive" on page 71
- "Removing the DVD-ROM Drive" on page 74

Note: If you have not already done so, prepare your system for service. Refer to "Preparing the Workstation for Service" on page 49. In order to install or remove the DVD-ROM drive, you must remove the left side panel and the drive shroud. You do not need to remove the entire bezel.

Installing the DVD-ROM Drive

Follow these steps to install the DVD-ROM drive:

Note: You must remove the drive shroud before you can install the DVD-ROM drive.

1. Remove the plastic drive blanking plate that covers the DVD-ROM drive opening in the drive shroud. Then remove the metal blanking plate that covers the front of the DVD-ROM drive cage.
2. Attach the 5.25-in. drive rails to the sides of the drive by inserting the pins into the openings in the sides of the drive (see Figure 3-13).
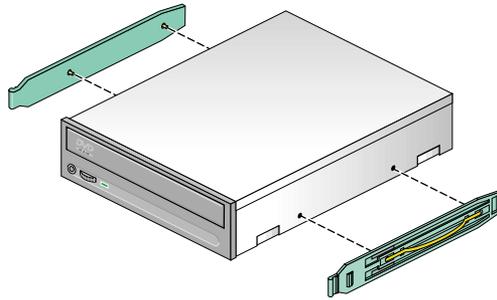
Figure 3-13   Installing the Drive Rails

3. Align the drive rails with the slots in the side of the drive cage and slide the drive into the drive cage until it clicks into place (see Figure 3-14).

4. Connect the IDE cable as follows (see Figure 3-14):

    a. Insert one end of the IDE cable into the IDE connector on the rear of the drive.

    b. Open the latches of the IDE connector on the IO9 board. Then, insert the other end of the IDE cable into the IO9 board IDE connector.

    c. Close the latches on the IO9 board IDE connector. Press the IO9 board into the interface board connectors to ensure that it is properly seated.

5. Connect the power cable to the rear of the drive (see Figure 3-14).
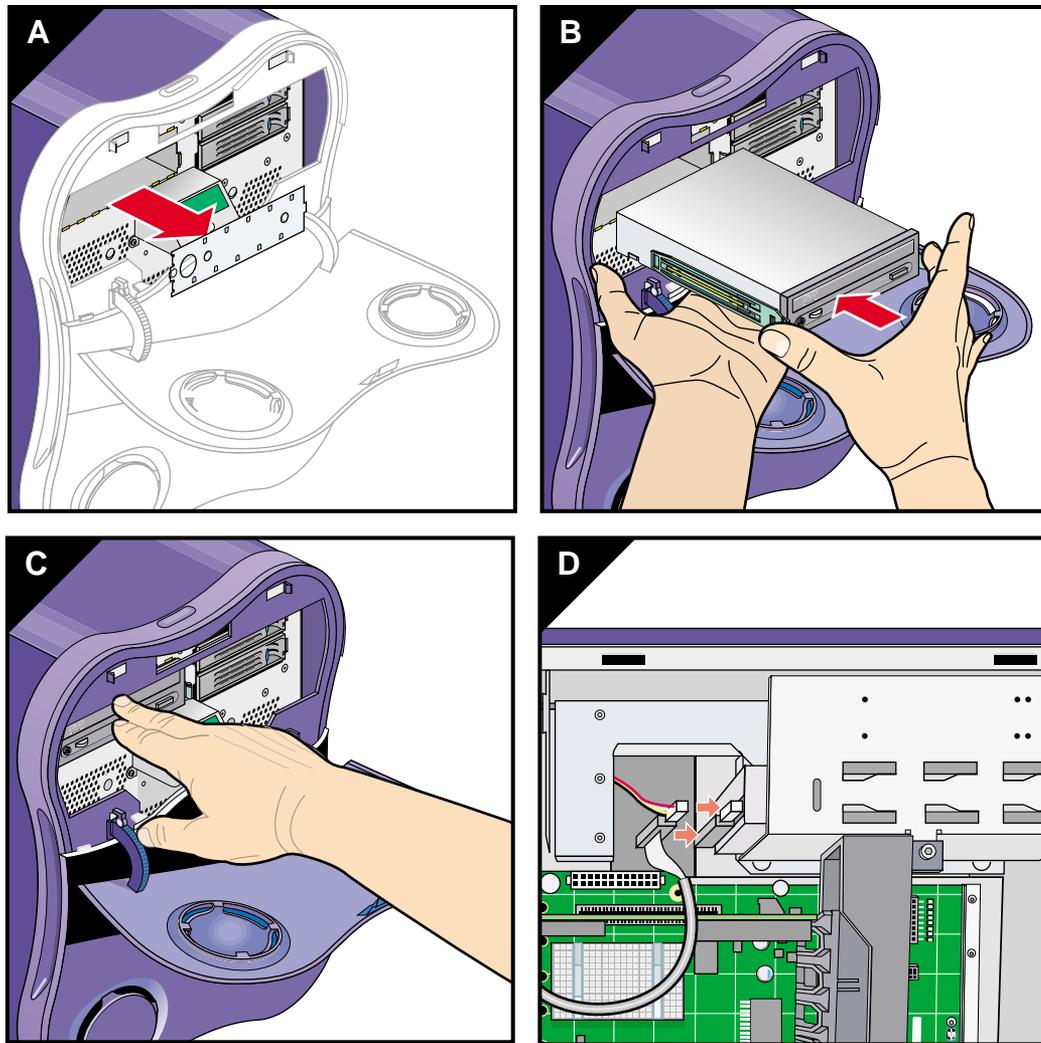
Figure 3-14   Installing the DVD-ROM Drive.

This completes the DVD_ROM drive installation. To return the workstation to service, see "Returning the Workstation to Service" on page 57.

Removing the DVD-ROM Drive

Follow these steps to remove the DVD-ROM drive:

Note: You must remove the drive shroud before you can remove the DVD-ROM drive.

---

1. Disconnect the IDE and power cables from the rear of the DVD-ROM drive.

2. Squeeze the tabs on the drive rails against the sides of the drive. Then slide the drive out of the drive cage (see Figure 3-15).
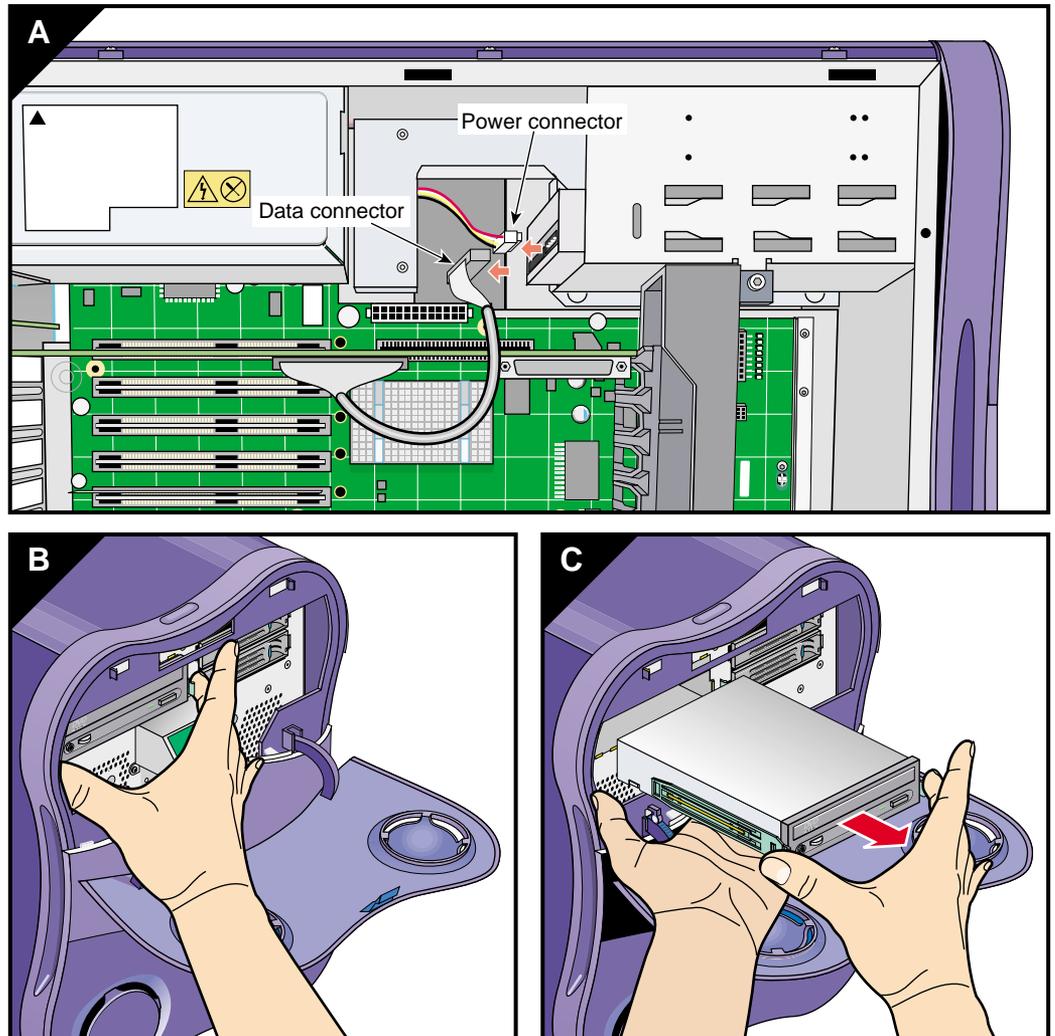
Figure 3-15   Removing the DVD-ROM Drive

3. If you are replacing the drive with a new drive, refer to "Installing the DVD-ROM Drive" on page 71. If you are not replacing the DVD-ROM drive, install a metal drive bay blanking plate in the DVD-ROM drive bay and a plastic blanking plate in the drive shroud to ensure proper airflow.

This completes the removal of the DVD-ROM drive. To return the workstation to service, refer to "Returning the Workstation to Service" on page 57.

Replacing the IO9 Board

The IO9 board provides basic I/O functions for the workstation. It also provides connectivity between the hard-disk drives, DVD-ROM drive, and the interface board. The following instructions show you how to remove and install the IO9 board:

- "Removing the IO9 Board" on page 76
- "Installing the IO9 Board" on page 78

Note: If you remove the IO9 board, you must install a replacement IO9 board. The workstation will not function without the IO9 board installed.

Note: If you have not already done so, prepare your system for service. Refer to "Preparing the Workstation for Service" on page 49. In order to replace the IO9 board, you must remove the left side panel.

Removing the IO9 Board

Follow these steps to remove the IO9 board:

1. Disconnect the SCSI and IDE cables from the IO9 board. Then loosen the PCI retention strap (see Figure 3-16).
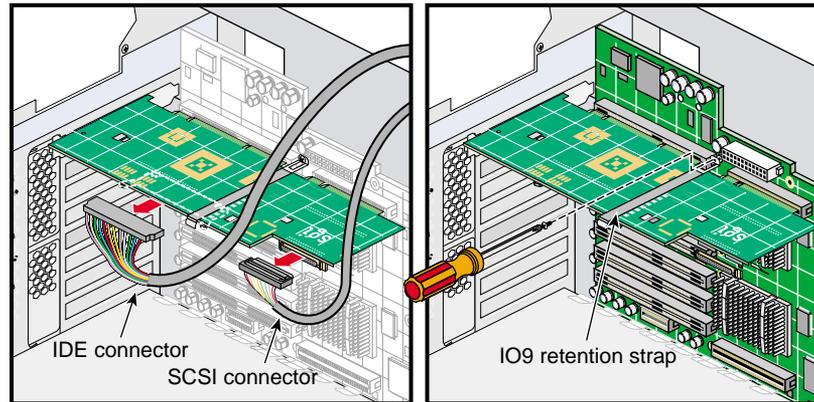
Figure 3-16   Disconnecting the Cables and Retention Strap

2. Remove the three screws that secure the PCI gate. Then open the PCI gate (see Figure 3-17).
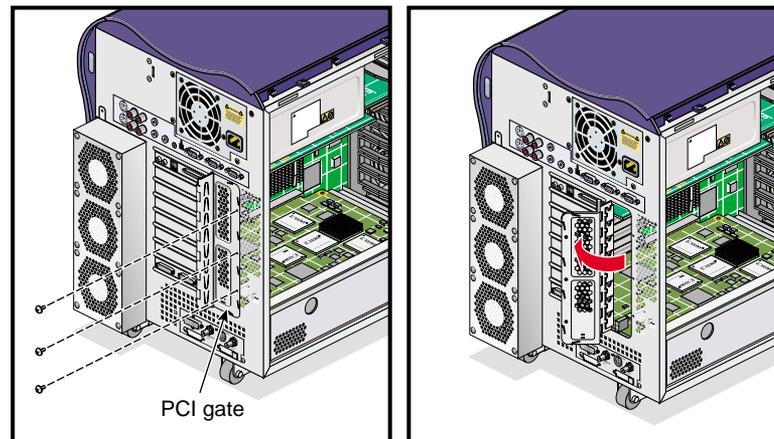
Figure 3-17   Opening the PCI Gate

3. Gently grasp both ends of the IO9 board. Then lift straight up until it clears the PCI slot. Tilt the front end of the IO9 board upward until it clears the edge of the chassis. Then remove the IO9 board from the enclosure and place it in a safe location (see Figure 3-18).
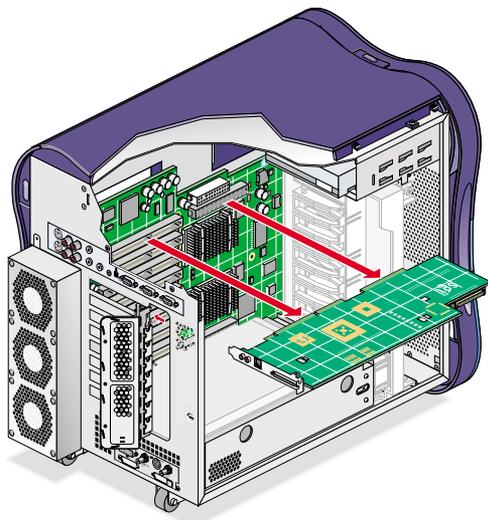
Figure 3-18   Removing the IO9 Board

This completes the IO9 board removal. To install a new IO9 board, proceed to the next section.

Installing the IO9 Board

Follow these steps to install a replacement IO9 board:

1. Align the IO9 board with PCI slot 1 on Bus 1. Then lower the IO9 board into the enclosure. Press straight down to seat the board in the PCI connector on the interface board (see Figure 3-19).
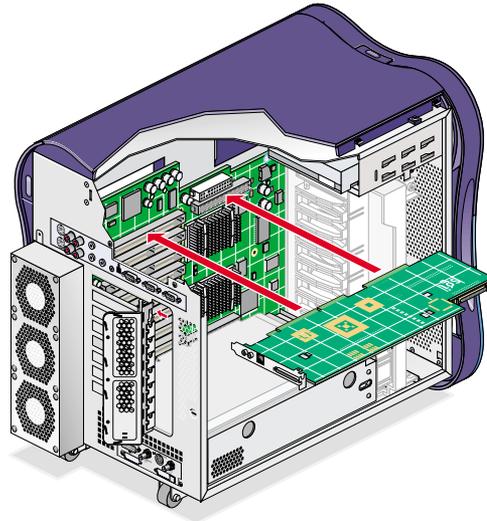
Figure 3-19   Installing the IO9 Board

2. Connect the SCSI and IDE cables to the IO9 board. To connect a cable, align the cable connector with the socket on the IO9 board and press down. Then attach the retention strap to the IO9 board (see Figure 3-20).

Note: The connectors and sockets are keyed. Ensure that you have properly aligned the connect and socket before you attempt to connect them.

IDE connector
SCSI connector
IO9 retention strap
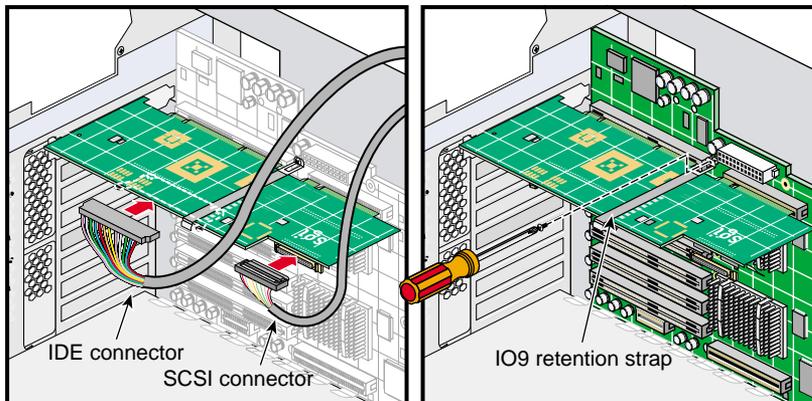
Figure 3-20   Connecting the Cables and Retention Strap

3. Ensure that the IO9 board is properly aligned in the PCI gate. Then close the gate and install the three screws that secure it to the enclosure (see Figure 3-21).
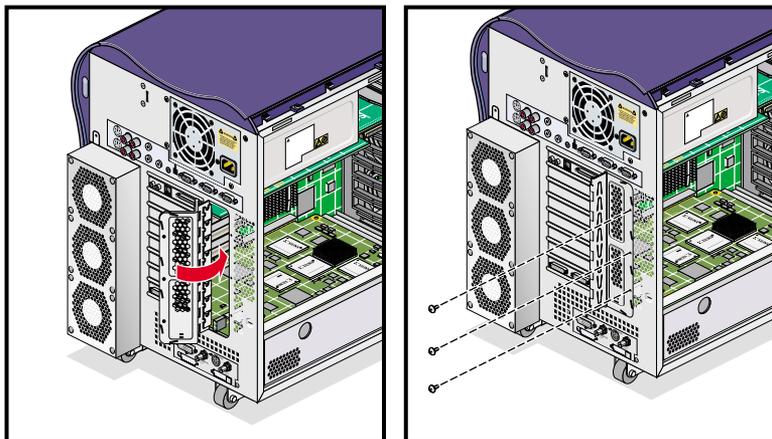
Figure 3-21   Closing the PCI Gate

This completes the installation of the IO9 board. To return the workstation to service, refer to "Returning the Workstation to Service" on page 57.

Installing or Removing XIO Boards

A optional XIO board can be installed in the XIO slot on the interface board. In order to install an XIO board, PCI bus 4, slot 2 must be empty. Some XIO boards require the installation of a support bracket on the fan wall. See the following sections for installation and removal instructions:

- "Installing the XIO Board Support Bracket" on page 81
- "Installing an XIO Board" on page 83
- "Removing an XIO Board" on page 85

Note: If you have not already done so, prepare your system for service. Refer to "Preparing the Workstation for Service" on page 49. In order to install or remove an XIO board, you must remove the left side panel.

Note: XIO option boards can only be installed in 2- or 4-processor workstations.

Installing the XIO Board Support Bracket

If your XIO board was shipped with a support bracket, follow these steps to install the bracket on the fan wall (see Figure 3-22):

1. Remove the fan wall from the enclosure. See "Replacing the Fan Wall" on page 94 for complete instructions.

2. Place the fan wall on a flat surface; Then align the hooks on the support bracket with the corresponding holes in the fan wall.

3. Insert the hooks into the holes on the fan wall; then press down until the bracket snaps into place.

4. Install the fan wall in the enclosure. See "Replacing the Fan Wall" on page 94 for complete instructions.
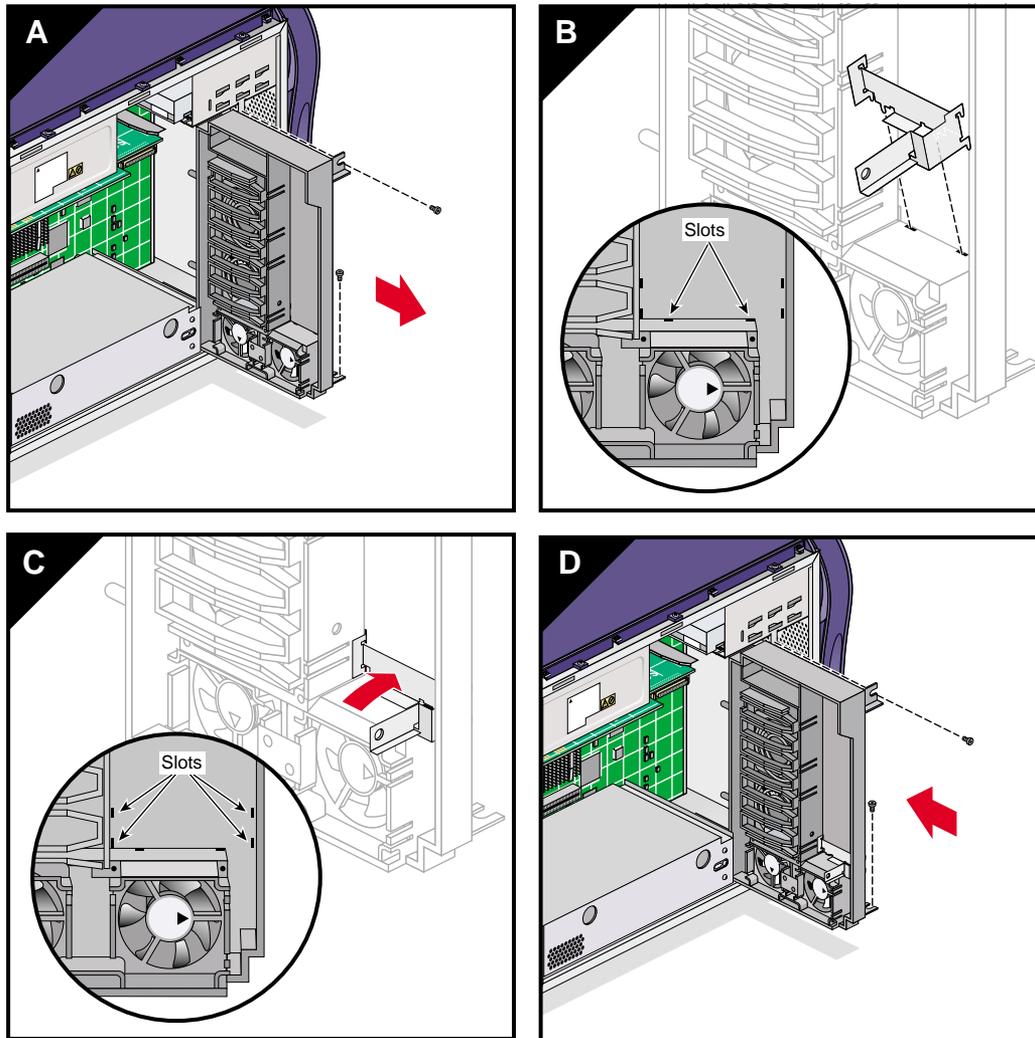
Figure 3-22   Installing the XIO Board Support Bracket

This completes the installation of the XIO board support bracket. Proceed to the next section to install an XIO board.

Installing an XIO Board

1. If your XIO board was shipped with a support bracket, install the bracket on the fan wall. See "Installing the XIO Board Support Bracket" on page 81 for complete instructions.

2. Remove the three screws that secure the PCI gate. Then open the PCI gate (see Figure 3-26).
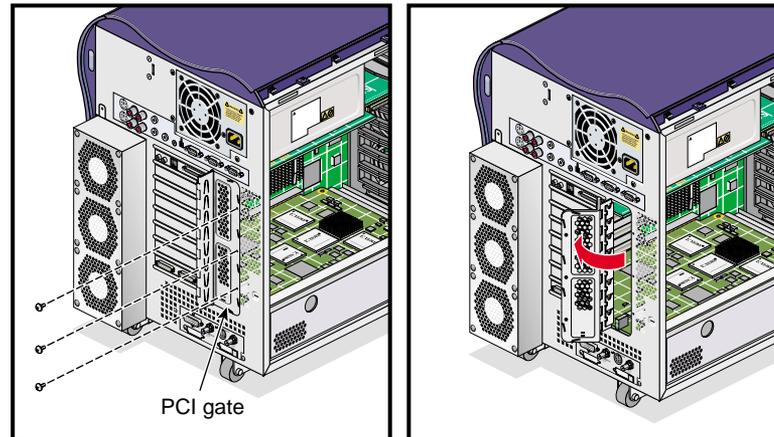
Figure 3-23   Opening the PCI Gate

3. Align the board with the XIO slot. Then lower the board into the enclosure.

4. Press the board straight into the XIO connector on the interface board. Then install the screw that secures the XIO board to the support bracket (see Figure 3-24).

Bracket

XIO board

Line up handle notch
with locator pin inside
chassis
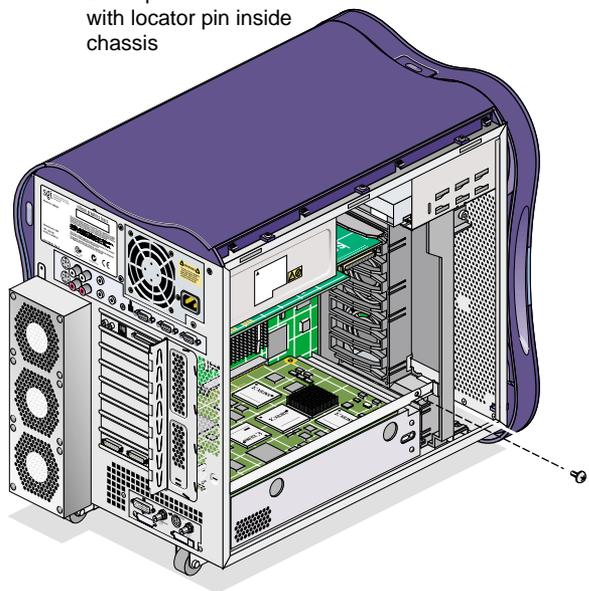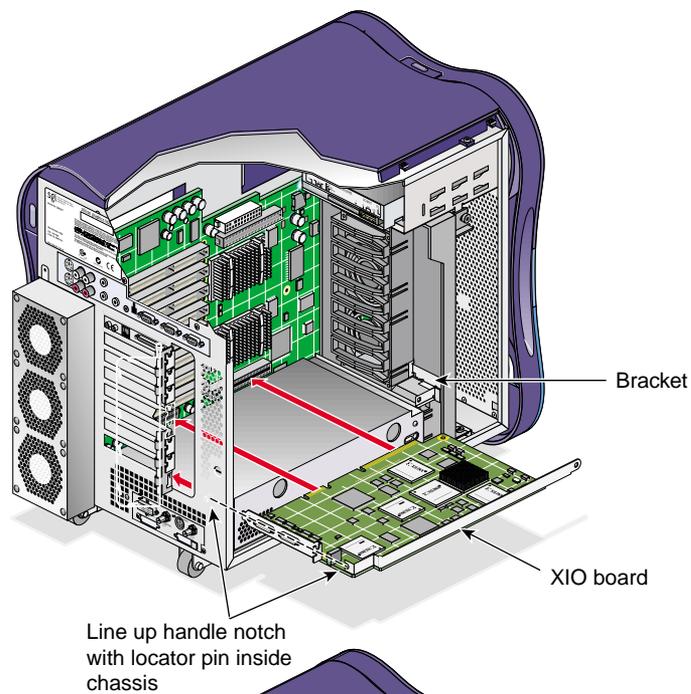
Figure 3-24   Installing an XIO Board

5. Ensure that the board is properly aligned in the PCI gate. Then close the gate and install the three screws that secure it to the enclosure (see Figure 3-25).

Note: If the XIO board you are installing is equipped with metal handle, ensure that the notch in the handle is aligned with the locator pin in the enclosure before closing the PCI gate (see Figure 3-25).
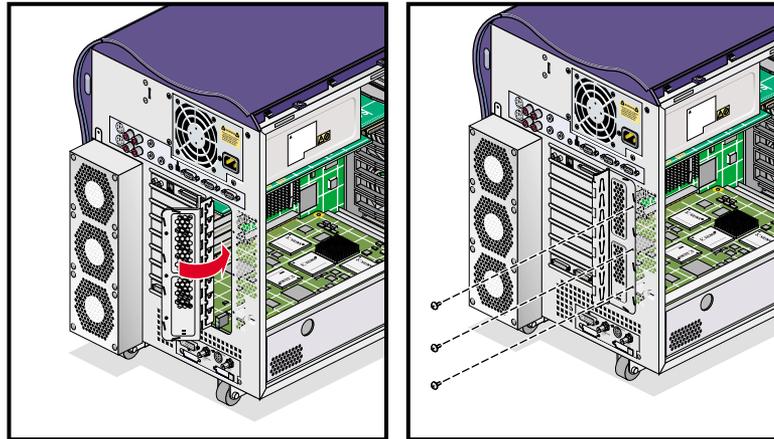
Figure 3-25   Closing the PCI Gate

This completes the installation of the XIO board. To return the workstation to service, refer to "Returning the Workstation to Service" on page 57.

Removing an XIO Board

Follow these steps to remove an XIO board:

1. Remove the three screws that secure the PCI gate. Then open the PCI gate (see Figure 3-26).
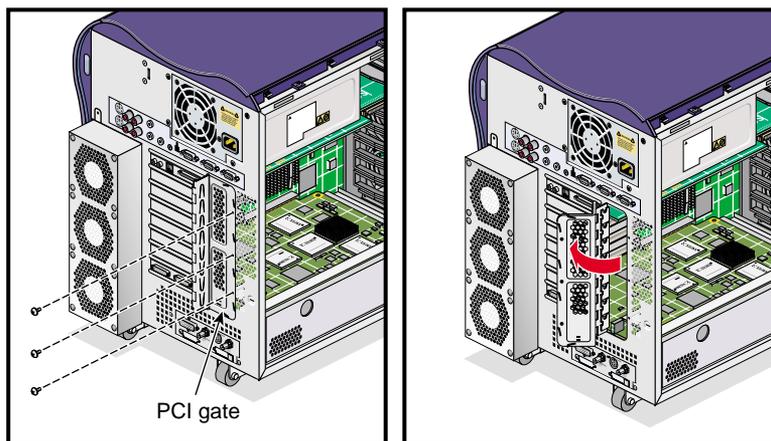
PCI gate

Figure 3-26   Opening the PCI Gate

2. If the XIO board you are removing is equipped with a support bracket, remove the screw that secures the board to the bracket.

3. Gently grasp both ends of the XIO board. Then pull straight out until it clears the XIO slot. Tilt the front end of the board upward until it clears the edge of the chassis. Then remove the board from enclosure and place it in a safe location (see Figure 3-27).
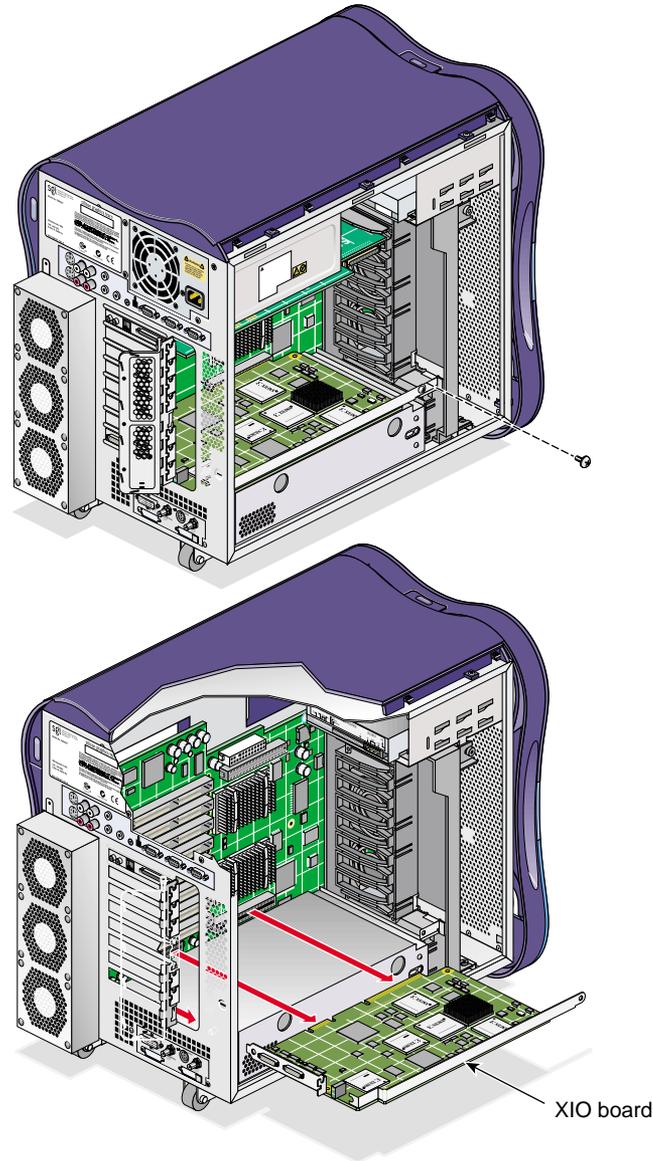
XIO board

Figure 3-27   Removing an XIO Board

This completes the XIO board removal. To install a new board, see "Installing an XIO Board" on page 83. To return the workstation to service, see "Returning the Workstation to Service" on page 57.

Installing or Removing PCI Boards

The 2- and 4-processor workstations can support as many as eight PCI/PCI-X boards. The 1-processor workstation supports as many as four PCI/PCI-X boards. The IO9 board always occupies one PCI-X slot, leaving seven available slots in 2- and 4-processor workstations and three available slots in 1-processor workstations. These instructions assume that you know the correct bus and slot you need to install the PCI board in. For more information about PCI board placement rules and configurations, refer to "PCI Buses" on page 38.

Note: If you have not already done so, prepare your system for service. Refer to "Preparing the Workstation for Service" on page 49. In order to install or remove a PCI board, you must remove the left side panel.

This section provides instructions for the following procedures:

- "Installing a PCI Board" on page 89
- "Removing a PCI Board" on page 92

Note: All of the figures in these sections depict 2- or 4-processor workstations. PCI buses 3 and 4 are not present in 1-processor workstations.

Installing a PCI Board

Follow these steps to install a PCI board:

1. Remove the three screws that secure the PCI gate to the enclosure. Then open the PCI gate (see Figure 3-28).
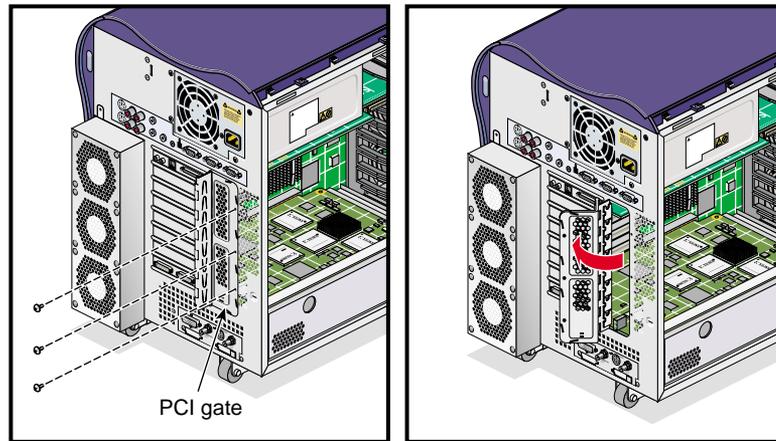
PCI gate

Figure 3-28   Opening the PCI Gate

2. If another PCI board is installed in the slot where you will install the new PCI board, you must remove it before you can install the new PCI board. See "Removing a PCI Board" on page 92.

Note: If you are installing a full-length PCI board, you must also install a PCI board retention strap.

---

3. Align the PCI board with the PCI slot. Then lower it into the enclosure with the connector end angled slightly downward (see Figure 3-29).

4. Align the connector end of the PCI board in the opening in the enclosure. Ensure that the screw hole in the PCI connector plate aligns with the tab on the PCI gate. Then press down firmly on the PCI board until it is fully seated in the PCI slot (see Figure 3-29).

PCI board installed
in PCI bus 2, slot 1
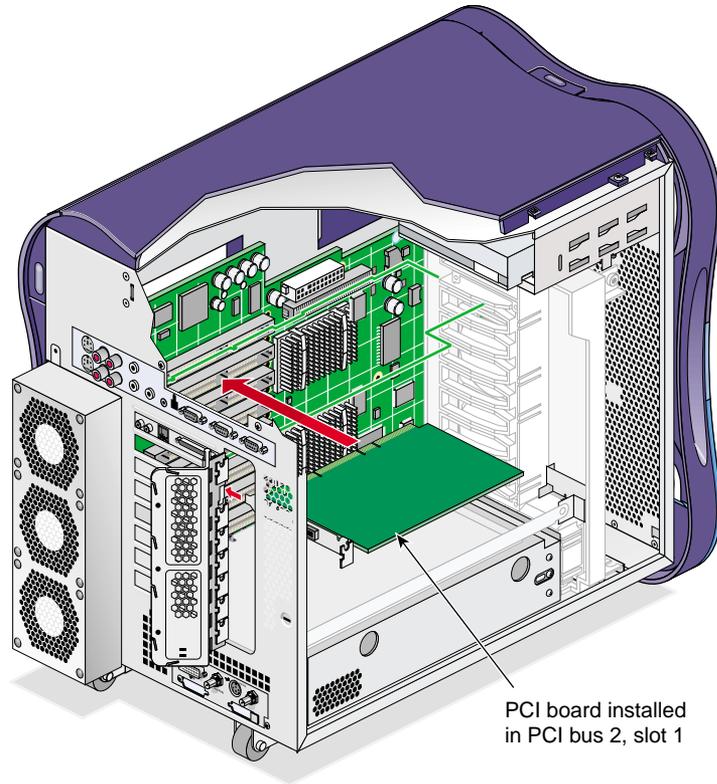
Figure 3-29   Installing the PCI Board

5.   Repeat steps 3 through 4 to install another PCI board.

6.   Close the PCI gate. Then install the three screws that secure the PCI gate (see Figure 3-30).
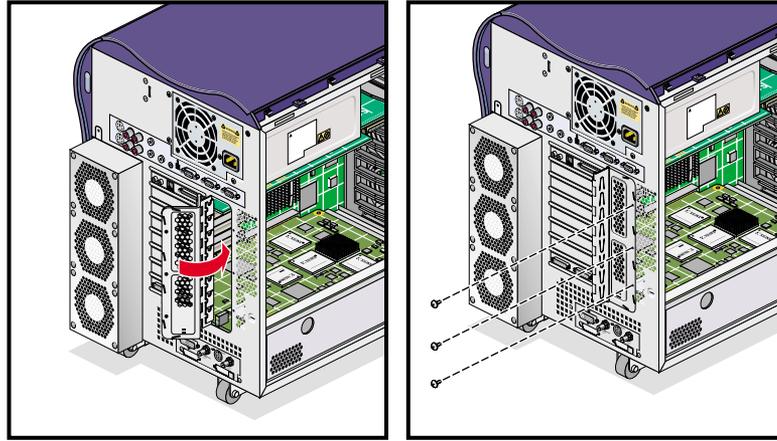
Figure 3-30   Closing the PCI Gate

This completes the PCI board installation. To return the workstation to service, refer to "Returning the Workstation to Service" on page 57.

Removing a PCI Board

Follow these steps to remove a PCI board:

1. Remove the three screws that secure the PCI gate to the enclosure. Then open the PCI gate (see Figure 3-31).
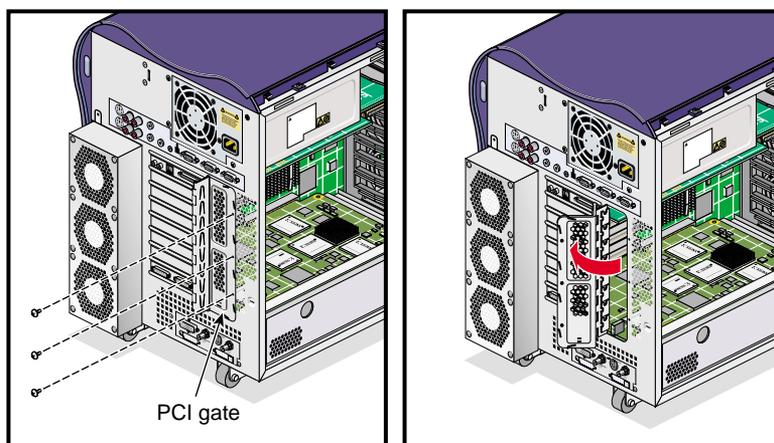
PCI gate

Figure 3-31   Opening the PCI Gate

2. If there is a retention strap installed on the PCI board, loosen it. Grasp the top edge of the PCI board firmly. Then lift the PCI board straight up until it clears the PCI slot.

3. Tilt the front end of the PCI board upward until it clears the edge of the chassis. Remove the PCI board from the enclosure and place it in a safe location (see Figure 3-32).

PCI board installed
in PCI bus 2, slot 1
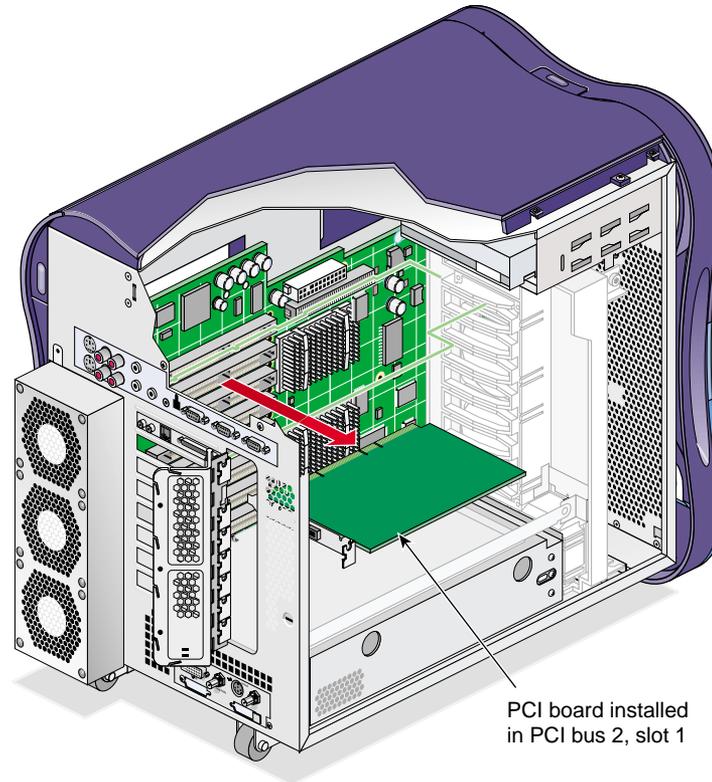
Figure 3-32   Removing a PCI Board

4. If you will be replacing the PCI board, see "Installing a PCI Board" on page 89.

5. If you are finished removing PCI boards, close the PCI gate. Then install the three screw that secure the gate to the enclosure.

This completes the PCI board removal. To return the workstation to service, refer to "Returning the Workstation to Service" on page 57.

Installing or Removing External devices

Refer to the documentation that came with the device for more information on connecting it to your workstation.

Replacing Cooling System Components

This section provides instructions for the following procedures:

- "Replacing the Fan Wall" on page 94
- "Replacing the Hard Disk Drive Fan" on page 95
- "Replacing the Rear Fan Assembly" on page 98

Caution: Never operate the unit without all of the cooling system components in place. Operating the workstation without the proper cooling equipment may damage the internal components.

Replacing the Fan Wall

The fan wall cools the interface board, the PCI boards, and the graphics module. Follow these steps to replace the fan wall (see Figure 3-33).

Note: If you have not already done so, prepare your system for service. Refer to "Preparing the Workstation for Service" on page 49. In order to remove the fan wall, you must remove the left side panel.

---

1. Disconnect the fan wall power cable from the interface board. Then remove the screw that secures the fan wall to the chassis. If there is an XIO board support bracket installed on the fan wall, remove the screw that secures the XIO board to the support bracket.

2. Slide the fan wall straight out of the chassis. Place it in a secure location.

3. Slide the replacement fan wall into the enclosure. Then install the screw that secures the fan wall to the chassis.

4. Connect the fan wall power cable to the fan wall power connector on the interface board.
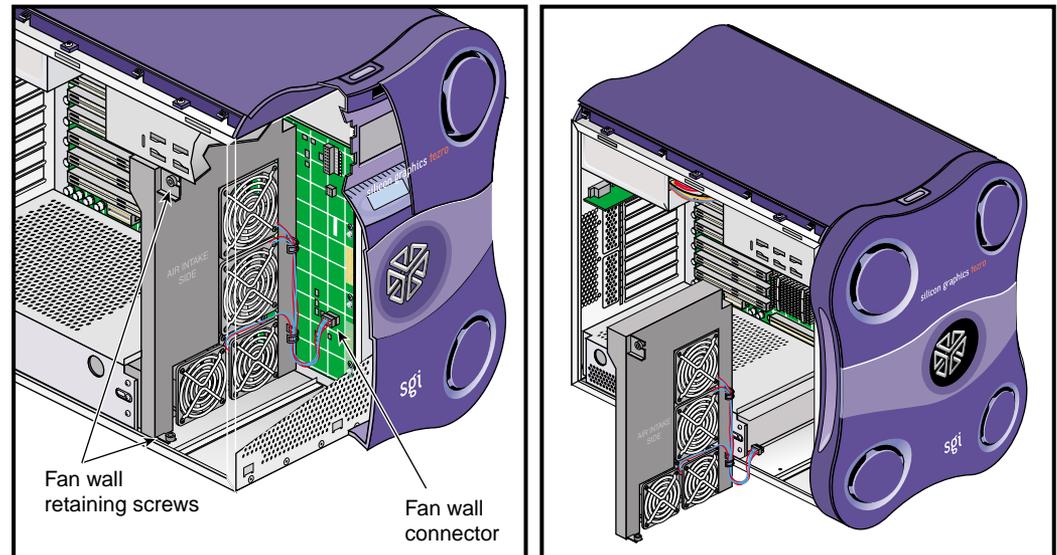
Figure 3-33   Replacing the Fan Wall

Note: If your fan wall is equipped with an XIO board support bracket, you must remove the bracket from the old fan wall and install it on the new fan wall. See "Installing the XIO Board Support Bracket" on page 81

This completes the fan wall replacement. To return the workstation to service, see to "Returning the Workstation to Service" on page 57.

Replacing the Hard Disk Drive Fan

Follow these steps to replace the hard disk drive fan:

Note: If you have not already done so, prepare your system for service. Refer to "Preparing the Workstation for Service" on page 49. In order to replace the hard disk drive fan, you must remove the right side panel.

---

1. Disconnect the disk drive fan power cable from the interface board. Then remove the screws that secure the disk drive fan to the enclosure (see Figure 3-34).

2. Carefully remove the fan from the enclosure (see Figure 3-34).
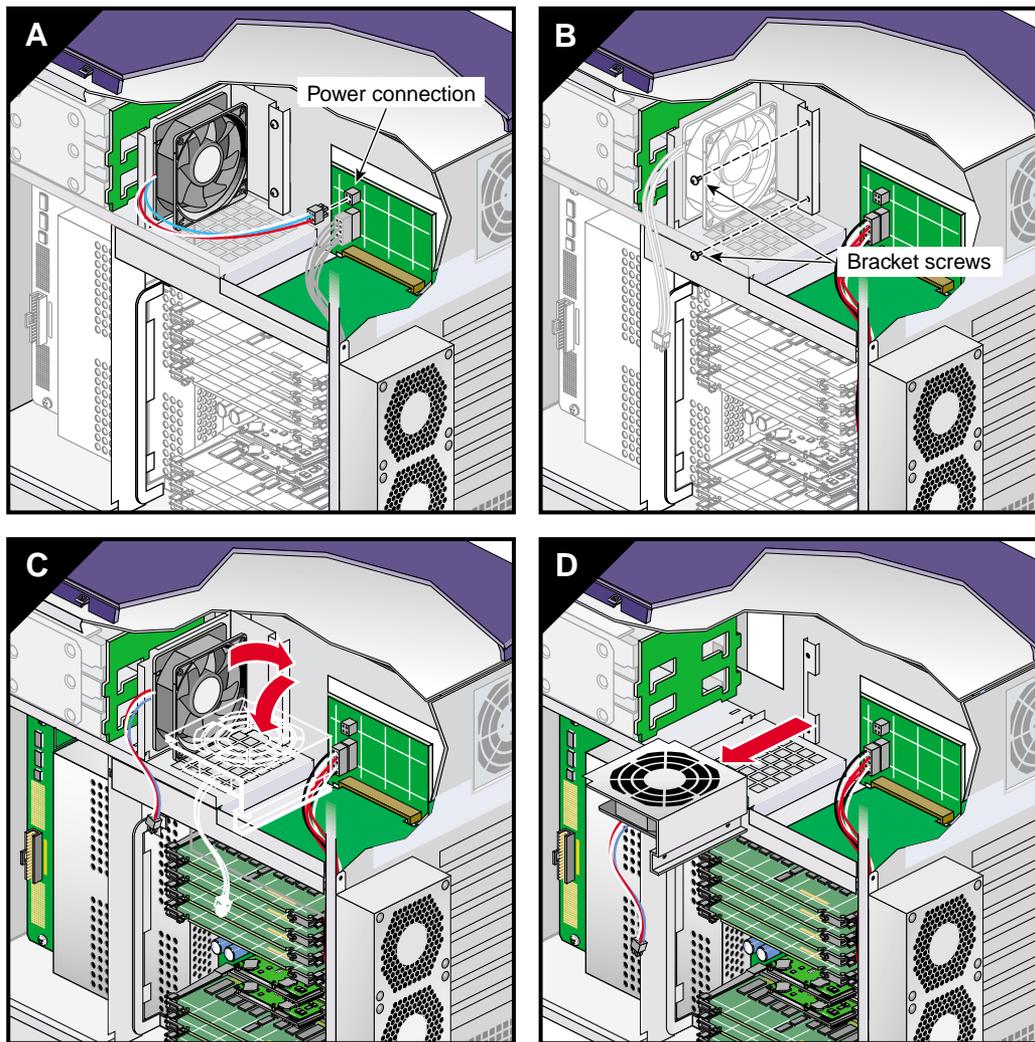
Figure 3-34 Removing the Hard Disk Drive Fan

3. Insert the new fan assembly into the enclosure (see Figure 3-35).

4. Align the screw holes in the fan bracket with the holes in the enclosure frame. Ensure that the front edge of the fan bracket has engaged with the fan bracket hook. Then install the screws that secure the fan bracket to the enclosure (see Figure 3-35).

5. Connect the disk drive fan power cable to the interface board (see Figure 3-35).
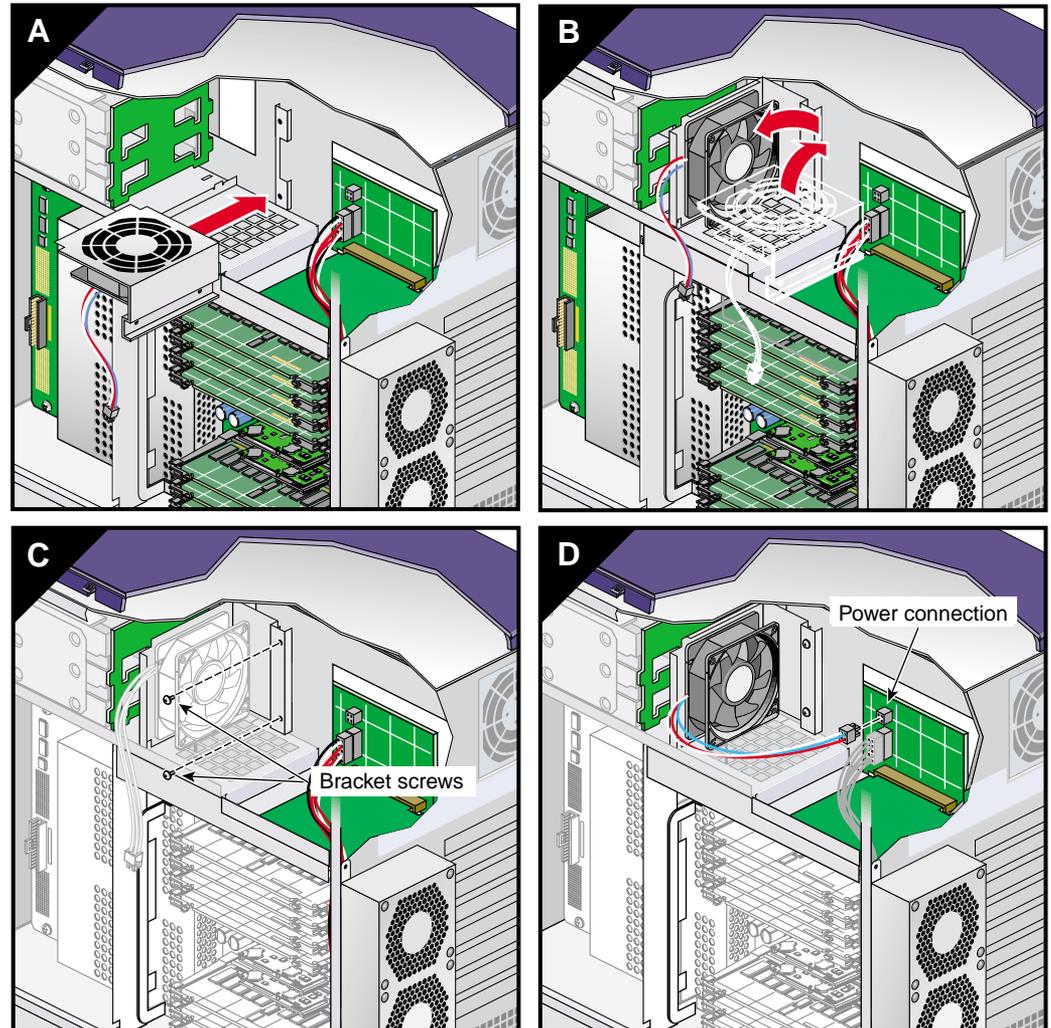
Figure 3-35   Installing the Hard Disk Drive Fan

This completes the replacement of the hard disk drive fan. To return the workstation to service, see "Returning the Workstation to Service" on page 57.

Replacing the Rear Fan Assembly

Follow these steps to replace the rear fan assembly (see Figure 3-36):

Note: If you have not already done so, prepare your system for service. Refer to "Preparing the Workstation for Service" on page 49. In order to replace the rear fan assembly, you must remove the right side panel.

1. Disconnect the rear fan assembly power cable from the interface board. Then remove the screw that secures the rear fan assembly to the enclosure.

2. Grasp the sides of the fan assembly and slide it upward until the hooks clear the holes in the enclosure.

3. Carefully pull the fan assembly power cable through the hole in the rear of the enclosure. Place the fan assembly in a secure location.

4. Insert the power cable of the replacement rear fan assembly into the hole in the rear of the enclosure from which you removed the old power cable.

5. Align the hooks and screw hole on the replacement fan assembly with the holes in the enclosure.

6. Insert the hooks on the fan assembly into the holes on the enclosure. Slide the fan assembly downward to firmly seat the hooks.

7. Install the screw that secures the rear fan assembly to the enclosure. Then connect the rear fan assembly power cable to the interface board.

Figure 3-36   Replacing the Rear Fan Assembly

This completes the replacement of the rear fan assembly. To return the workstation to service, see "Returning the Workstation to Service" on page 57.

Replacing Internal Cables

The following sections contain instructions for replacing internal cables:

- "Replacing the L1 Display Cable" on page 100
- "Replacing the LED Cable" on page 103

- "Replacing the DVD-ROM Drive Cable" on page 105

Replacing the L1 Display Cable

Follow the steps in this section to replace the L1 display cable.

Note: If you have not already done so, prepare your system for service. Refer to "Preparing the Workstation for Service" on page 49. In order to replace the L1 display cable, you must remove the left side panel and the bezel.

1. Remove the two screws that secure the L1 display bracket to the enclosure. Then remove the outer cover from the L1 display.

2. Lift the L1 display bracket upward until the hooks on the bracket clear the holes in the enclosure (see Figure 3-37).

3. Carefully remove the two screws that mount the L1 display board to the bracket. Then, grasping the display board by the edges, separate the display board from the bracket (see Figure 3-37).

4. Gently disconnect the L1 display cable from the display board. Place the L1 display board in a secure location (see Figure 3-37).

5. Disconnect the L1 display cable from the interface board. Then gently pry the grommet out of the hole in front of the enclosure and remove it from the cable.

6. Carefully push the L1 display cable into the hole in the front of the enclosure. Then remove the cable from inside the enclosure (see Figure 3-37).
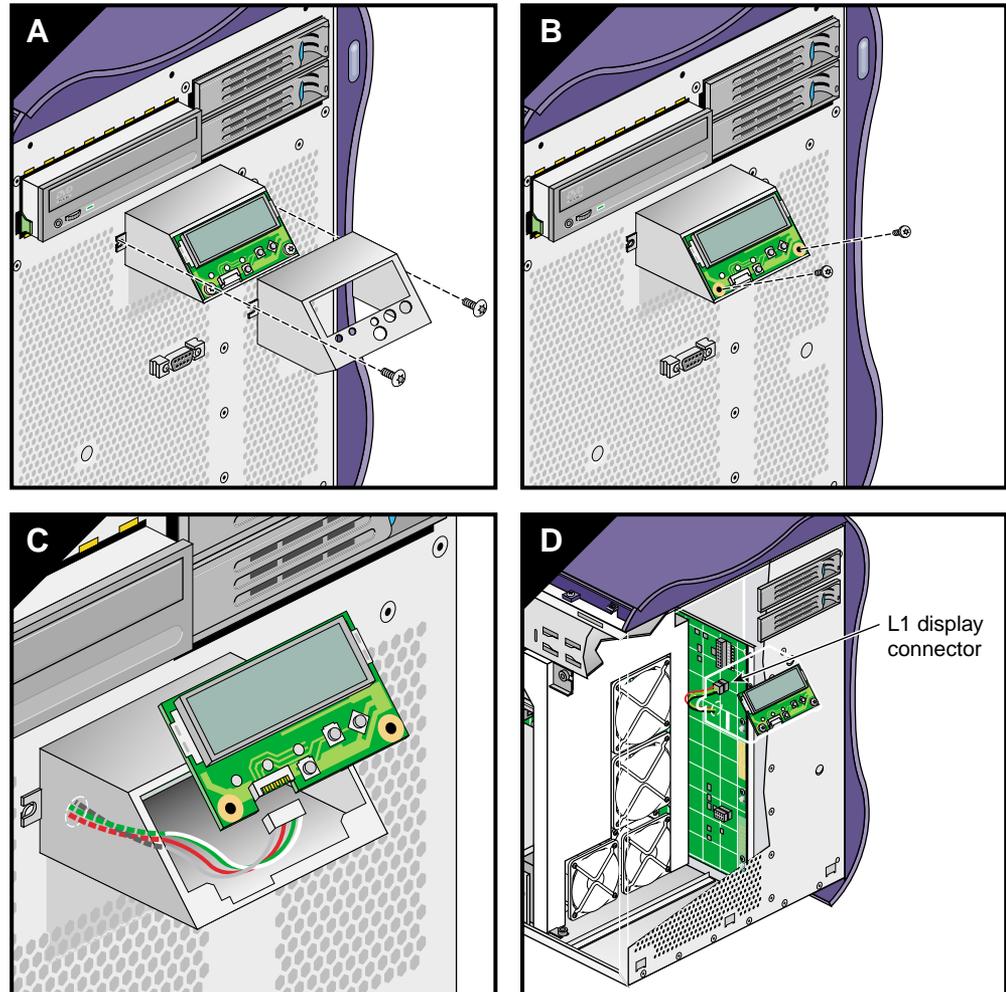
Figure 3-37   Removing the L1 Display Cable

7. If the replacement L1 display cable does not already have a grommet installed on it, install the grommet now.

8. Push the L1 display board connector of the replacement L1 display cable out through the hole in the front of the enclosure. Then seat the grommet in the hole (see Figure 3-38).

9. Connect the replacement L1 display cable to the interface board and the L1 display board (see Figure 3-38).

10. Install the two screws that secure the L1 display board to its bracket (see Figure 3-38).

11. Align the hooks on the bracket with the holes in the enclosure. Insert the hooks into the holes, and press down to seat the housing on the front of the enclosure (see Figure 3-38).

12. Slide the outer cover over the L1 display bracket. Then install the two screws that secure the L1 display bracket to the front of the enclosure (see Figure 3-38).
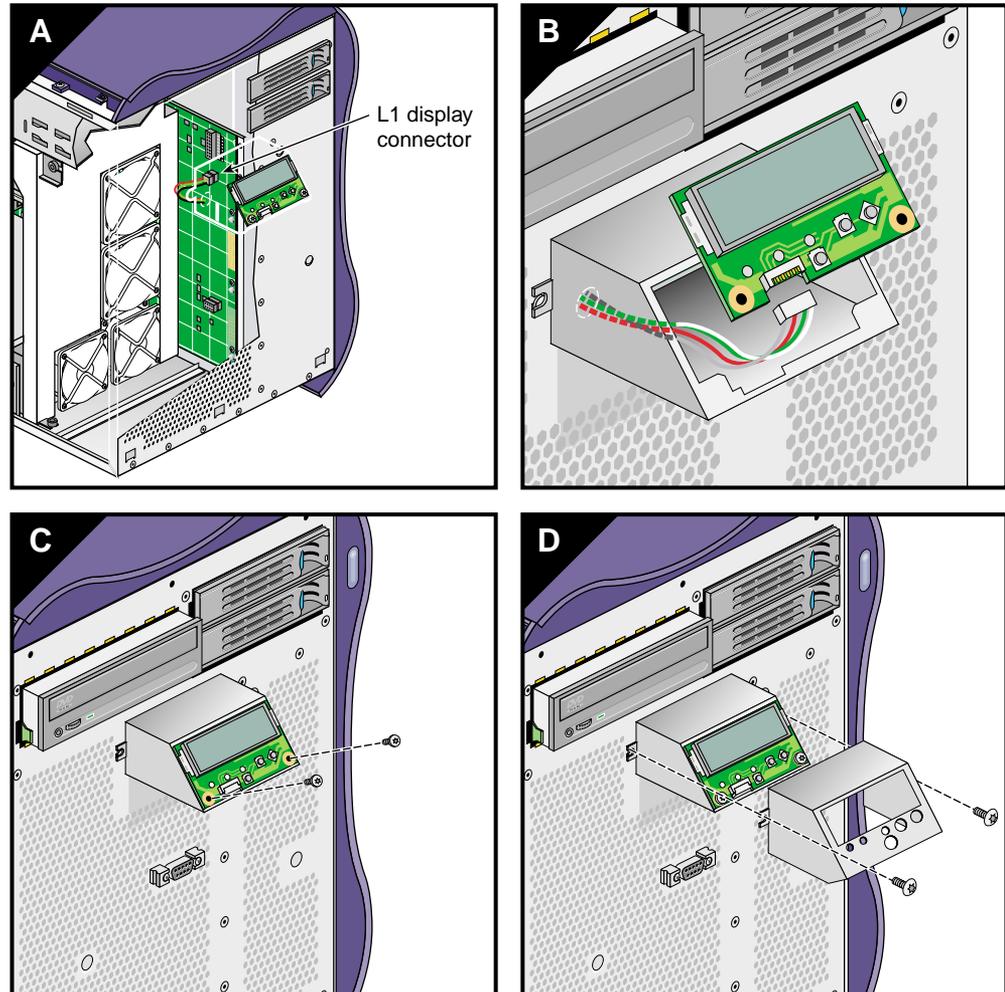
Figure 3-38   Installing the L1 Display Cable

This completes the replacement of the L1 display cable. To return the workstation to service, see to "Returning the Workstation to Service" on page 57.

Replacing the LED Cable

Follow these steps to replace the LED cable (see Figure 3-39).

Note: If you have not already done so, prepare your system for service. Refer to "Preparing the Workstation for Service" on page 49. In order to replace the LED cable, you must remove the left side panel and the bezel.

1. Disconnect the LED cable from the interface board.

2. Use a small phillips-blade screwdriver to remove the two screws and latch-blocks that secure the LED cable pass-through connector to the front of the enclosure. Place the screws and latch-blocks in a secure location. Then remove the LED cable from the enclosure.

3. Insert the new LED cable into the enclosure. Secure the pass-through connector to the front of the enclosure using the screws and latch-blocks you removed in step 2.
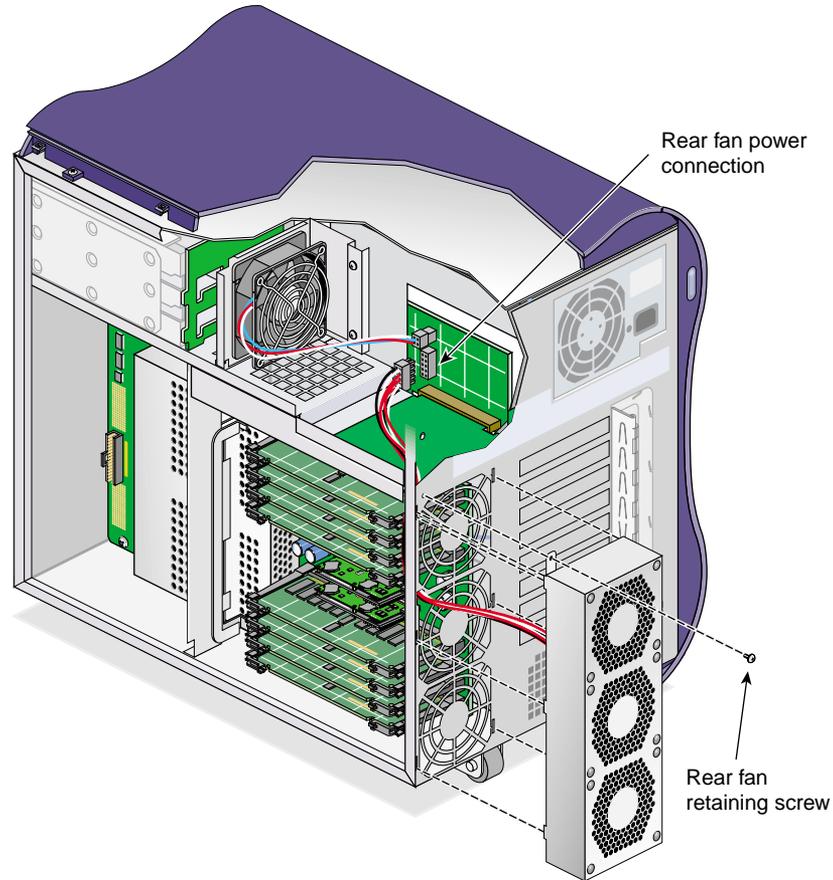
4. Connect the other end of the LED cable to the interface board.
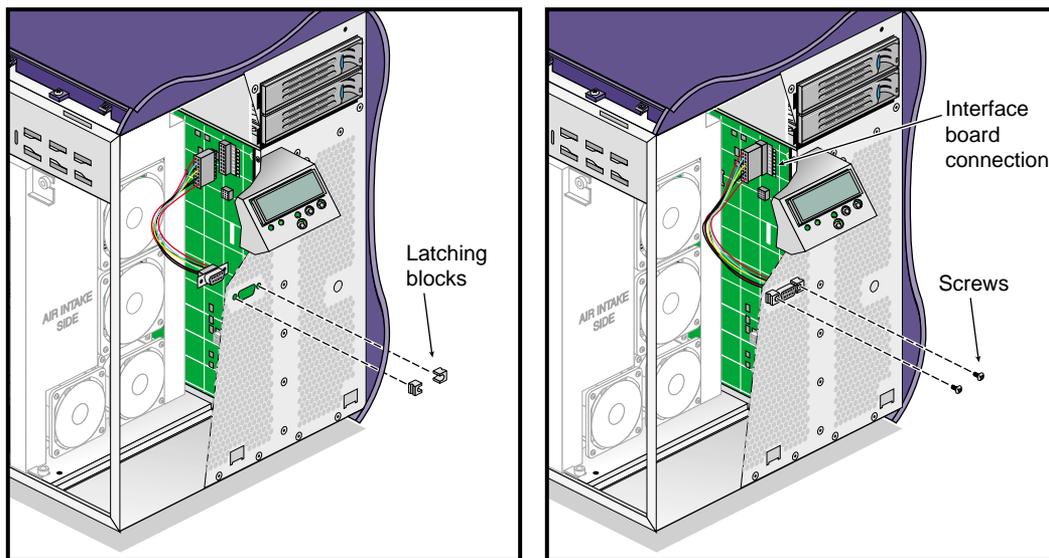
Figure 3-39 Replacing the LED Cable

This completes the replacement of the LED cable. To return the workstation to service, see "Returning the Workstation to Service" on page 57.

Replacing the DVD-ROM Drive Cable

Follow the steps in this section to replace the DVD-ROM drive cable (see Figure 3-40).

Note: If you have not already done so, prepare your system for service. Refer to "Preparing the Workstation for Service" on page 49. In order to replace the DVD-ROM drive cable, you must remove the left side panel.

1. Open the latches on the DVD-ROM drive cable connector on the IO9 board. Then gently disconnect the DVD-ROM drive cable from the IO9 board.

2. Disconnect the other end of the DVD-ROM drive cable from the rear of the DVD-ROM drive and remove the cable from the enclosure.

3. Connect the replacement DVD-ROM drive cable to the rear of the DVD-ROM drive. Note that the cable is keyed: ensure that you are aligning the cable in the connector correctly.

4. Connect the replacement DVD-ROM drive cable to the IO9 board. Note that the cable is keyed: ensure that you are aligning the cable in the connector correctly.

5. Close the latches on the DVD-ROM drive cable connector. Then gently press the IO9 board into the interface board to ensure that it is firmly seated in its connectors.
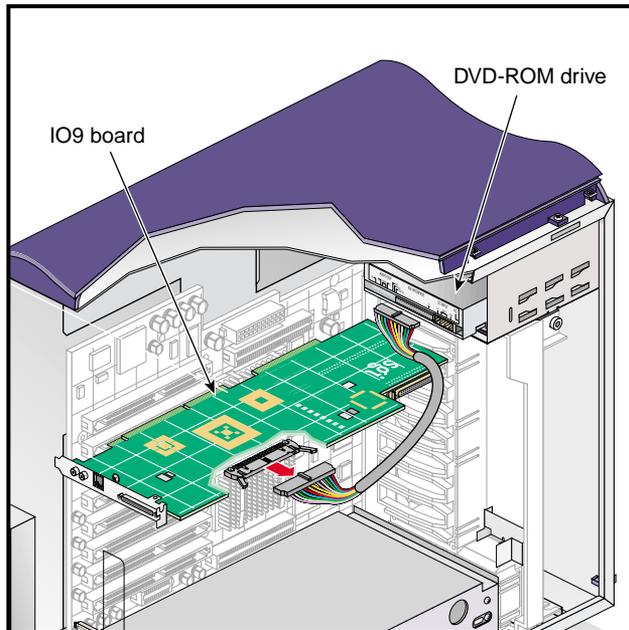
Figure 3-40   Replacing the DVD-ROM Drive Cable

This completes the replacement of the DVD-ROM drive cable. To return the workstation to service, see "Returning the Workstation to Service" on page 57.

Replacing Enclosure Components

This section provides instructions for the following procedures:

- "Replacing the Enclosure Plastics" on page 106
- "Replacing the L1 Display" on page 108

Replacing the Enclosure Plastics

This section contains the following procedures:

- "Replacing the Bezel Assembly" on page 107

- "Replacing the Side Plastics" on page 107
- "Replacing the Top Plastics" on page 107

Replacing the Bezel Assembly

See "Removing the Enclosure Bezel" on page 54 and "Installing the Bezel" on page 58 for instructions on replacing the bezel assembly.

Replacing the Side Plastics

See "Removing the Left or Right Side Panel" on page 52 and "Installing the Side Panels" on page 60 for instructions on replacing the side panels.

Replacing the Top Plastics

Follow these instructions to replace the top plastic of the enclosure.

Note: If you have not already done so, prepare your system for service. Refer to "Preparing the Workstation for Service" on page 49. In order to replace the top plastic, you must remove the right and left side panels and the bezel.

1. Remove the six screws that secure the top plastic to the enclosure. Then lift the top plastic off of the enclosure.
2. Align the holes in the replacement top plastic with the holes in the enclosure.
3. Install the six screws that secure the top plastic to the enclosure.
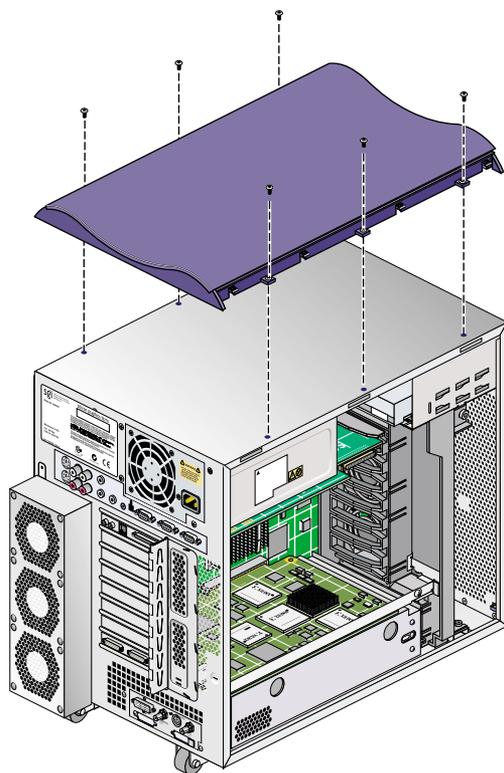
Figure 3-41   Replacing the Top Plastic

This completes the replacement of the top plastic. To return the workstation to service, see to "Returning the Workstation to Service" on page 57.

Replacing the L1 Display

Follow the steps in this section to replace the L1 display.

Note: If you have not already done so, prepare your system for service. Refer to "Preparing the Workstation for Service" on page 49. In order to replace the L1 display, you must remove the bezel.

1. Remove the two screws that secure the L1 display bracket to the enclosure. Then slide the outside cover off of the L1 display (see Figure 3-42).

2. Lift the L1 display housing upward until the hooks on the housing clear the holes in the enclosure (see Figure 3-42).

3. Carefully remove the two screws that mount the L1 display board to its housing. Then, grasping the display board by the edges, separate the display board from the housing (see Figure 3-42).

4. Gently disconnect the L1 display cable from the L1 display board. Place the L1 display board in a secure location (see Figure 3-42).
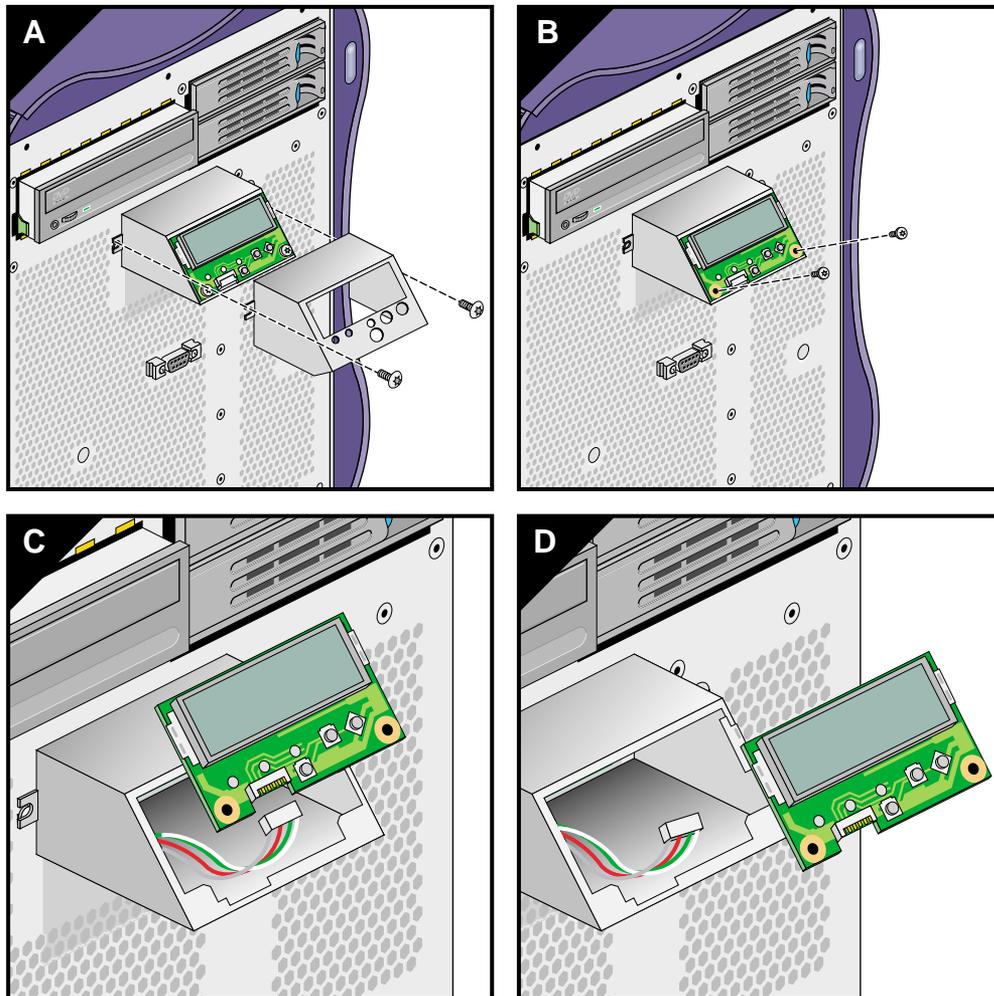
Figure 3-42   Removing the L1 Display Board

5.   Connect the L1 display cable to the replacement L1 display board (see Figure 3-43).

6.   Install the two screws that secure the L1 display board to its bracket (see Figure 3-43).

7.   Align the hooks on the bracket with the holes in the enclosure. Insert the hooks into the holes, and then press down to seat the bracket on the front of the enclosure (see Figure 3-43).

8.   Slide the outside cover over the L1 display. Then install the two screws that secure the L1 display to the front of the enclosure (see Figure 3-43).
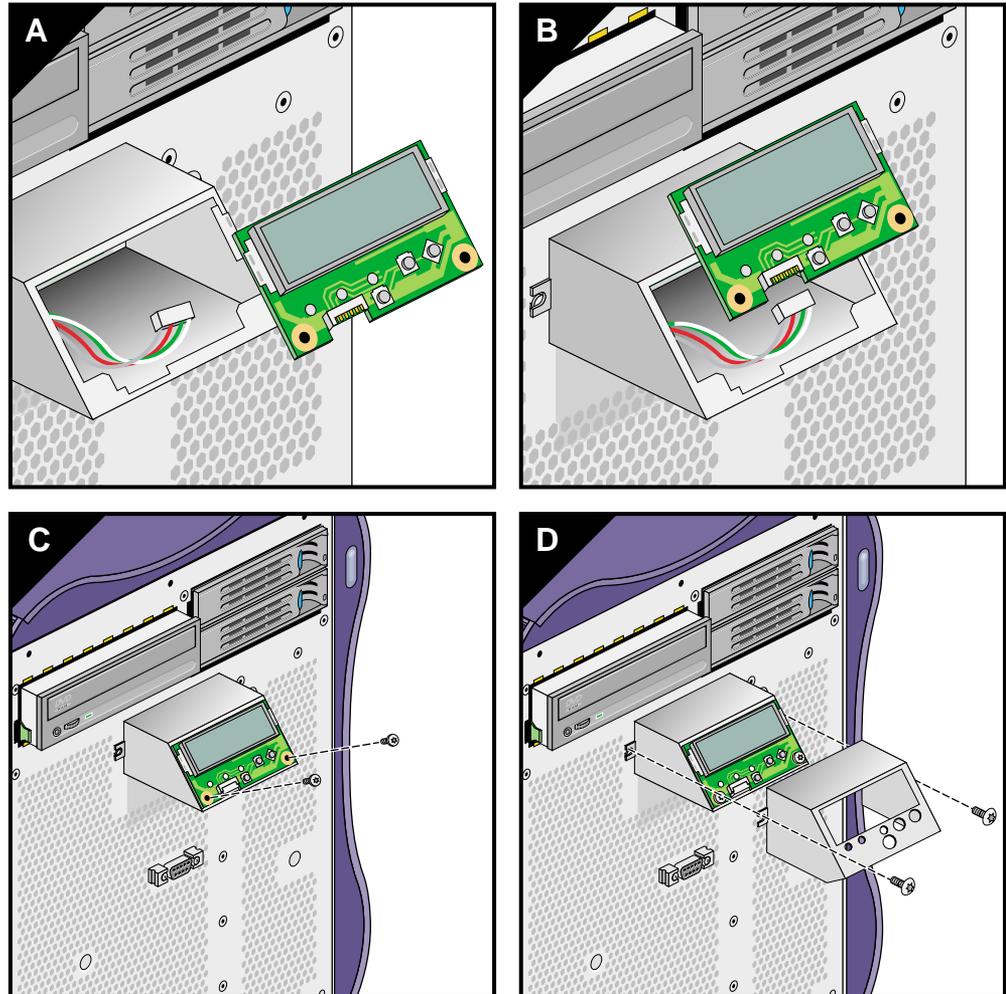
Figure 3-43   Installing the L1 Display Board

This completes the replacement of the L1 display board. To return the workstation to service, see "Returning the Workstation to Service" on page 57.

Troubleshooting and Diagnostics

If you are experiencing problems with your Silicon Graphics® Tezro™ visual workstation, please review the material in this chapter. If you are unable to resolve the problem, contact your service provider as follows:

- If you are located in North America, contact the Customer Support Center at 1-800-800-4SGI. SGI personnel will guide you through the troubleshooting process.

- If you are located outside of North America, contact your local SGI subsidiary or authorized distributor.

This chapter includes the following sections:

Troubleshooting

This section covers the following topics:

- "Environmental Fault Monitoring" on page 114
- "Bezel LEDs" on page 114

Environmental Fault Monitoring

The workstation monitors its environment to ensure proper operation. It will automatically power off if any of the following faults are found:

- Any fan spins at less than 80% of nominal speed.
- Any temperature sensor registers 158 °F (70 °C) or above.
- Any voltage reaches +/- 20% of nominal.

If your workstation is powering off unexpectedly, check for these conditions.

Bezel LEDs

The LEDs in the workstation bezel can provide important troubleshooting information. Table 4-1 shows a list of LED signals and what they mean.

Table 4-1   Bezel LED Signals

LED Signal	Explanation
Blinking White	Power button pressed (On or Off)
Solid white	Successful PROM boot/ OS running
Solid yellow	L1 has detected a problem. Check the L1 display for more information
Blinking red	General system failure Check the L1 display for more information
Solid red	System node board failure (failed to read PROM at power on)

Diagnostics

The Silicon Graphics Tezro visual workstation is equipped with diagnostics to test the system hardware and diagnose part failures. These diagnostics are grouped into three categories:

- **Power-on diagnostics (POD)**
  Power-on diagnostics are PROM-resident tests that run automatically when you power on the system. As the boot process discovers hardware components, it runs power-on diagnostics to verify that each component that is needed to boot the system is working correctly. Refer to "Power-on Diagnostics" on page 115 for more information about POD.

- **Offline diagnostics**
  Offline diagnostics use a standalone diagnostic environment to test the system hardware; the operating system cannot be running while you use offline diagnostics. Refer to "Offline Diagnostics" on page 117 for more information.

- **Online diagnostics**
  Online diagnostics are tests that verify system hardware while the operating system is running. To prevent data loss, you should use the online diagnostics only when the system is idle. Refer to "Online Diagnostics" on page 120 for more information.

All diagnostics are loaded on your workstation when you receive it. To upgrade to future revisions of the diagnostics, download the appropriate *Customer Diagnostics* package from Supportfolio (http://support.sgi.com). Contact your service representative for more information.

Note: The diagnostics described in this document run only on Silicon Graphics Tezro visual workstations. They will not work on any other SGI systems.

Power-on Diagnostics

The power-on diagnostics run automatically when you power on or reset the system. As the boot process discovers hardware, it verifies that each component is functional enough to load the operating system.

The power-on diagnostics test the hardware in the following order:

- CPU
- Bedrock ASIC
- PROM
- Memory DIMMs
- Secondary cache
- PIC ASICs
- PCI slots
- Serial ports
- SCSI controller
- VPro graphics

If the power-on diagnostics complete successfully, the **System Maintenance** menu appears or the system automatically boots, depending on how the system is configured.

If the power-on diagnostics detect errors, the diagnostics disable the failing hardware and continue testing. When testing completes, the system may or may not be able to boot, depending on the hardware that has been disabled. If the system does not boot, contact your service representative.

Offline Diagnostics

Offline diagnostics run a sequence of tests on the system hardware under a standalone diagnostic environment; the operating system cannot be running while the offline diagnostics test the system

The offline diagnostics include a "launcher" that automatically runs a sequence of tests. In most cases, you should run the offline diagnostics automatically with the launcher. Use the following procedure to run the launcher:

1. Power on the system.

2. Wait until the **System Maintenance** menu appears.

   Note: If the *Autoload* PROM variable is set to `Yes`, you must click on the **Stop for Maintenance** button to access the **System Maintenance** menu.

   ---

3. Select the **Run Diagnostics** option.

   Note: You can also start the launcher by entering the following command at the command monitor (PROM) prompt (>>):
   ```
   boot -f dksc (0,1,0) /stand/smdk/smdk --a
   ```

The launcher automatically runs the offline diagnostics on system components in the following order:

- CPU

  Note: The CPU test supports single-CPU systems; if a system has more than one CPU, the CPU test does not run.

- Secondary cache
- Memory DIMMs
- I/O components: IO9 card and audio and I/O daughtercard (including the SCSI controller, serial ports, Ethernet port, mouse port, keyboard port, and RTO/RTI connectors)

> **Note:** The offline diagnostics test the simpler components first and then proceed to the more complex components.

Table 4-2 shows the approximate time required (in minutes and seconds format) to automatically run the offline diagnostics on various workstation configurations. (Your testing time will vary, depending on your hardware configuration.)

Table 4-2   Time Required to Run Offline Diagnostics

Testing Progress	Total Elapsed Time		
	1-CPU Workstation with 512MB memory	2-CPU Workstation with 1GB memory	4-CPU Workstation with 1GB memory
CPU testing completes	0:26	N/A[a]	N/A[a]
Secondary cache testing completes	1:18	0:25	1:54
Memory DIMM testing completes	4:47	4:32	5:07
I/O testing completes	6:15	5:34	6:09

a. CPU testing is not performed on systems that have more than one CPU.

The offline diagnostics display test status information as they run. If the diagnostics complete testing without detecting errors, the output is similar to the following example:

```
Starting diagnostic program...

                        Press <Esc> to return to the menu.

SMDK SGI Version 6.152 TEST built 08:41:26 AM Mar  6, 2003
smdk loading io discovery code...
smdk loading launcher code...
smdk>
sMDK Diagnostic Launcher: Version 2.0
Built 00:42:56 Mar  6 2003
Setting up diagnostics.....
term none
Starting diagnostics.....



Testing  CACHE.........   PASSED
Testing  DIMM...............................................   PASSED
Testing  IO.................. PASSED
FINISHED
Reseting...
resetting the system...
```

If the launcher detects an error, it displays a FAILED status message for the hardware it is testing and stops testing. If any of the components do not pass the offline diagnostics, contact your service representative.

Online Diagnostics

> **Caution:** The `runalldiags` script should be run while the system is idle. If you run the online diagnostics while the system is in use, data may be lost.

Online diagnostics are tests that verify system hardware while the operating system is running. When you run the online diagnostics from the IRIX operating system prompt, each diagnostic runs a set of tests for a certain number of loops. The online diagnostics test the following areas of the system:

- CPU
- Memory
- I/O
- Graphics
- Storage devices
- Network devices

The online diagnostics also run a system stress test, which tests all areas of the system under heavy load.

The `runalldiags` script automatically runs a sequence of online diagnostics. It runs in three modes:

- Basic mode verifies memory and performs 30 minutes of stress testing. (If you want to perform regularly scheduled testing, use basic mode.)

- Normal mode performs the same tests as basic mode and also performs I/O testing. (The I/O testing may disrupt any serial port and USB devices.)

- Extensive mode performs more disruptive I/O testing. (Ethernet is unavailable, and USB operations are disrupted.) It also performs more intensive CPU, memory, and stress testing. Use this mode only if you suspect there is a problem with the system.

Follow these steps to run the `runalldiags` script:

Note: You must have root level access to the system to run online diagnostics.

---

1. Enter the following command at the IRIX command prompt to change to the directory that contains the diagnostics:
   #>cd /usr/diags/bin

2. Enter the following command to start the script:
   #>./runalldiags [*options*]

Note: When you run `runalldiags` in `-normal` or `-extensive` modes, you should run it from the console. The Ethernet testing that `runalldiags` performs in `-normal` and `-extensive` modes disrupts any `telnet` sessions on the system.

Refer to Table 4-3 for descriptions of the command-line options.

Table 4-3   `runalldiags` Command-line Options

Option	Description
-h	-help	Displays help information
-basic	Runs the script in basic mode
-normal	Runs the script in normal mode (default)
-extensive	Runs the script in extensive mode
-host *<host>*	Specifies a system to target for network tests
-d *<directory>*	Specifies the directory that contains the online diagnostics

If a diagnostic fails, the script saves the output from the diagnostic in a file in the `/tmp` directory (for example, `/tmp/diagTestOutput.1.olenet`). Output from the script indicates the actual name of the file. When a diagnostic fails, the script continues to run the remaining diagnostics.

Note: If you have USB devices connected to your workstation, you must disconnect the USB cables from the rear of the enclosure after the online diagnostics have finished running. Then reconnect the cables to restore the USB devices.

Online diagnostics display PASS [*testname*] when a test passes and FAIL [*testname*] when a test fails. If any of the components do not pass the online diagnostics, contact your service representative.

Example 1

The following example shows output from running runalldiags in basic mode with no errors:

```
olab1 12# ./runalldiags -basic

Running online diagnostics at Basic level
Time: Tue Jun 24 16:25:36 CDT 2003
System Information: IRIX64 olab1 6.5 6.5.20m 04091957 IP35
Plan on running: olmem pandora

olmem - Online Memory Diagnostic     (Check /var/adm/SYSLOG for error
message)
PASS(olmem)
pandora - System Stress Test
PASS(pandora)

Finished running at Tue Jun 24 17:00:05 CDT 2003
Ran: 2  Failed: 0
```

Example 2

The following example shows output from running `runalldiags` in basic mode with one error:

```
olab1 3# ./runalldiags -basic

Running online diagnostics at Basic level
Time: Tue Jun 24 10:55:36 CDT 2003
System Information: IRIX64 olab1 6.5 6.5.20m 04091957 IP35
Plan on running: olmem pandora

olmem - Online Memory Diagnostic    (Check /var/adm/SYSLOG for error
message)
PASS(olmem)
pandora - System Stress Test
FAIL(pandora): see /tmp/diagFailure.0.pandora

Time: Tue Jun 24 11:35:38 CDT 2003
Ran: 1 Failed: 1
```

Technical Specifications and Pinouts

This chapter contains technical information about the Silicon Graphics® Tezro™ visual workstation. The following topics are covered:

- "Physical and Environmental Specifications" on page 126
- "Power Supply Specifications" on page 128
- "I/O Port Specifications" on page 128
- "Serial Cables and Adapter Specifications" on page 132
- "VPro Graphics Board I/O Port Specifications" on page 137

Physical and Environmental Specifications

Table A-1 shows the physical and environmental specifications for the workstation.

Table A-1   Physical Environment Specifications

Feature	Specification
Workstation dimensions	17 in. (44 cm) tall 13.75 in. (35 cm) wide 20.75 in. (53 cm) deep **Note:** The rear fan assembly extends an additional 1.25 inches (3 cm) from the rear of the enclosure. You must leave adequate clearance for airflow at the rear of the enclosure.
Weight	60.6 lb. (27.5 kg)
Power requirements	50-60 Hz and 100-120/200-240 VAC
Voltage and frequency	100-240 VAC, 50-60 Hz, 7.0-3.0 A, 430 W
Temperature Tolerance (operating)	+5 °C (41 °F) to +35 °C (95 °F) 5000 ft ASL or less +5 °C (41 °F) to +30 °C (86 °F) 5000 ft ASL to 10,000 ft ASL
Temperature tolerance (non-operating)	-40 °C (-40 °F) to +85 °C (185 °F)
Relative humidity	10% to 80% operating (no condensation) 10% to 95% non-operating (no condensation)
Heat dissipation	815 Btu/h minimum 2053 Btu/h maximum
Maximum altitude	10,000 ft (3,049 m) operating 40,000 ft (12,195 m) non-operating
Vibration, sine sweep (operating)	5-500-5 Hz, 0.25 G input
Vibration, sine sweep (non-operating)	3-200-3 Hz, 0.5 G input

Table A-1   Physical Environment Specifications **(continued)**

Feature	Specification
Vibration, random (operating)	0.10 Grms for 15 minutes
Vibration, random (non-operating)	1.15 Grms for 15 minutes
Shock, half-sine wave (operating)	30 G, 3 msec (vertical); 15 G, 3 msec. (horizontal)
Shock, trapezoidal wave (non-operating)	35 G, 200 in./sec.
Sound power	5.2 bels per ISO 7779 at +5 °C to +25 °C up to 5000 feet altitude; higher temperatures or altitudes will increase sound
Sound pressure	39.4 dBA at operator position per ISO 7779

Power Supply Specifications

Table A-2 shows the power supply specifications for the workstation.

Table A-2   Power Supply Specifications

Feature	Specification
AC line voltage rating	90-264 VAC RMS nominal, 50-60 Hz
Output ratings	24 amps @ 3.3 V
	24 amps @ 5 V
	8 amps @ +12 V1
	12 amps @ +12 V2
	18 amps @ +12 V3
	0.5 amps @ -12 V
	2 amps @ +5 standby
Combined output Limit	Combined 3.3-V, 5-V, and 12-V output is limited to 500 watts.

I/O Port Specifications

This section contains specifications and port pinout information for the I/O ports of the workstation. The ports are discussed in the following sections:

- "Ethernet 10-Base-T/100-Base-T Port" on page 128

- "Keyboard and Mouse Ports" on page 130

- "Serial Ports" on page 131

- "Serial Cables and Adapter Specifications" on page 132

Ethernet 10-Base-T/100-Base-T Port

The workstation auto-selects the Ethernet port speed and type (duplex versus half-duplex) when the workstation is booted, based on what it is connected to. Figure A-1 shows the Ethernet port.
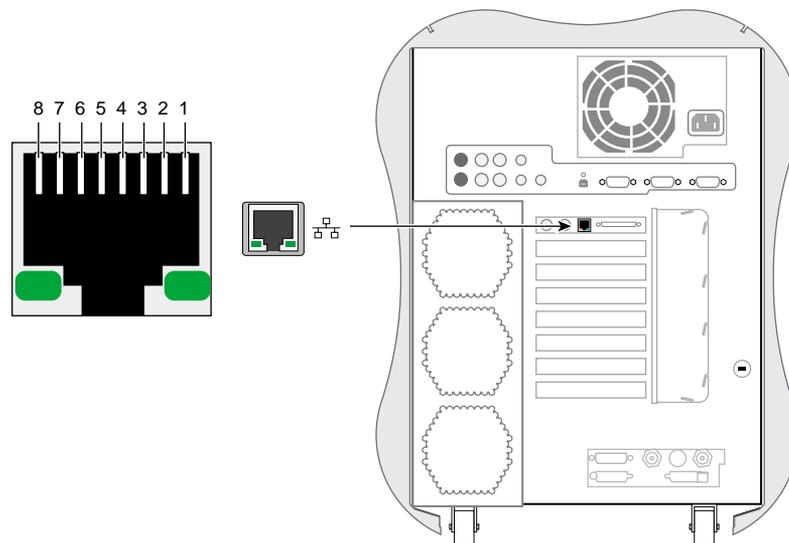
Figure A-1   Ethernet 10-Base-T/100-Base-T Port Pinout and Location

Table A-3 shows the cable pinout assignments for the Ethernet port.

Table A-3   Ethernet 10-Base-T/100-Base-T Port Pinout

Pin	Assignment
1	Transmit+
2	Transmit–
3	Receive+
4	(Reserved)
5	(Reserved)
6	Receive–
7	(Reserved)
8	(Reserved)

Keyboard and Mouse Ports

The workstation uses keyboards and mouse devices that are PS/2-compatible. The combined current draw of the keyboard and mouse is limited to 0.5 amps at +5V. Figure A-2 shows the keyboard and mouse ports.
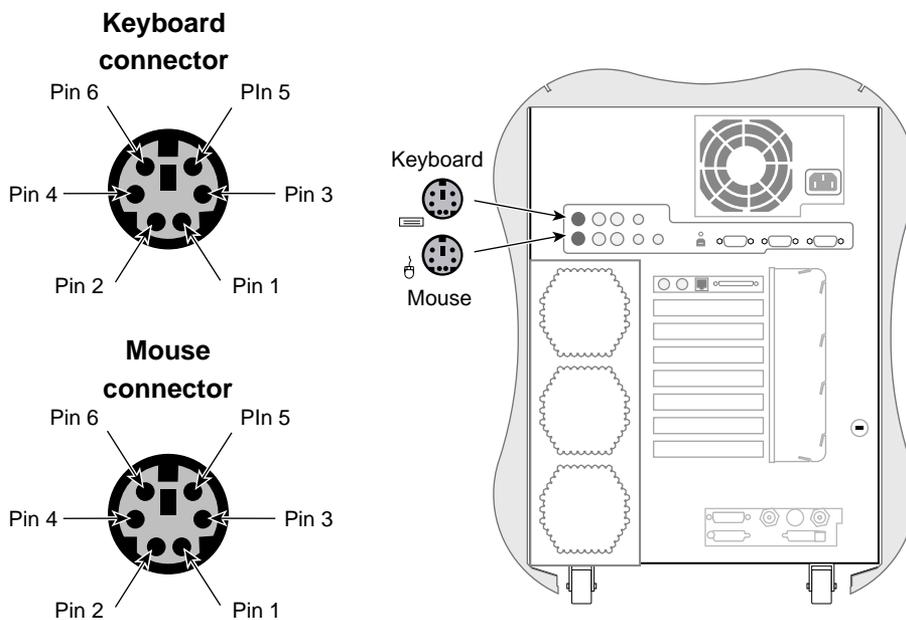
Figure A-2   Keyboard and Mouse Port Pinouts and Locations

Table A-4 shows the pinout assignments for the keyboard and mouse ports.

Table A-4   Keyboard and Mouse Port Pinout

Pin	Assignment
1	Keyboard/mouse data
2	(Reserved)
3	Ground
4	Keyboard/mouse power (+5V)

Table A-4   Keyboard and Mouse Port Pinout **(continued)**

Pin	Assignment
5	Keyboard/mouse clock
6	(Reserved)

Serial Ports

The workstation features two 9-pin serial ports. These ports are capable of transferring data at rates as high as 230 KB/s. Other features of the ports include:

- Programmable data, parity, and stop bits

- Programmable baud rate and modem control

Figure A-3 shows a serial port.
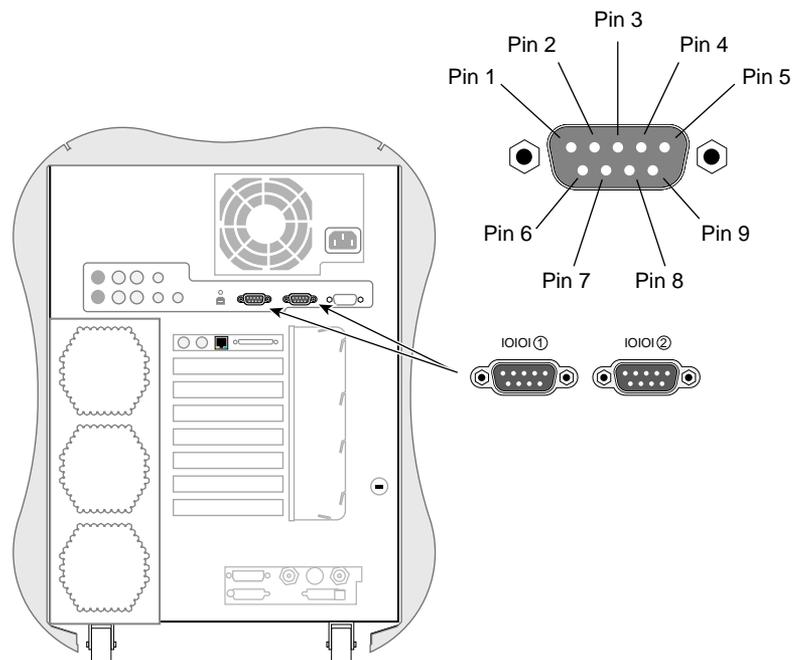
Figure A-3   Serial Port Pinouts and Locations

Table A-5 shows pinout assignments for the 9-pin male DB-9 connector.

Table A-5   Serial Port Pinout

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

Serial Cables and Adapter Specifications

This section contains cable pinout information for serial cables that you can connect to your workstation. It also describes SGI serial port converters. The following topics are covered:

Printer/Dumb Terminal Serial Cable

For serial printers and dumb terminals, use a 3-wire standard PC cable. Table A-6 shows the cable connector pinout assignments for this cable.

Note: For a 3-wire cable and no hardware flow control modem, you must use the /dev/ttyd* command devices in the configuration files. For more detailed information, see the serial man page. To access the man page, select **Help > Man pages** from the Toolchest or place the cursor in the console window and type **man serial**.

Table A-6   Printer/Dumb Terminal Cable Pinout

Signal Description	Pin Number DB-9 Connector (Female)	Pin Number DB-25 Connector (Male)
	1	NOT CONNECTED
RXD	2	2
TXD	3	3
	4	NOT CONNECTED
GND	5	7
	6	NOT CONNECTED
	7	NOT CONNECTED
	8	NOT CONNECTED
	9	NOT CONNECTED

PC Modem Serial Cable

Use a full-handshake (includes RTS and CTS) PC modem serial cable for a modem with RTS/CTS flow control. Table A-7 shows the cable connector pin assignments for this cable.

You can use this cable for all serial devices except those that do not need RTS flow control. If you add a null modem adapter to one end of the cable, you can still use it with devices like serial printers and dumb terminals that do not need RTS flow control. You can purchase the full-handshake PC modem serial cable from SGI or your local service provider.

Note: If you are attaching a modem with modem signals and RTS/CTS flow control, you must use the `/dev/ttyf*` command devices in the configuration files. For more detailed information, see the `serial` man page. To access this man page, select **Help > Man pages** from the Toolchest or place the cursor in the console window and type **man serial**.

Table A-7   PC Modem Cable Pinout

Signal Description	Pin Number DB-9 Connector (Female)	Pin Number DB-25 Connector (Male)
DCD	1	8
RXD	2	3
TXD	3	2
DTR	4	20
GND	5	7
DSR	6	6
RTS	7	4
CTS	8	5
RI	9	22

Serial Port Adapter Cables

The workstation's serial ports conform to the PC standard pinout for EIA standard RS-232 signals.

The purpose of the adapter cable is to allow the workstation to use standard PC serial devices. Table A-8 shows the adapter cable pinout for a standard PC or Macintosh serial port.

Table A-8   Female DB-9 to Female MiniDIN8 Adapter Cable Pinout

From: Female DB	To: MiniDIN8	PC Signal	Macintosh Signal
1	7	DCD	GPi
2	5	RD	RxD-
3	3	TD	TxD-
4	1	DTR	TxD+
5	4	SG	SG
6	8	DSR	RxD+
7	6	RTS	HSKo
8	2	CTS	HSKi
9	Unused	RI	Unused

The purpose of the following adapter cable is to support ANSI/SMPTE Standard 107M-1992.

Table A-9 shows the pinout for a female DB-9 to female DB-9 adapter cable.

Table A-9   Female DB-9 to Female DB-9 Adapter Cable Pinout

Female DB-9 Connected to Workstation	Female DB-9 Connected to Peripheral
1	Unused
2	To DB9 -2 (RxD-)
3	To DB9-8 (TxD-)
4	Unused
5	To DB9-6 and DB9-4 (GND)
6	To DB9-7 (RxD+)
7	To DB9-3 (TxD+)
8	Unused
9	Unused

Note: For more detailed information, see the `serial` man page. To access it, open an IRIX shell and enter **man serial**

You can also access man pages by selecting **Help > InfoSearch** and entering **man serial.**

VPro Graphics Board I/O Port Specifications

This section provides specifications for the following ports:

- "DVI-I Video Port" on page 137
- "Stereo View Port" on page 140
- "Genlock Port" on page 141
- "Swap Ready Port" on page 142

DVI-I Video Port

Figure A-4 shows the DVI-I video port.

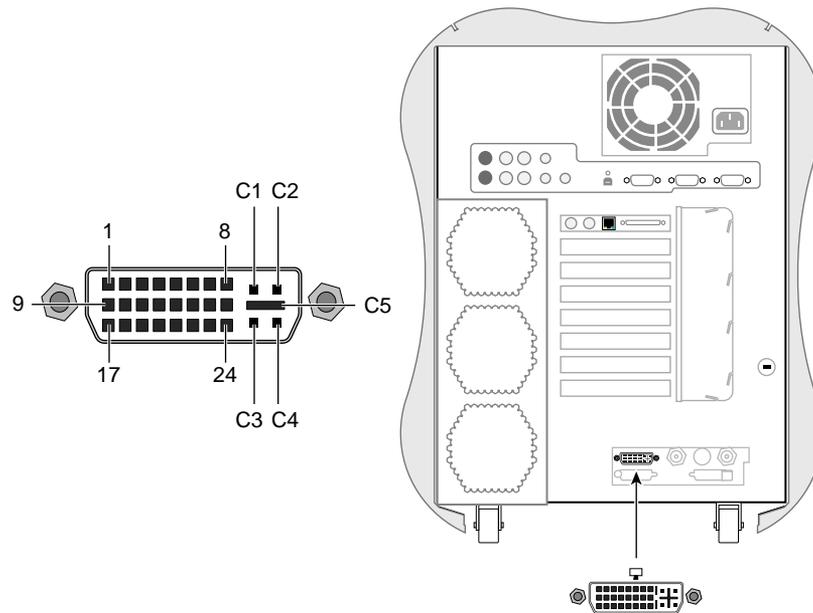**Figure A-4**   DVI-I Port Pinout and Location

Table A-10 shows the port pinout assignments for DVI-I port(s).

Table A-10   DVI-I Video Port Pinout

Pin	Assignment	Pin	Assignment
1	DATA 2-	16	HOT_POWER
2	DATA2+	17	DATA 0-
3	SHIELD 2/4	18	DATA 0+
4	DATA 4-	19	SHIELD 0/5
5	DATA 4+	20	DATA 5-
6	DDC_CLOCK	21	DATA 5+
7	DDC_DATA	22	SHIELD CLOCK
8	VSYNC	23	CLOCK -
9	DATA 1-	24	CLOCK +
10	DATA1+	C1	A_RED
11	SHIELD 1/3	C2	A_GREEN
12	DATA 3-	C3	A_BLUE
13	DATA 3+	C4	HYNSC
14	DDC_POWER	C5	A_GROUND2
15	A_GROUND1	C6	A_GROUND3

Table A-11 lists the scan rates supported by the VPro graphics board.

Table A-11   Supported VPro Graphics Board Scan Rates

Resolution	Refresh Rate
1024x768	60 Hz,75 Hz, and 96 Hz-Stereo
1280x1024	59, 60, 72, 75, 85 Hz, and 96 Hz-Stereo
1280x1024	100 Hz Stereo (also through DCD2)
1280x720	60 and 72 Hz
1280x1024	30 Hz interlaced
1280x960	30 Hz interlaced
1600x1024	83 Hz
1600x1200	60, 72, and 75 Hz
1920x1035	30 Hz interlaced
1920x1080	30 Hz interlaced
1920x1200	60 Hz
1920x1200	25 and 30 Hz

Stereo View Port

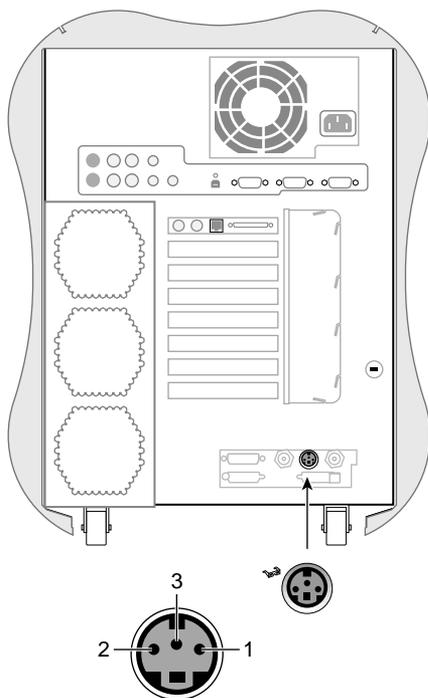The following diagram shows the Stereo View port.

Figure A-5   StereoView Port Pinout and Location

Table A-12 shows the cable pinout assignments for the Stereo View port on the VPro graphics board.

Table A-12   Stereo View Pinout Assignments

Pin	Assignment
1	+12 VDC output to Stereo View device
2	Ground
3	Stereo left/right Eye signal (1=left, 0=right) (STEREO_LEFT)

Genlock Port

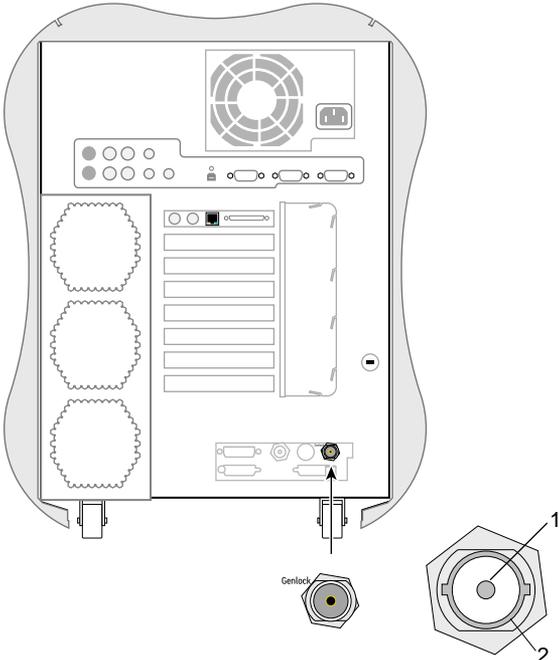The following diagram shows the Genlock port.

Figure A-6   Genlock Port Pinout and Location

Table A-13 shows the cable pinout assignments for the Genlock port on the VPro graphics board.

Table A-13   Genlock Pinout Assignments

Pin	Assignment
1	Genlock Input/output video or 3.3V TTL signal levels
2	Sigma - return ground

Swap Ready Port

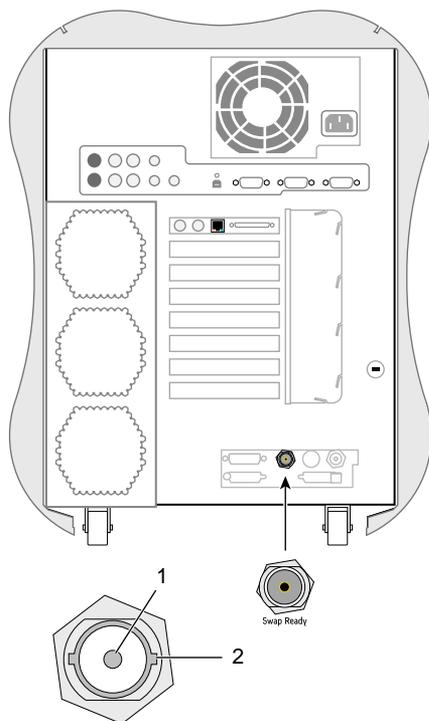The following diagram shows the Swap Ready port.

Figure A-7   Swap Ready Port Pinout and Location

Table A-14 shows the cable pinout assignments for the Swap Ready port on the VPro graphics board.

Table A-14   Swap Ready Pinout Assignments

Pin	Assignment
1	Swapbuffer gang sync open Collector I/O
2	Signal return ground

Regulatory Specifications

This appendix provides regulatory statements about your workstation as follows:

- "CMN Number" on page 143
- "CE Notice and Manufacturer's Declaration of Conformity" on page 144
- "Electromagnetic Emissions" on page 144
- "Shielded Cables" on page 146
- "Electrostatic Discharge" on page 147
- "Laser Compliance Statement" on page 147
- "Lithium Battery Compliance Statement" on page 147

The Silicon Graphics® Tezro™ visual workstation conforms to several national and international specifications and European Directives listed on the "Manufacturer's Declaration of Conformity." The CE mark insignia displayed on each device is an indication of conformity to the European requirements.

Caution: This product has several governmental and third-party approvals, licenses, and permits. Do not modify this product in any way that is not expressly approved by SGI. If you do, you may lose these approvals and your governmental agency authority to operate this device.

CMN Number

The model number, or CMN number, for the workstation is on the system label, which is mounted on the rear panel of the system enclosure.

CE Notice and Manufacturer's Declaration of Conformity

The "CE" symbol indicates compliance of the device to directives of the European Community. A "Declaration of Conformity" in accordance with the standards has been made and is available from SGI upon request.

Electromagnetic Emissions

This section provides the contents of electromagnetic emissions notices from various countries.

FCC Notice (USA Only)

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by using one or more of the following methods:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Caution: Changes or modifications to the equipment not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Industry Canada Notice (Canada Only)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique német pas de perturbations radioélectriques dépassant les normes applicables aux appareils numériques de Classe A préscrites dans le Règlement sur les interferences radioélectriques établi par le Ministère des Communications du Canada.

VCCI Notice (Japan Only)

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に
基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると
電波妨害を引き起こすことがあります。この場合には使用者が適切な
対策を講ずるよう要求されることがあります。

Figure B-1   VCCI Notice (Japan Only)

Chinese Class A Regulatory Notice

警告使用者 :

這是甲類的資訊產品 , 在居住的環境中使用時 , 可能會造成射頻
干擾 , 在這種情況下 , 使用者會被要求採取某些適當的對策 .

Figure B-2   Chinese Class A Regulatory Notice

Korean Class A Regulatory Notice

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자
또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는
구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Figure B-3   Korean Class A Regulatory Notice

Shielded Cables

The Silicon Graphics Tezro visual workstation is FCC-compliant under test conditions that include the use of shielded cables between the workstation and its peripherals. Your workstation and any peripherals you purchase from SGI have shielded cables. Shielded cables reduce the possibility of interference with radio, television, and other devices. If you use any cables that are not from SGI, ensure that they are shielded. Telephone cables do not need to be shielded.

Optional monitor cables supplied with your workstation use additional filtering molded into the cable jacket to reduce radio frequency interference. Always use the cable supplied with your system. If your monitor cable becomes damaged, obtain a replacement cable from SGI.

Electrostatic Discharge

SGI designs and tests its products to be immune to the effects of electrostatic discharge (ESD). ESD is a source of electromagnetic interference and can cause problems ranging from data errors and lockups to permanent component damage.

It is important that you keep all the covers and doors, including the plastics, in place while you are operating the workstation. The shielded cables that came with the workstation and its peripherals should be installed correctly, with all thumbscrews fastened securely.

An ESD wrist strap may be included with some products, such as memory or PCI upgrades. The wrist strap is used during the installation of these upgrades to prevent the flow of static electricity, and it should protect your system from ESD damage.

Laser Compliance Statement

The DVD-ROM drive in this computer is a Class 1 laser product. The DVD-ROM drive's classification label is located on the drive.

Lithium Battery Compliance Statement

Only qualified service personnel should replace the soldered lithium battery(s) in the workstation.

Warning: **Replace the battery with the same or equivalent type as recommended by the manufacturer, or the battery could explode. Discard used batteries according to the manufacturer's instructions.**

Warning: **Advarsel!: Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Léver det brugte batteri tilbage til leverandøren.**

Warning: **Advarsel: Eksplosjonsfare ved feilaktig skifte av batteri. Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten. Brukte batterier kasseres i henhold til fabrikantens instruksjoner.**

Warning: **Varning: Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.**

Warning: **Varoitus: Pәristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.**

Warning: **Varoitus: Pәristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.**

Warning: **Vorsicht!: Explosionsgefahr bei unsachgemäßen Austausch der Batterie. Ersatz nur durch denselben oder einen vom Hersteller empfohlenem ähnlichen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.**

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