

Silicon Graphics® Prism™ Deskside
Visualization System Hardware User's Guide

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For regulatory and compliance information, see Appendix B, "Regulatory Information."

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About This Guide

Welcome to the user's guide for the Silicon Graphics® Prism™ Deskside visualization system. Your new deskside system offers one or two graphics pipes and a high-bandwidth architecture in a convenient free-standing deskside tower chassis. The system is available in a variety of configurations and can be upgraded to meet your future needs.

This guide shows you how to set up, use, and troubleshoot your system. Go to the first chapter for quick start information, or use the table of contents to find the topic area you need. This guide is provided for all end-users, administrators and technical support staff. Many of the hardware tasks are relatively simple and require minimal computer knowledge. A few tasks are more difficult; they are easier to perform if you have some computer hardware experience.

This guide is written for owners, system administrators, and users of the Silicon Graphics Prism Deskside visualization system. It is written with the assumption that the reader has a good general knowledge of computer graphics and computer operations.

Important Information

Your SGI system support engineer (SSE) should perform the addition or replacement of parts, cabling, and service of your Silicon Graphics Prism Deskside system, with the exception of the following tasks that you may perform yourself:

- Installing and booting your system.
- Cabling the system to standard and optional peripherals.
- Using your system console to enter commands and perform system functions such as powering on and powering off.
- Using the On/Off, reset, and non-maskable interrupt (NMI) switches on the front panel of your system.
- Removing and replacing the base I/O PCI card.

- Installing and removing other PCI and PCI-X cards (including graphics cards).
- Installing and removing disk drives.
- Removing and replacing the DVD-ROM drive.
- Installing and removing memory modules (DIMMs).
- Removing and replacing the L1 controller display.
- Removing and replacing system cooling fans.



Warning: To ensure your safety and protect your system, do not add or replace any components that this guide does not designate as customer replaceable. Contact your SGI system support engineer (SSE) to install any hardware components that are not designated as customer replaceable in this guide.

Chapter Descriptions

The following topics are covered in this guide:

- Chapter 1, “Quick Start Installation and Operation Procedures,” provides instructions for unpacking and setting up your new system. It also explains how to power the system on, log in, access programs, and power off the system.
- 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 system. 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. The section on L1 error codes covers general errors you might encounter as well as serious problems that may occur when a system is unable to boot. It also includes instructions for running the system diagnostics, which can help you find problems. Information on reconfiguring the XF86Config file for specialized operation of the system is also found in this chapter.

- 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 system 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 additional information on working with your Silicon Graphics Prism Deskside visualization system, see the following SGI documentation:
- *SGI L1 and L2 Controller Software User’s Guide* (007-3938-00x) (available online). This guide describes the L1 and L2 controller functions, commands, and error messages that you may need to operate and maintain your system.
- *SGIconsole Hardware Connectivity Guide* (007-4340-00x) (optional). This guide describes how to connect an optional SGIconsole to SGI systems. You can use an optional SGIconsole to manage and monitor multiple Silicon Graphics systems.
- *Obtaining Maximum Performance on Silicon Graphics Prism Visualization Systems* (007-4751-xxx). This document, intended primarily for application developers, provides guidance on how to get the best performance from a Silicon Graphics Prism Visualization System.

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.
- SGI ProPack for Linux documentation, and all other documentation included in the RPMs on the distribution CDs can be found on the CD titled “SGI ProPack vX.X for Linux - Documentation CD.” To access the information on the documentation CD, open the `index.html` file with a web browser. Because this online file can be updated later in the release cycle than this document, you should check it for the latest information.
- The release notes, which contain the latest information about software and documentation in this release, are on the SGI ProPack for Linux Documentation CD in the root directory, in a file named `README.TXT`.

Note: There are no command line `grelnotes` or `relnotes` available on an SGI Linux system. The **InfoSearch** tool is not available with Linux.

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.
<i>variable</i>	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.

Product Support

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- If you are in North America, contact the Technical Assistance Center at +1 800 800 4SGI or contact your authorized service provider.
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Quick Start Installation and Operation Procedures

This chapter shows you how to quickly set up and begin using your Silicon Graphics Prism Deskside visualization system in the following sections:

- “Setting Up the System” on page 1
- “Using the System” on page 13

Setting Up the System

This section covers the following topics:

- “Checking Your Shipment” on page 2
- “Lifting the System” on page 4
- “Getting Acquainted” on page 5
- “Cabling the System” on page 9

Checking Your Shipment

Figure 1-1 shows the basic components that ship with your system. If parts of your shipment are damaged or missing, contact your support provider. Note that the figure shows only the basic single-pipe deskside system components. Systems with two graphics pipes would have the additional components (monitor, cables, etc.) needed to support a second display.

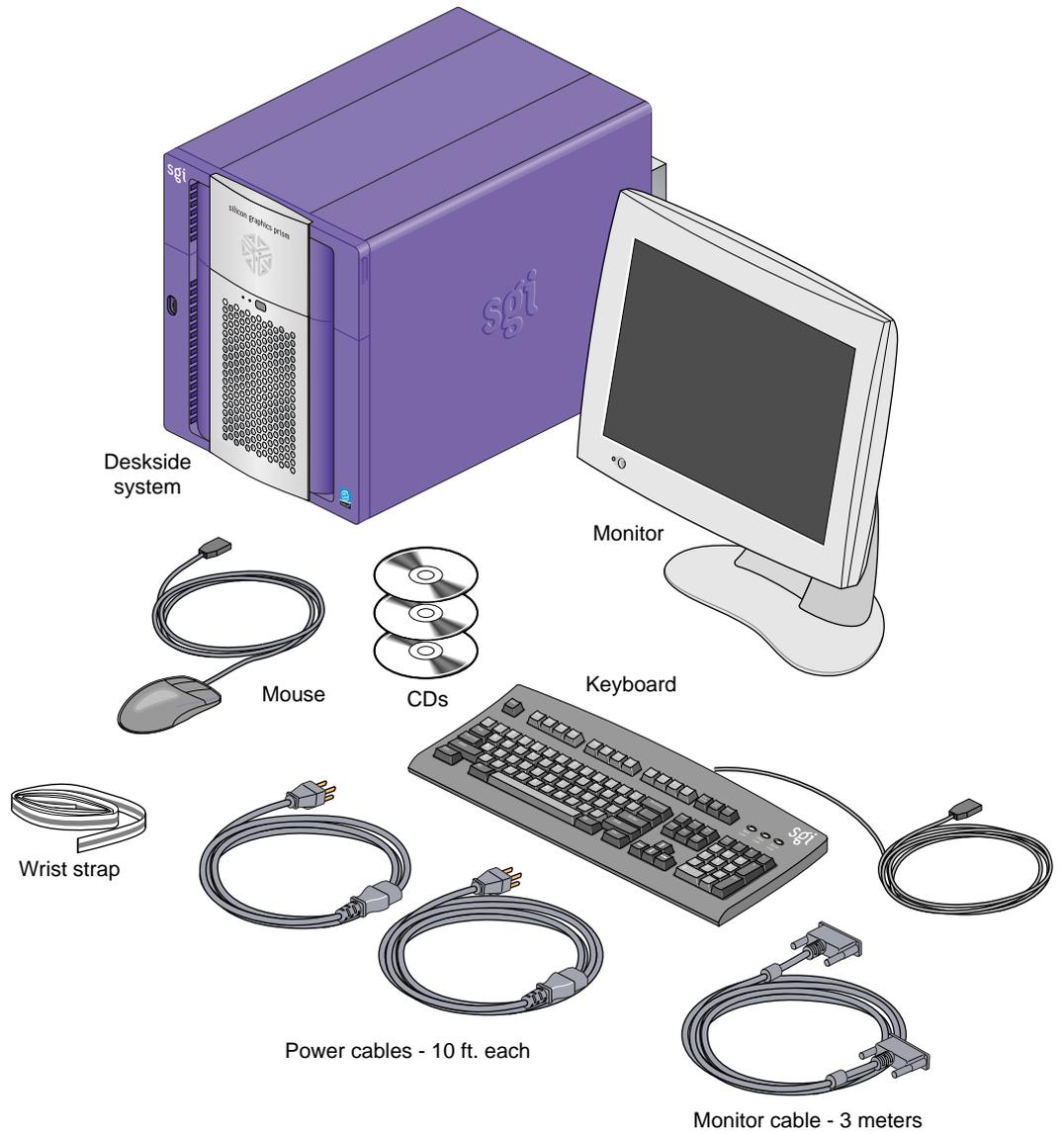


Figure 1-1 Basic System Shipment Contents

Lifting the System

The base system configuration weighs approximately 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.

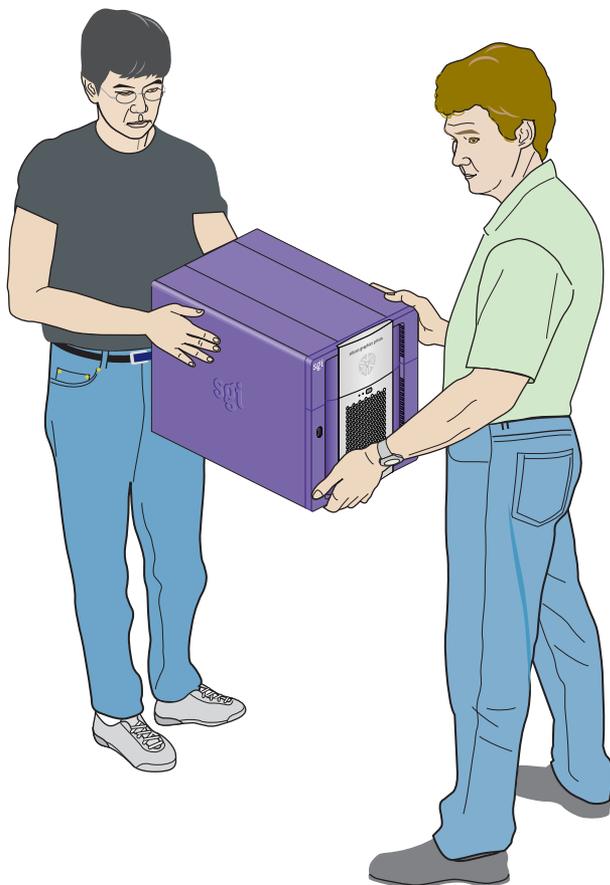


Figure 1-2 Lifting the System

Getting Acquainted

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

- Figure 1-3 on page 6, which shows the front view of the system.
- Figure 1-4 on page 8 shows the rear panel items on the system.

Front Panel Items

Items on the front panel include

- L1 controller panel display (behind the front door)
- Power button
- Two status LEDs
- One or two hard disk drives
- DVD-ROM drive
- USB option port
- Reset switch
- Recessed Non Maskable Interrupt (NMI) switch (use a paper clip to actuate)

For more information on front panel controls, see “Powering On the System” on page 13.

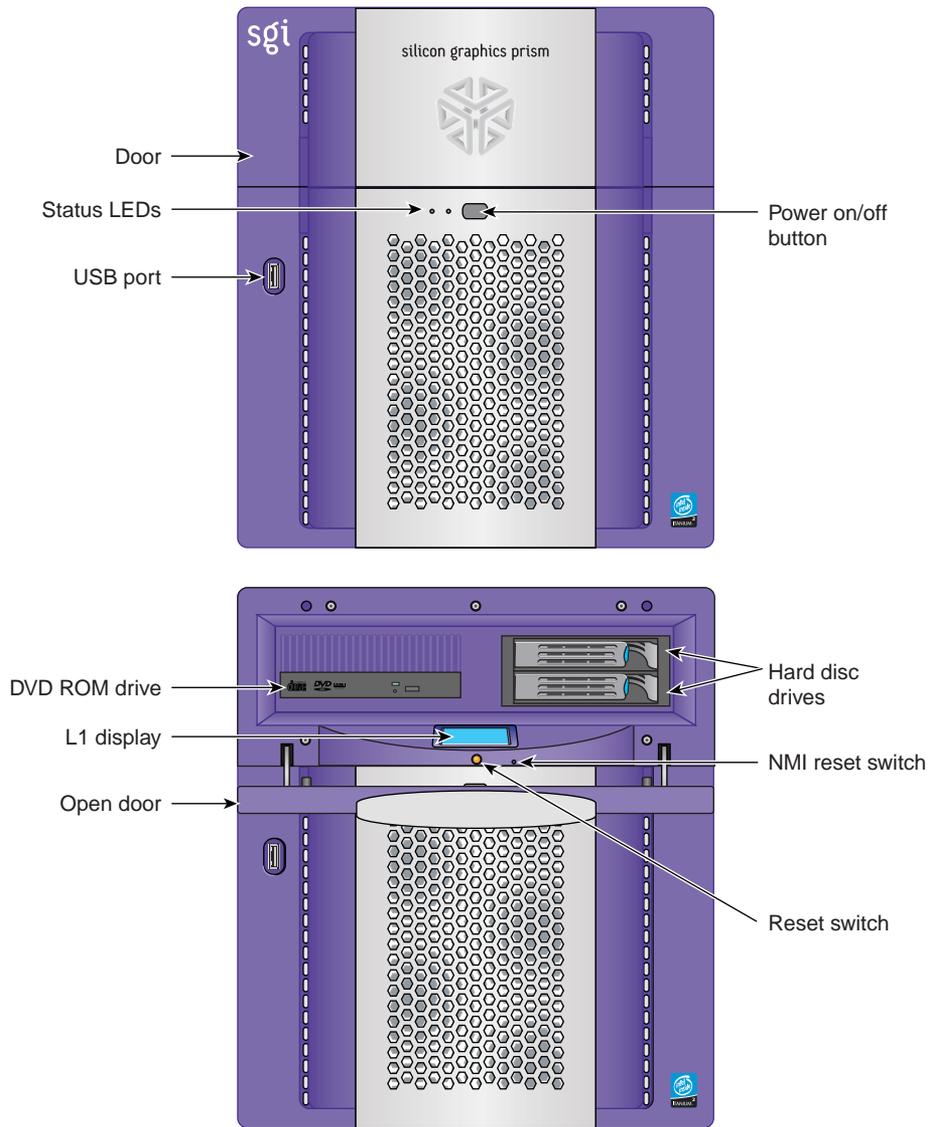


Figure 1-3 Front View of the System

Rear Panel Items

The rear panel of the Silicon Graphics Prism Deskside unit has the following items:

- **AC power input.** This connector attaches to an AC power outlet.
- **Standard PCI daughter board.** This static PCI card provides four USB ports for keyboards and mice, a DB-9 serial port (L1 console and diagnostic port). ImageSync In and ImageSync Repeat connectors for optional image sync functionality are also included.
- **Base I/O PCI card.** Provides internal hard disk and removable media support, a 36-pin MDR serial port connector, and an Ethernet connection.
- **One or (optionally) two graphics boards (pipes).** Located near the bottom of the unit.

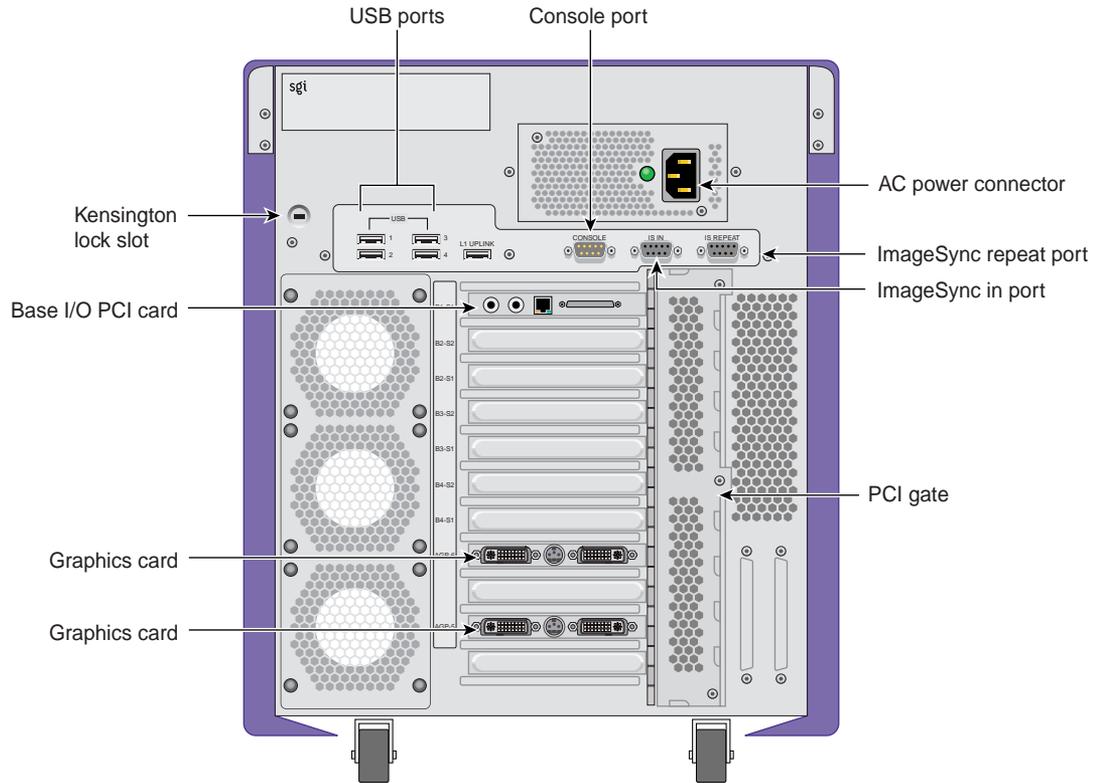


Figure 1-4 System Rear Panel Items

Cabling the System

To set up the System, follow these steps:

1. Connect the keyboard and mouse cables, as shown in Figure 1-5.

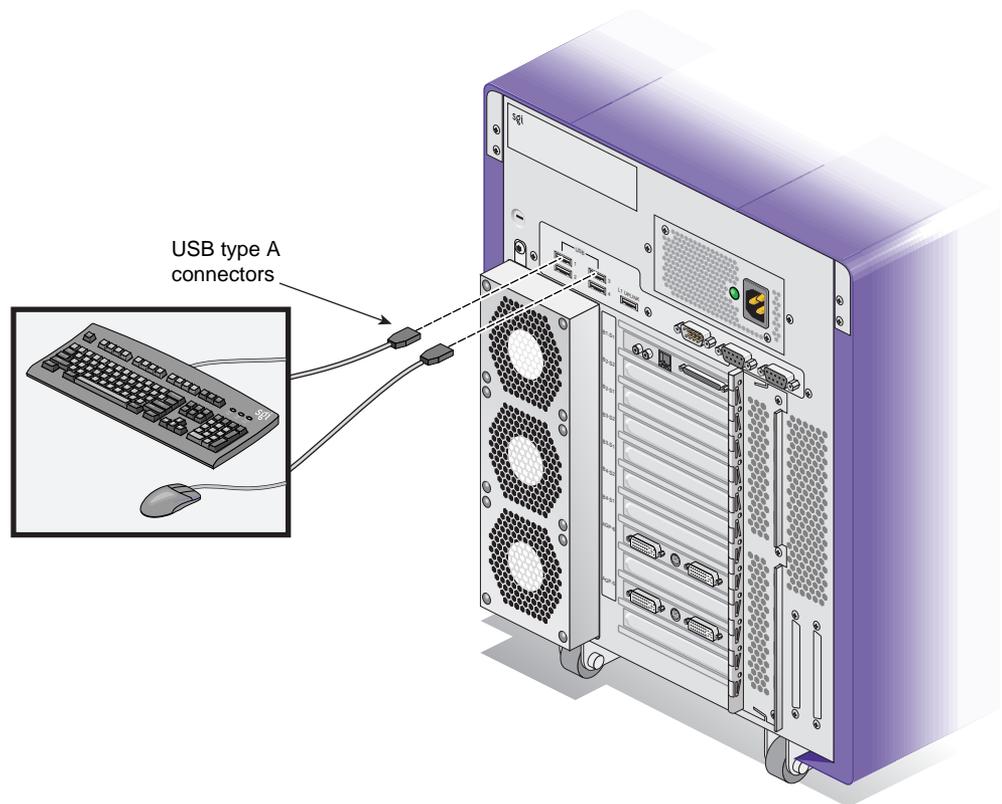


Figure 1-5 Connecting the USB Keyboard and Mouse Cables

2. Connect the Ethernet cable to the Ethernet port on the base I/O card, as shown in Figure 1-6.

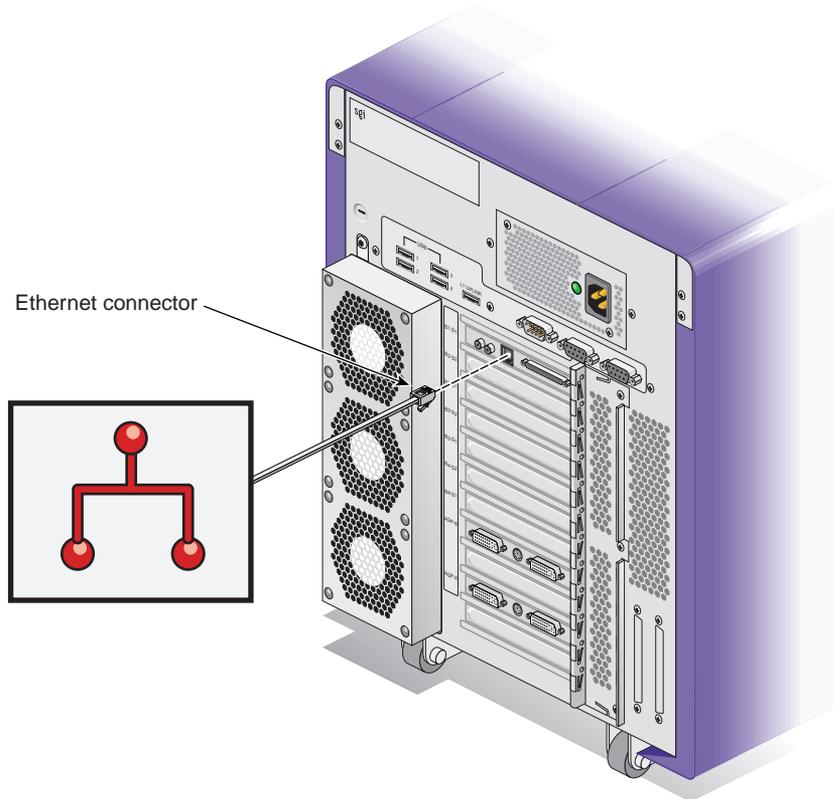


Figure 1-6 Connecting the Ethernet Cable

3. Connect the monitor-to-graphics cable, as follows (see Figure 1-7):
 - Connect one end of the monitor-to-graphics cable to the monitor.
 - Connect the other end of the monitor-to-graphics cable to the DVI-I video connector on the left side of the graphics board on the back of your system.

Note: The System 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.

Important: When using an optional compositor, you must always connect the graphics output cable to the left side (as viewed from the rear of the system) graphics connector.

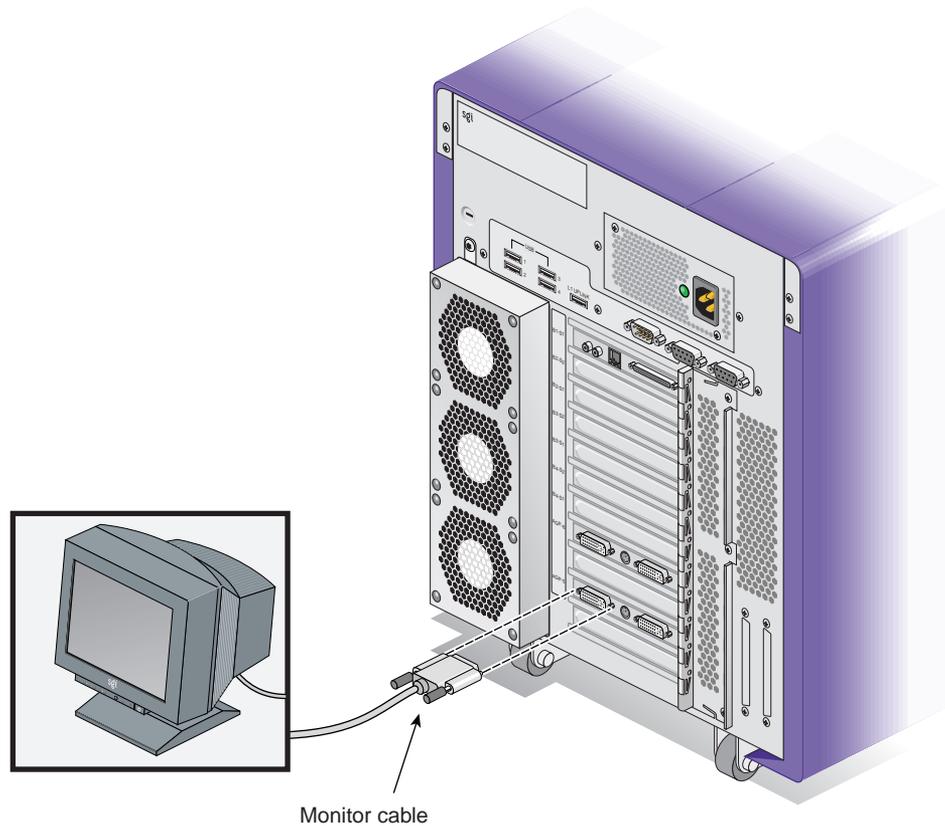


Figure 1-7 Connecting the Monitor Cable Example

4. Connect the power cables to your system and monitor. Then plug them into approved electrical outlets (see Figure 1-8).

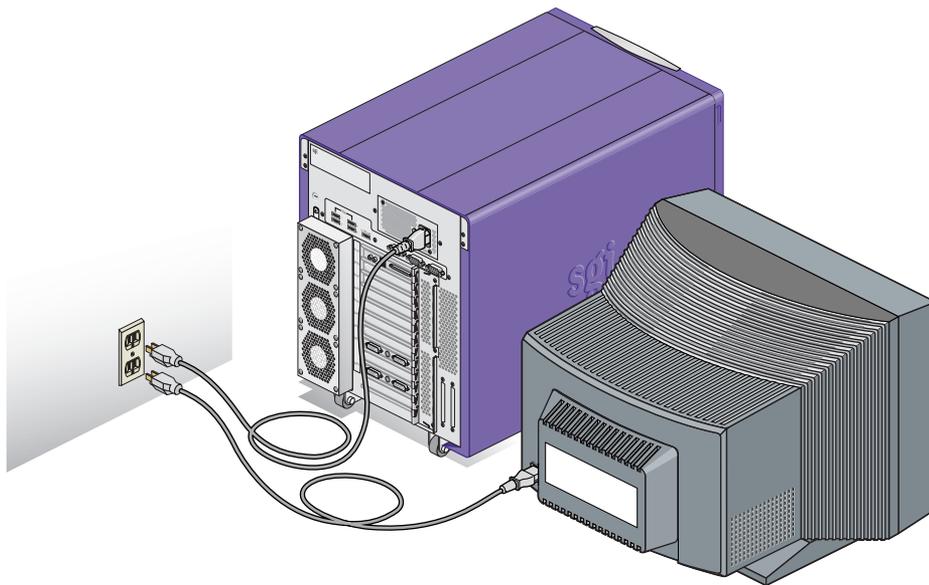


Figure 1-8 Connecting the System and Monitor Power Cables Example

You have finished the quick start setup of your system. Proceed to the next sections for information on booting, configuration, and use of the visualization system.

Using the System

This section provides information about using your Silicon Graphics Prism Deskside visualization system. The topics covered include:

- “Powering On the System” on page 13
- “Powering Off the System” on page 15

Powering On the System

Press the power buttons on your monitor and system as shown in the example in Figure 1-9.

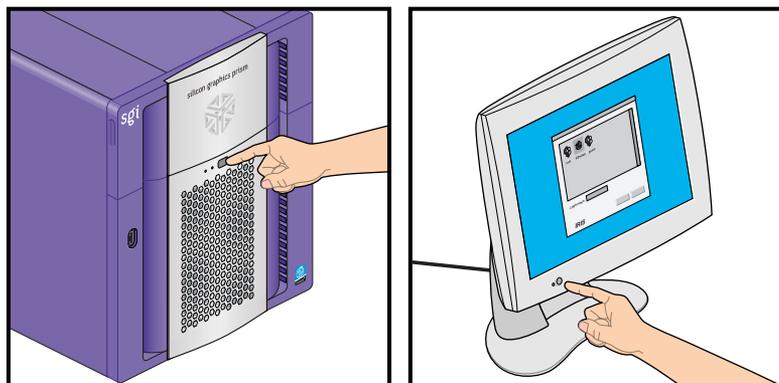


Figure 1-9 Powering On the System and Monitor Example

A green LED flashing on the front of the deskside unit indicates that the system is booting.

Important: The monitor may remain blank for 90 seconds or longer during the boot process, depending on your system configuration. Do not push the power button again or you may disrupt the boot process. Check the L1 display for an error message if you feel that the system is not booting properly. See Chapter 4, “Troubleshooting and Diagnostics” for more information.

The front panel of the enclosure (see Figure 1-3 on page 6) has the following controls and indicators:

- **L1 controller display.** A liquid crystal display (LCD) that shows status and error messages generated by the L1 controller.

Note: See Chapter 4, “Troubleshooting and Diagnostics” or refer to the *SGI L1 and L2 Controller Software User’s Guide* (007-3938-00x) for more information on the L1 controller.

- **Status LEDs.** The front panel has the following LEDs:
 - **Power button LED.** This LED illuminates green when the internal components are on.
 - **Service-required LED.** This LED illuminates yellow to indicate that an item is not functioning properly (for example, a fan is off), but the system is still operating. Check the L1 panel for any error indications, and see the section “L1 Controller Error Messages” on page 107 for more information.
 - **Failure LED.** This LED illuminates red to indicate that a failure has occurred and the system or module has shut down.
- **Power button.** Press this button to power on the desktide system. Alternatively, you can power on the system from an optional system console.
- **Reset button.** Use a pen or other pointed object to press this button to reset the internal processors and ASICs. The reset will cause a memory loss.
- **NMI button.** Pressing this button (using an inserted paper clip) issues a non-maskable interrupt command to the system. When the system hangs, you can send an NMI interrupt. The interrupt goes to PROM and causes the CPU state to be captured. This information is saved in flash PROM and in the system log, and can assist your service technician in debugging system hangs or other similar problems.

Powering Off the System

You can shut down your system from a Linux prompt, or power off your system either from the L1 console or using the power button on the front of the system.

To gracefully shut down the operating system, enter the following command from a Linux shell window: `shutdown -h now`

To shut off power to the overall system, enter one of the following commands from an optional L1 console:

```
Ctrl-t  
or  
pwr d
```

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

1. Go to the front of your deskside system.
2. Press the power button, as shown in Figure 1-10.

Within a few seconds, a shutdown notifier appears. Within a minute, the system powers off automatically.

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 1-11. If the system still fails to power off, unplug the power cable from the rear of your deskside system and contact your service provider.

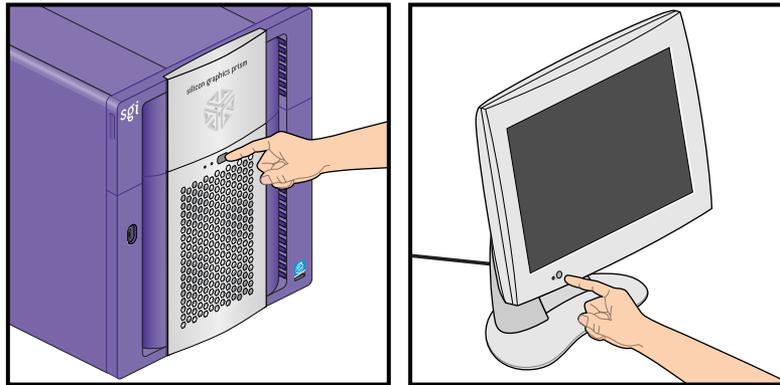


Figure 1-10 Powering Off the System Using the Front Power Button

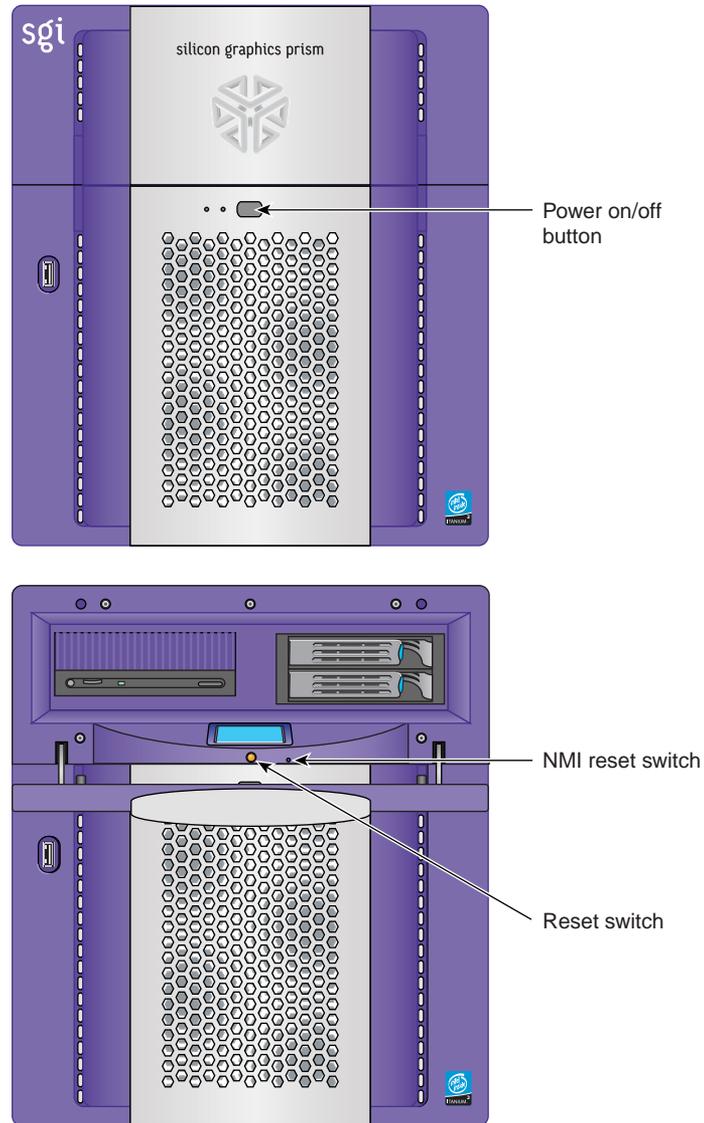


Figure 1-11 Power Button and Reset Switches

System Overview

The Silicon Graphics Prism Deskside visualization system is a high-power, high-performance system. It features one or two graphics pipes, one or two 64-bit Intel processors, and a high-bandwidth architecture in a convenient free-standing tower chassis. This chapter provides general information about the major hardware components of the system in the following sections:

- “System Enclosure” on page 20
- “System Node Board” on page 22
- “Processors” on page 22
- “Memory DIMMs” on page 22
- “Internal Hard Disk Drives” on page 28
- “DVD-ROM Drive” on page 29
- “Graphics Boards” on page 30
- “PCI Buses” on page 32
- “Power Supply” on page 34
- “Cooling System” on page 35
- “Optional Components, Peripherals, and Upgrades” on page 37

System Enclosure

The Silicon Graphics Prism Deskside visualization system is housed in the system enclosure as shown in Figure 2-1 and Figure 2-2. The enclosure provides structure and protection for the internal components.

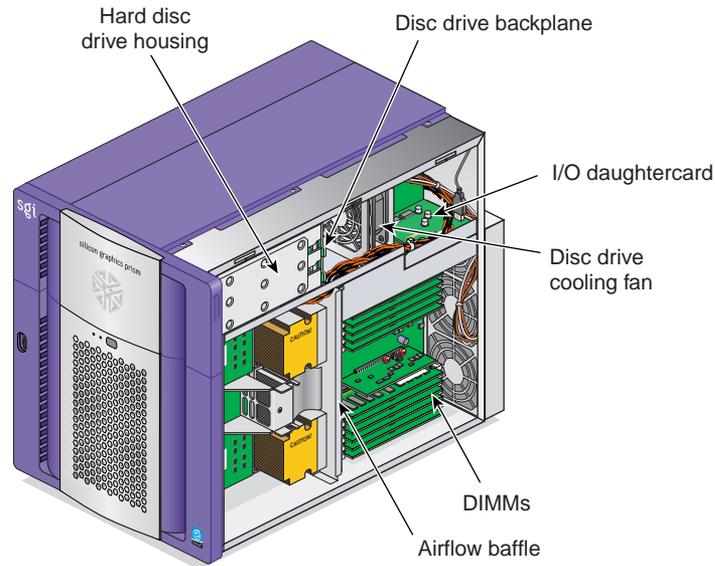


Figure 2-1 System Enclosure Layout (Right-Front View with Side Panel Removed)

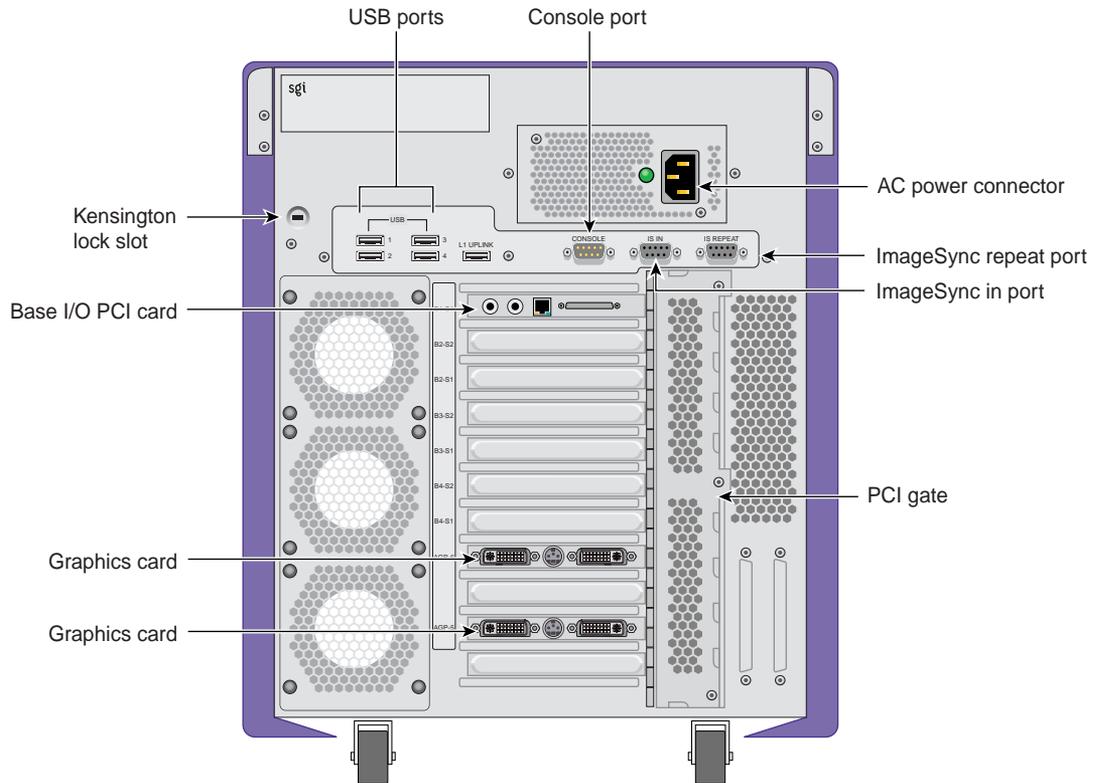


Figure 2-2 System Enclosure Layout (Rear View)

System Node Board

The system is powered by an scaleable system node board. 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. These boards are not customer replaceable.

Processors

The system is available with one or two 64-bit Intel processors. These processors are available in different clock speeds and cache sizes. Each processor has on-board cache memory and external cache memory. Each processor is mounted on the system node board under a heat-dissipating protective cover. The processors are not customer replaceable.

Memory DIMMs

The system is configured with a minimum of four DIMMs (2 GB) of memory and a maximum of 12 DIMMs (24 GB) of memory. Your system uses double data rate synchronous dynamic random-access memory (DDR SDRAM). The DIMMs are always installed in groups of four. Each DIMM in a group of four must be the same speed and memory capacity. Different DIMM groups may have different speed and memory capacity values. “Installing or Removing a Memory DIMM” in Chapter 3 provides additional detail on memory DIMMs including removal and replacement rules and procedures. Figure 2-3 shows the memory DIMM group placement.

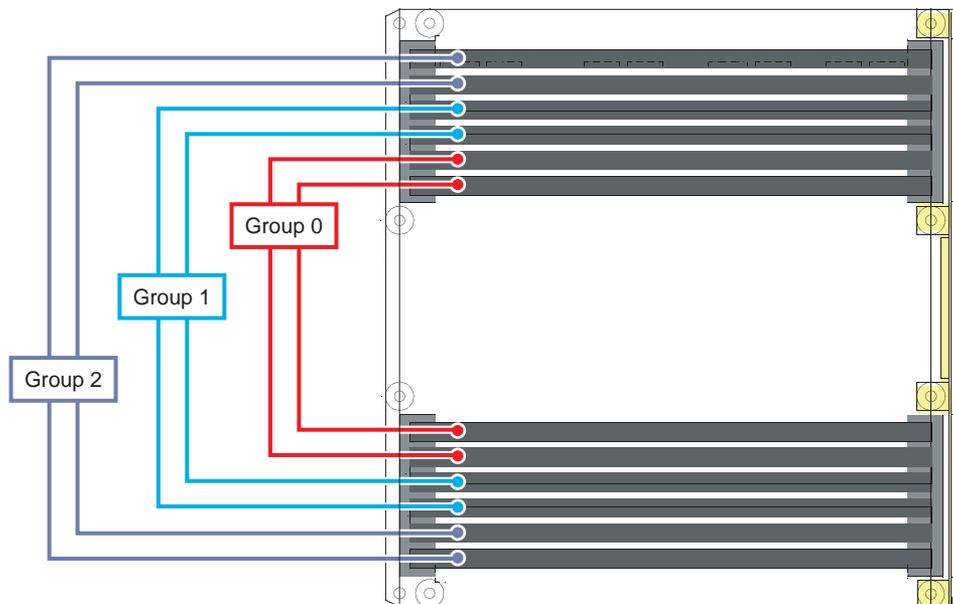


Figure 2-3 Memory DIMM Group Locations

Important: The system will not be operational unless four DIMMs in memory group 0 are install.

Note: The DIMMs used in the Silicon Graphics Prism Deskside visualization platform are **not** compatible with DIMMs used in the Origin 200, Origin 300, Origin 350 series, Origin 2000, Origin 3000, SGI 3000 series, SGI 2000 series, Onyx systems, Fuel, Octane Octane2, O2, O2+, or Tezro systems.

System Base I/O Board

The base I/O board is the full-length PCI board that is installed in PCI slot 1, (the top PCI slot). It provides the following I/O connectors and interfaces for the system (see Figure 2-4):

- An internal IDE connector for the internal DVD-ROM drive
- Internal serial ATA connectors for the hard disk drives
- An external 36-pin MDR connector for optional external serial devices

Note: The 36-pin connector uses a four-cable adapter with four 9-pin serial connectors.

- Real time interrupt in and out connectors (RTI input and RTI output) located on the left side of the PCI card (these connectors are not currently supported)
- A 10/100/1000-BaseT Ethernet connector (RJ45)

The I/O 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.”

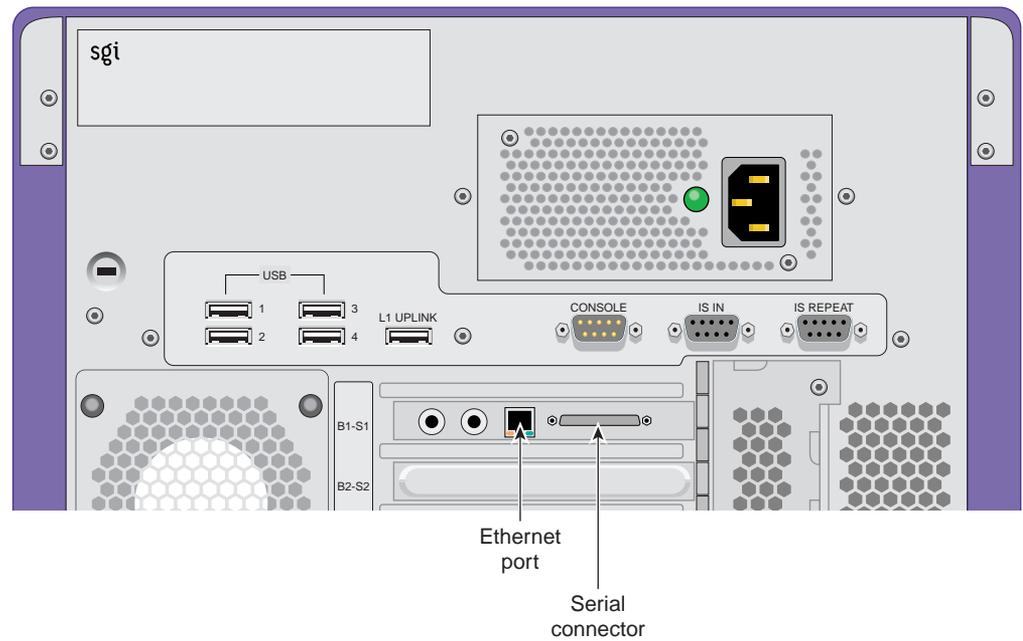


Figure 2-4 System Base I/O Board External Connectors

The 36-pin MDR serial connector on the base I/O board can connect to multiple serial devices by way of the serial adapter cable shown in Figure 2-5 on page 26. Leave the serial adapter cable unplugged if you are not connecting any serial devices to the system.

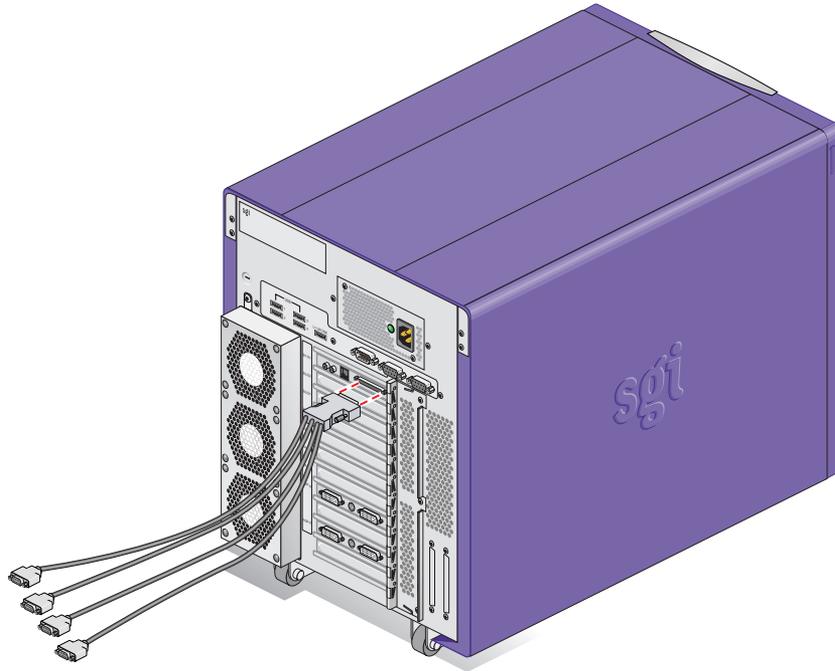


Figure 2-5 Serial Port Adapter Cable Connection

I/O Daughtercard

The standard (static) I/O daughter card is a long narrow board that is mounted on the rear of the enclosure just below the power supply. It uses one of the system PCI slots. This card acts as an extension of the base I/O board and is **not** customer replaceable. The board provides the following connectors (see Figure 2-6):

- Four USB A ports used for keyboard and mouse connections
- One L1 diagnostic port (USB-B)
- One L1 console port (DB9)
- ImageSync in (IS IN) and ImageSync repeat (IS Repeat)

For technical specifications and pinouts of these connectors, refer to Appendix A, “Technical Specifications and Pinouts.”.

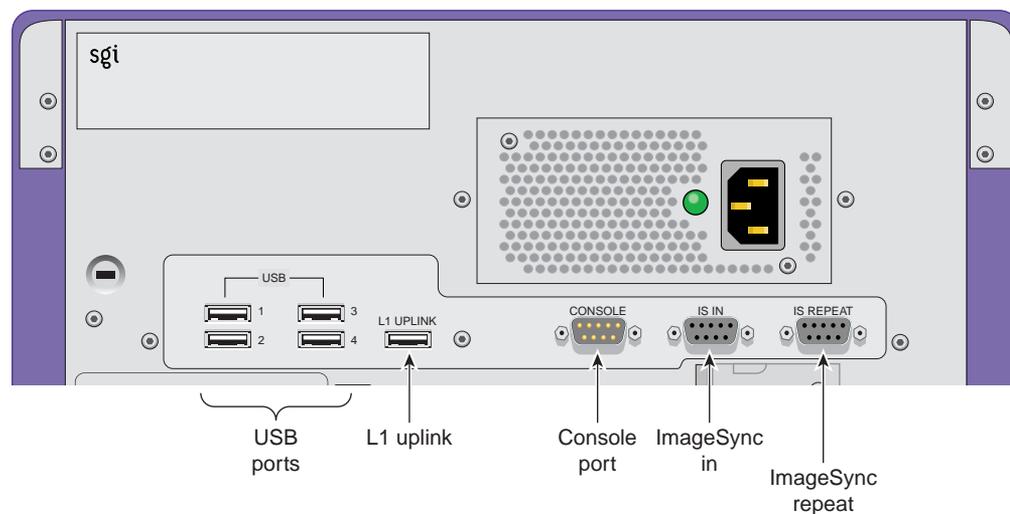


Figure 2-6 Static I/O Daughter Card Connectors

Internal Hard Disk Drives

The Silicon Graphics Prism Deskside visualization system supports one or two internal hard disk drives. These drives provide the unit with large amounts of storage and quick access times.

The hard disk drives in the system are sled mounted (see Figure 2-7). 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 backplane, which connects the disk drives to the base I/O board (see Figure 2-8).

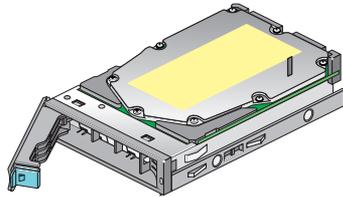


Figure 2-7 Hard Disk Drive Sled

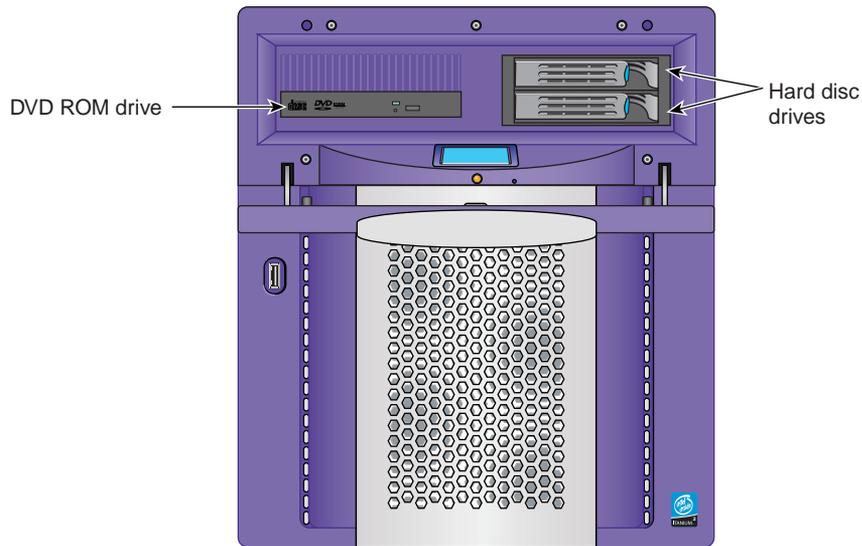


Figure 2-8 Internal Hard Disk Drive Locations

The disks are numbered 1 and 2, with 1 being the bottom disk and 2 being the top. Disk 1 is the system disk, which has the Linux operating system installed on it. Your system 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 64.

DVD-ROM Drive

Your system supports an optional internal DVD-ROM drive. The drive is installed in the 5.25-in. drive bay, as shown in Figure 2-8. For information about removing the DVD-ROM drive and installing a new one, refer to “Replacing the DVD-ROM Drive” on page 69.

Graphics Boards

The graphics slots are located at the center-rear section of the system (near the bottom of the enclosure), as shown in Figure 2-9. The graphics board(s) installed are tested and configured to work with your Silicon Graphics Prism Deskside system. You should not replace them with graphics cards from other systems unless directed to do so by your service provider.

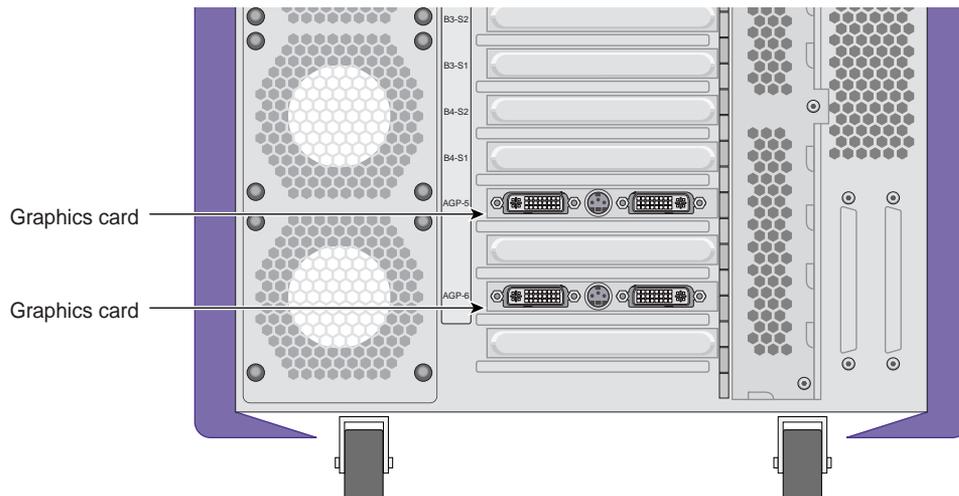


Figure 2-9 Locating the Graphics Board(s)

The Prism deskside system graphics board has the following features:

- Dual DVI-I graphics connectors
- High speed DDR memory
- Full scene anti-aliasing
- AGP 4X/8X support

Note: Some of the graphics boards come with an ImageSync connection for use with optional ImageSync PCI cards. Check with your SGI sales or service representative if you need to install optional ImageSync functionality in your system.

PCI Buses

Each deskside system supports eight 64-bit, PCI-X slots which are divided into four buses, as shown in Figure 2-10. Note that the top two slots of bus 1 are always occupied by the static I/O daughter board and the base I/O PCI card. The system's base I/O board always occupies bus 1, slot 1, and the static I/O daughter board is permanently installed in the top slot (bus 1, slot 2). The static I/O daughter card provides the USB, L1 USB, serial console, and ImageSync connectors for the deskside unit.

The remaining six slots are available for other optional PCI/PCI-X boards. Each bus can support card speeds of up to 133 MHz. The slots are divided into buses, as shown in Figure 2-10.

- PCI Bus 1 has one usable slot, which always contains the base I/O board.
- PCI Buses 2, 3, and 4 each have two slots.

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

- Avoid placing high and low speed cards on 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 66-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. 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.

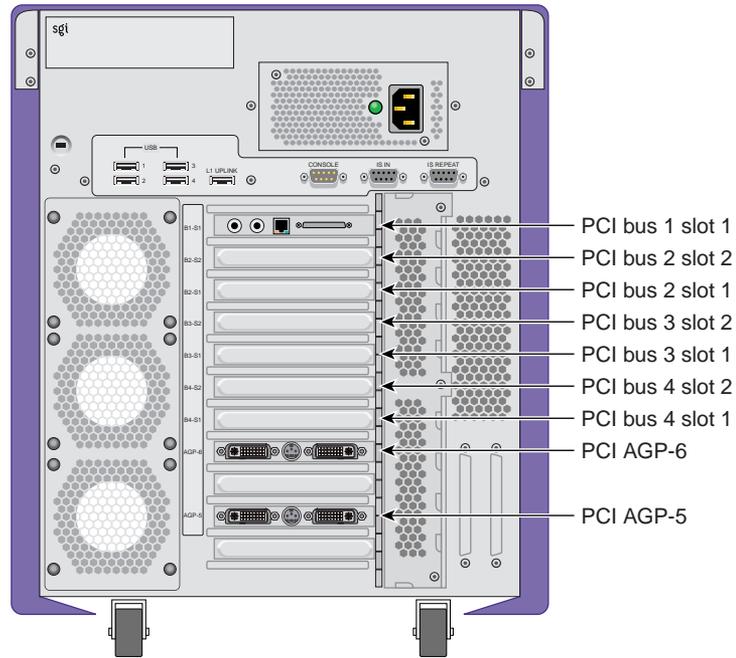


Figure 2-10 PCI Buses and Slots

For a list of available PCI boards see “PCI Boards” on page 37 or contact your SGI sales representative.

Power Supply

The power supply for the system is located in the top rear quadrant of the chassis, as shown in Figure 2-11.

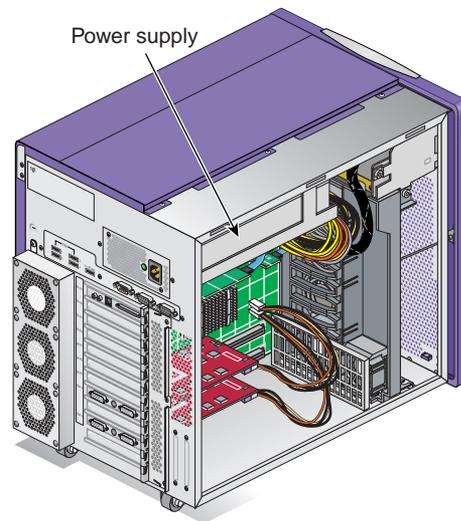


Figure 2-11 Power Supply Location

The power supply provides up to 700 watts of power to the node and interface boards, internal hard disk drives, DVD-ROM drive, and other optional components installed in the enclosure.

Cooling System

The system uses a total of eight fans to cool the internal components. The following components make up the cooling system (see Figure 2-12):

- **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.

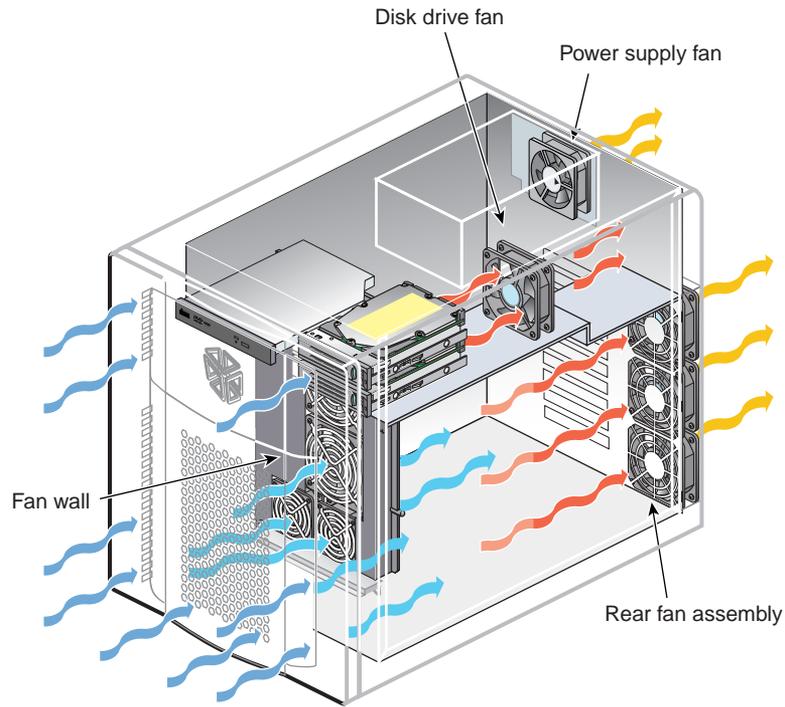


Figure 2-12 Cooling System Components

Optional Components, Peripherals, and Upgrades

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

- “PCI Boards” on page 37
- “Memory Upgrades” on page 37
- “Processor Upgrades” on page 38
- “Storage Upgrades” on page 38
- “Displays” on page 39
- “Peripherals” on page 39

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

PCI Boards

A wide variety of PCI options are available for your system, including networking, serial, USB, and video boards. The following boards are a sample of the available options:

- Dual port Ultra3 SCSI LVD or single-ended SCSI adapter
- Single- and dual-port 2-gigabit Fibre Channel boards with optical connectors
- 1-port 1000Base-SX gigabit Ethernet adapter
- Multi-channel audio I/O board

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

Memory Upgrades

The following memory upgrades are available for the system:

- 2-GB DIMM group
- 4-GB DIMM group
- 8-GB DIMM group

Note: The system supports a maximum of 12 memory DIMMs. Memory DIMMs must be installed in groups of four, and each group of four must be of the same speed and memory capacity.

Processor Upgrades

Each deskside visualization system is available with 1 or 2 processors. The processors are available with different clock speeds and cache sizes. Processor upgrades are accomplished by replacing the entire system node board (which requires a service call by a trained technician).

For a complete list of available processor, I/O, or graphics upgrades, contact your sales representative.

Storage Upgrades

The following storage upgrades are available for the system:

- One additional hard disk drive (total internal capacity is two hard drives)
- External SCSI DAT drive

An SGI InfiniteStorage TP900 non-RAID SCSI array is available for optional mass storage capacity. This unit is normally mounted in a rack.

The system can also be connected by way of a fibre channel PCI option card to a high-performance storage array, such as the SGI InfinitePerformance TP9700. These disk arrays offer large storage capacities in RAID 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

There are two basic types of displays available with the system:

- Silicon Graphics flat panel display with DVI-D to DVI-D cable
- SGI CRT monitor with DVI-I to VGA cable

Displays are available in different sizes. Check with your sales or service representative for current offerings.

Peripherals

The following peripherals are available with the system:

- 3-button mouse
- Keyboard
- Speakers

For a complete list of available components, contact your SGI sales representative or see the following web page:

<http://www.sgi.com/peripherals/>

Maintenance and Upgrade Procedures

This chapter provides safety information and instructions for adding or removing components from your Silicon Graphics Prism Deskside visualization system. The following topics are covered:

- “Safety Instructions” on page 42
- “Ordering Parts” on page 43
- “Required Tools” on page 43
- “Preparing the System for Service” on page 44
- “Returning the System to Service” on page 52
- “Installing or Removing a Memory DIMM” on page 57
- “Installing or Removing Internal Hard Disk Drives” on page 64
- “Removing the DVD-ROM Drive” on page 69
- “Removing the Base I/O Board” on page 74
- “Installing or Removing PCI Boards” on page 80
- “Installing or Removing External Devices” on page 87
- “Replacing Cooling System Components” on page 87
- “Replacing Internal Cables” on page 94
- “Replacing Enclosure Components” on page 101

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

Safety Instructions

Read and follow these instructions carefully before servicing your system.

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 system 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 system 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 internal components may expose you to dangerous voltage points or other risks. Refer all servicing not specified as customer replaceable in this guide 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 system. Please see “Lithium Battery Compliance Statement” on page 173 for more information.

Ordering Parts

Replacement parts are available directly from your local service provider. Contact your SGI sales or support representative 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 System for Service

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

- “Powering Off and Disconnecting the System” on page 44
- “Removing the Enclosure Panels” on page 46
- “Installing or Removing Internal Parts” on page 50

Powering Off and Disconnecting the System

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

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

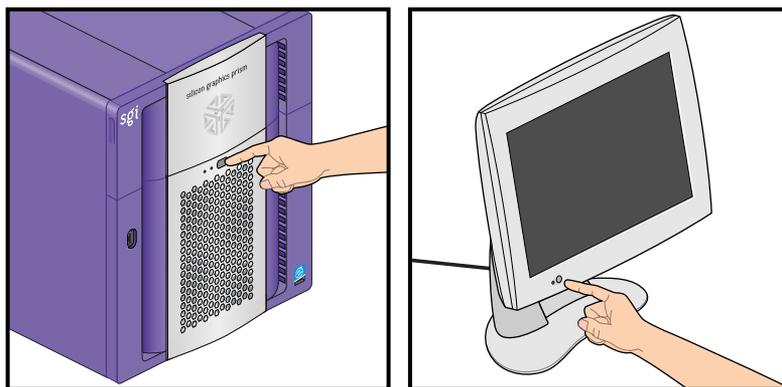


Figure 3-1 Powering Off the System

2. Disconnect all of the cables from the rear of the system. 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 system for some procedures. Refer to the individual procedures for detailed instructions on preparing the system.

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

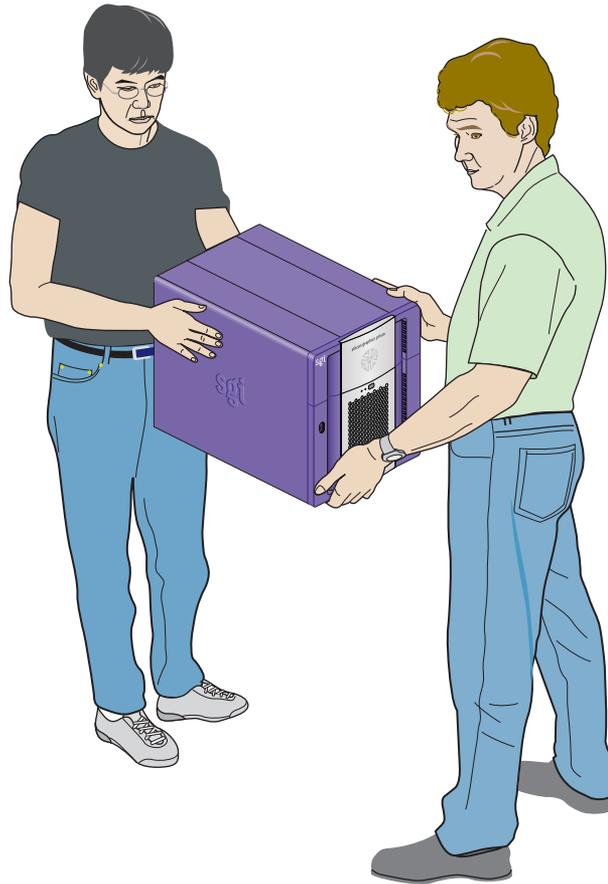


Figure 3-2 Moving the System

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 46
- “Removing the Left or Right Side Panel” on page 47
- “Removing the Enclosure Bezel” on page 48

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 system.

Table 3-1 Component Access by Enclosure Panel

Right Side Panel	Left Side Panel	Front Side Panel (Bezel)
Memory DIMMS	Base I/O board	L1 display
Hard Disk Drive Fan	L1 display cable	L1 display cable
Rear Fan Assembly	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).

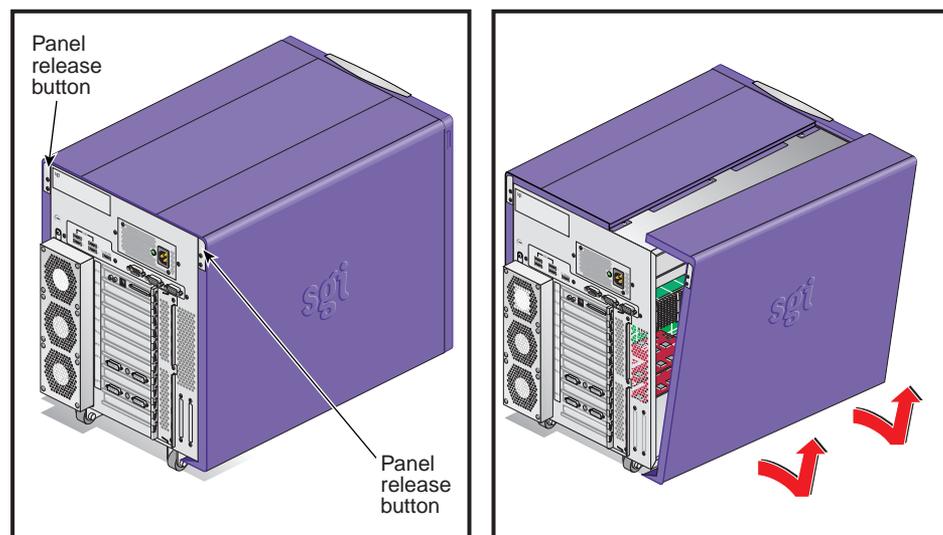


Figure 3-3 Removing the Enclosure Side Panel

If you only need to remove the left or right side panel, proceed to “Installing or Removing Internal Parts” on page 50. If you need to remove the bezel of the system, 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.
2. Remove the five screws that secure the front bezel and door assembly to the top of the chassis.
3. Tilt the top of the bezel frame toward you slightly. Then lift the bezel and door assembly off of the tabs that are supporting it.
4. Lift the bezel up, pull it away from the enclosure, and place it in a secure location.

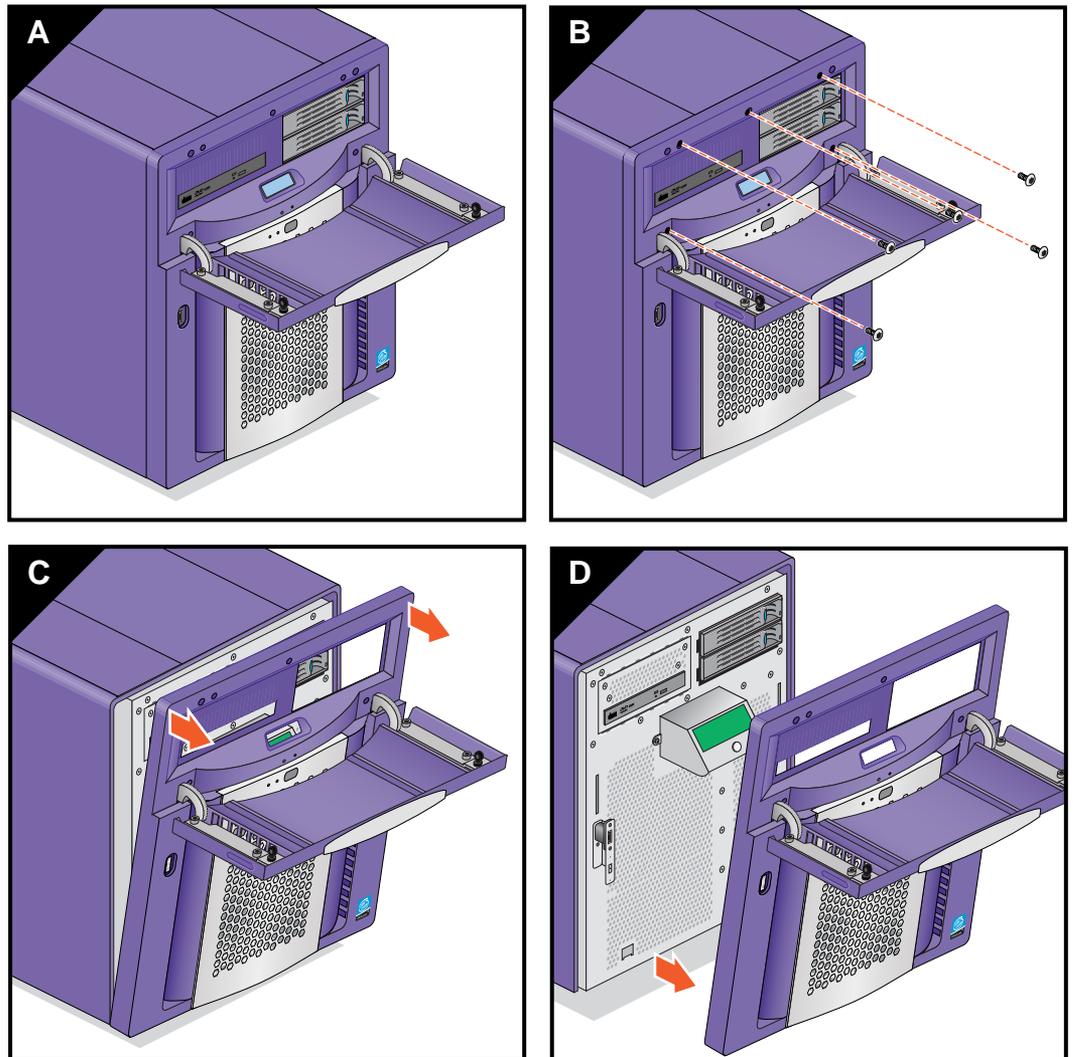


Figure 3-4 Removing the Bezel

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 system 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 system are extremely sensitive to static electricity. Always wear the wrist strap when you work with parts inside your system. 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 system. 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 57
Internal hard disk drives	“Installing or Removing Internal Hard Disk Drives” on page 64
DVD-ROM Drive	“Removing the DVD-ROM Drive” on page 69

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

Component	Procedure
PCI and Base I/O board	“Removing the Base I/O Board” on page 74
PCI boards	“Installing or Removing PCI Boards” on page 80
Fans:	
Fan wall	“Replacing the Fan Wall” on page 87
Hard disk drive fan	“Replacing the Hard Disk Drive Fan” on page 89
Rear fan assembly	“Replacing the Rear Fan Assembly” on page 92
Internal Cables:	
L1 display cable	“Replacing the L1 Display Cable” on page 94
LED cable	“Replacing the LED Cable” on page 98
DVD-ROM drive cable	“Replacing the DVD-ROM Drive Cable” on page 99
Enclosure Components:	
Enclosure Bezel Assembly	“Replacing the Bezel Assembly” on page 101
Enclosure Side Plastics	“Replacing the Side Plastics” on page 101
L1 Controller Display	“Replacing the L1 Display” on page 102

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

Returning the System to Service

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

- “Installing the Enclosure Bezel” on page 52
- “Installing the Side Panels” on page 54
- “Cabling and Powering on the System” on page 55

Installing the Enclosure 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.
2. Insert the tabs into the holes and press the bezel and door assembly against the enclosure to ensure that it snaps into place and is properly seated.
3. Lift the bezel slightly if needed to align the screw holes with the mounting holes in the enclosure. Then install the screws that secure the bezel to the enclosure.

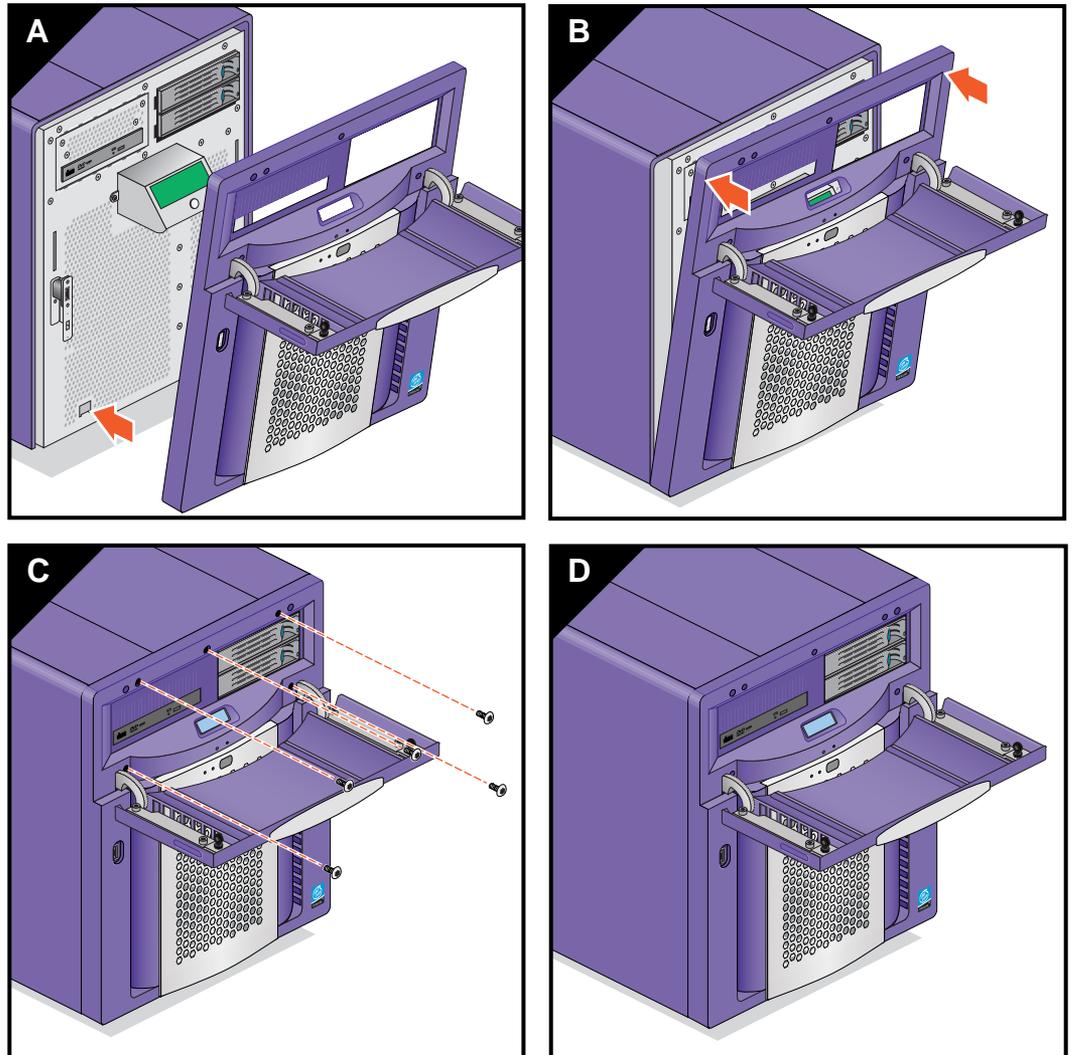


Figure 3-5 Installing the Bezel and Door Assembly

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.

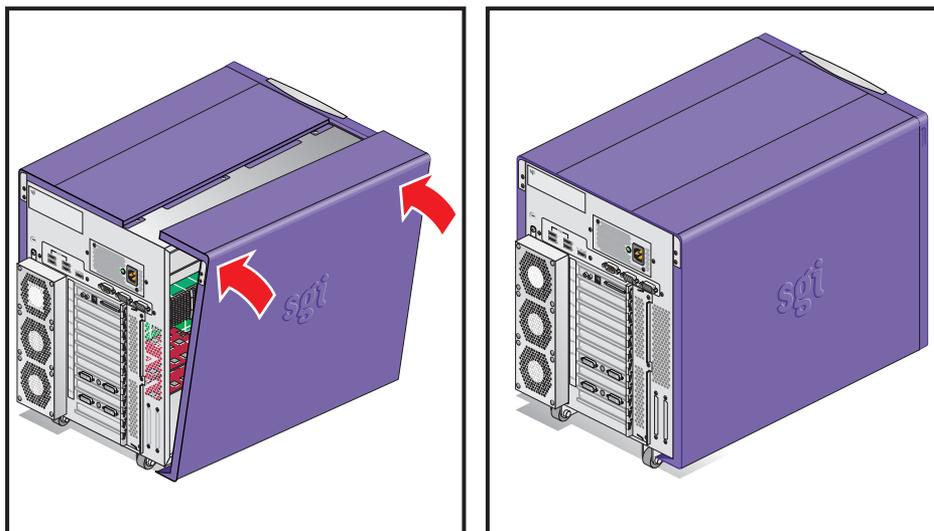


Figure 3-6 Replacing the Side Panel

Cabling and Powering on the System

Follow these steps to cable and power on the system.

1. Reconnect all of the system cables to the rear of the enclosure (see Figure 3-7).
2. Press the power buttons on your system and monitor.
3. If your system does not boot correctly, see Chapter 4, “Troubleshooting and Diagnostics.”

This completes the procedure for returning the system to service.

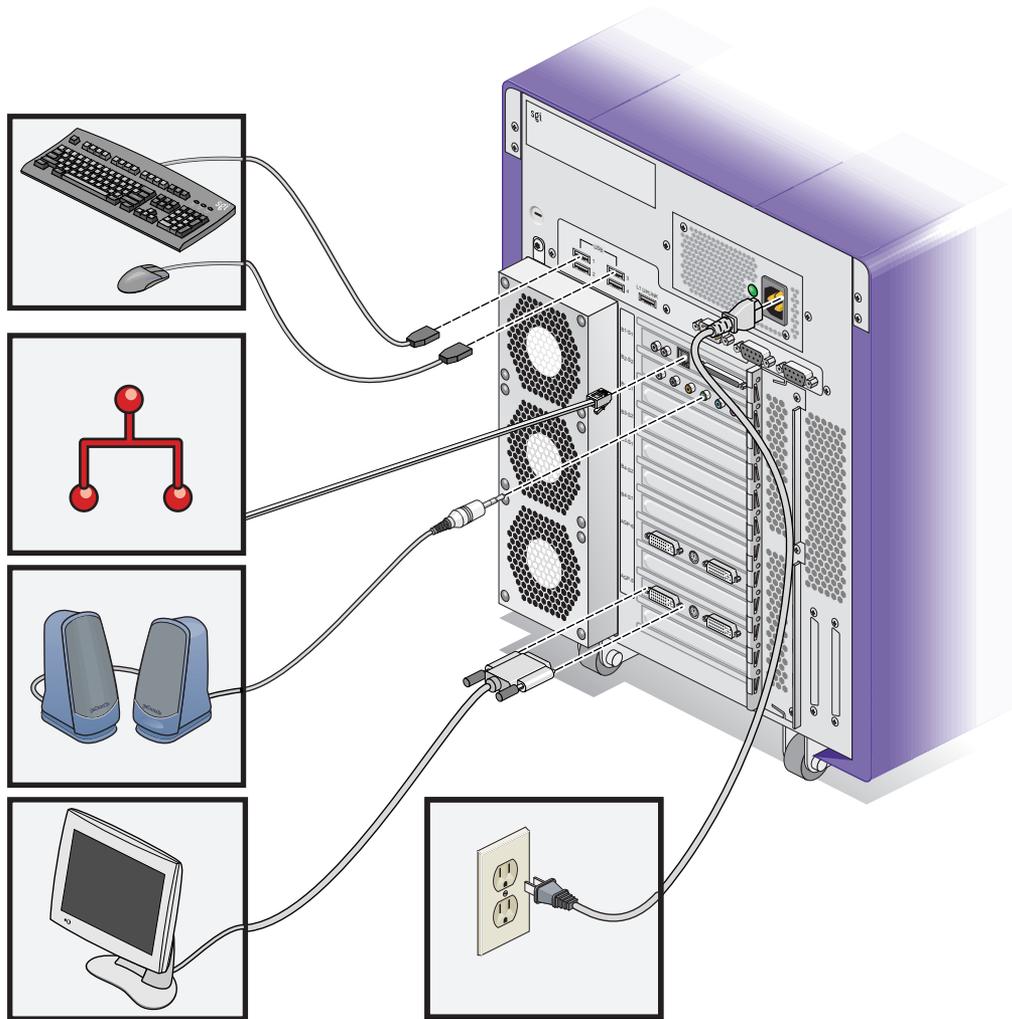


Figure 3-7 Reconnecting the Cables to the System

Installing or Removing a Memory DIMM

The Silicon Graphics Prism Deskside visualization system is configured with a minimum of 2-GB of on-board system memory and a maximum of 24 GB of memory. Memory is contained on small cards that are referred to as DIMMs (dual inline memory modules). Each deskside system can contain four, eight, or twelve DIMMs installed in DIMM slots located on the system node (mother) board.

The memory DIMM sockets are divided into three 4-DIMM groups (groups 0, 1, and 2). 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, continue reading the rest of this section.

Note: If you have not already done so, remove the right side of the enclosure to access the DIMMS. Refer to “Preparing the System for Service” on page 44.

Instructions are provided in the following sections:

- “Removing a DIMM” on page 59
- “Verifying Memory Installation” on page 63

These twelve DIMM slots are organized into three groups of four DIMMs each, as shown in Figure 3-8 on page 58. DIMMs are installed one per DIMM slot, and four at a time (group of four). Follow these guidelines when installing DIMM groups:

- Memory is increased or decreased in four-DIMM group increments only.
- Each of the four DIMMs that make up a DIMM group must be the same memory size and speed; however, different groups of DIMMs can differ in memory size or speed.
- The first four DIMMs (group 0) **must** be in place for the base module to operate properly.
- Mixing DIMM groups with different access speeds will cause the memory bus to default to the speed used for the slowest group.
- The maximum bus speed for a completely full set of DIMM memory slots (three installed groups), defaults to 100 MHz or 133 MHz, depending on the type of DIMMs installed.

Note: The DIMMs used in the Silicon Graphics Prism Deskside visualization platform are **not** compatible with DIMMs used in the Origin 200, Origin 300, Origin 350 series, Origin 2000, Origin 3000, SGI 3000 series, SGI 2000 series, Onyx systems, Fuel, Octane Octane2, O2, O2+, or Tezro systems.

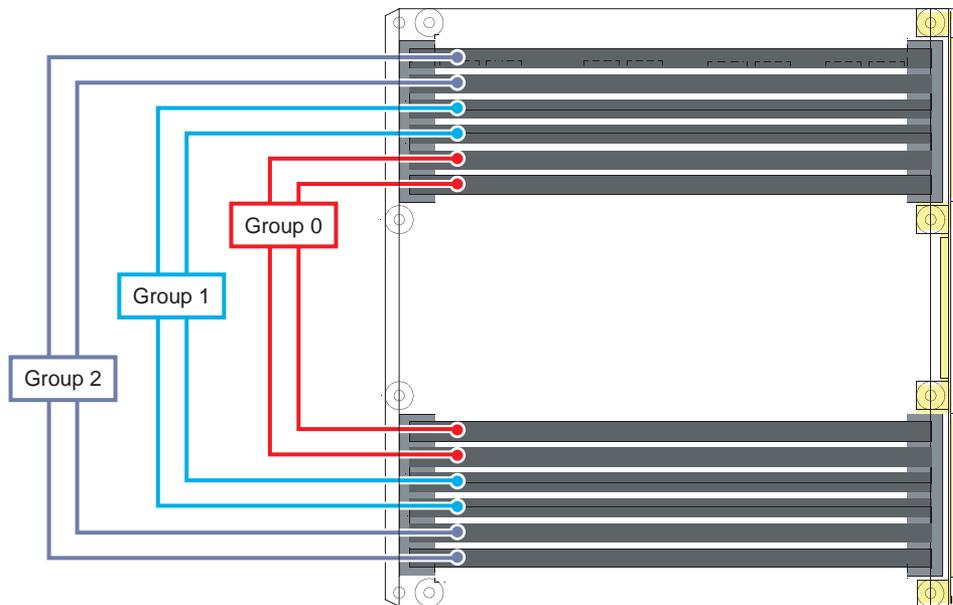


Figure 3-8 Layout of Slots and DIMM Memory Groups



Caution: Electronic equipment can be irreparably damaged by electrostatic discharge (ESD). Always follow these preventive measures when you handle a system component:

- Remove a component from its antistatic bag only when you are ready to install it.
 - If you handle a component before installation, do not place it on surfaces that produce ESD (carpeting, for example) or near devices that create static electricity.
 - Attach a static wrist strap to your wrist and to a grounded connection on your system when you install or remove a component.
-

Removing a DIMM

To remove a DIMM, follow these steps:

1. Locate the DIMM that you want to remove.
2. Remove the DIMM, as follows (see Figure 3-9):

Note: For guidelines on removing or replacing the DIMMs, make sure to read the introductory material in “Installing or Removing a Memory DIMM” on page 57 and see Figure 3-8 on page 58.

- a. Push out and down on the two ejector latches (located at each end of the DIMM socket) to disengage the DIMM from its connector.
- b. Carefully grasp the DIMM and pull it up and out of the guide rails.

Note: Hold the DIMM only by its edges. Be careful not to touch its components or gold edge connectors.

- c. Place the DIMM on an ESD-safe surface.
3. If you are installing a new DIMM, proceed to “Installing a DIMM Group” on page 61. If you are not installing new DIMMs, repeat the procedures until all the DIMMs have been removed from the group.
4. Place the DIMM(s) in an antistatic bag and store in a secure location.

Important: The four sockets in a DIMM bank must always be either empty or fully populated. The system will not function if there are no memory DIMMs installed. Four memory DIMMs of equal capacity and speed must always be installed in DIMM bank (group) zero. See Figure 3-8 on page 58.

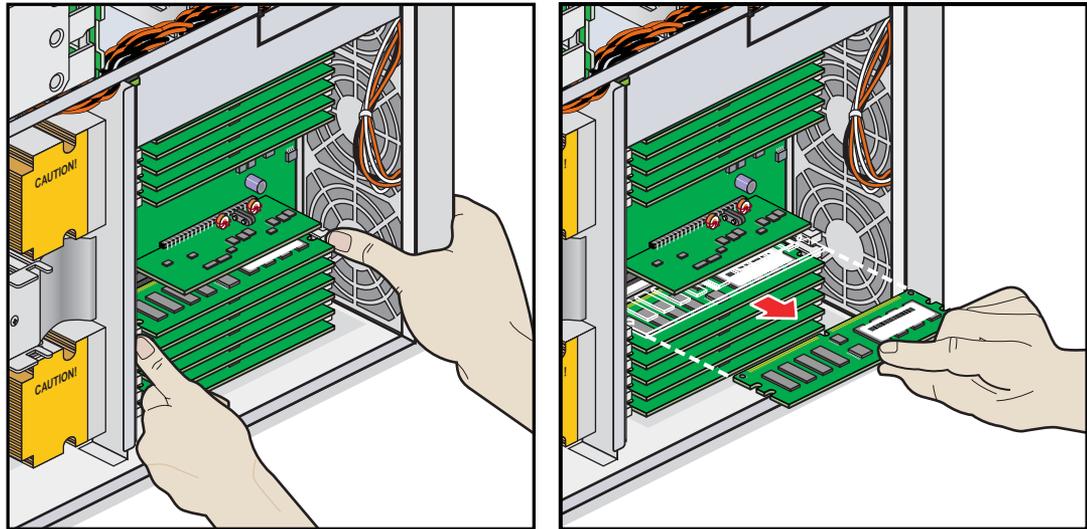


Figure 3-9 Removing a DIMM

Installing a DIMM Group

To install a DIMM group, follow these steps:

1. Power off the Silicon Graphics Prism Deskside platform. For specific powering off instructions, see “Powering Off the System” in Chapter 1.
2. Disconnect all of the cables at the rear of the module.



Warning: Components may be hot. To avoid injury, allow the components to cool for approximately five minutes before you proceed with these instructions.

3. Install the DIMMs, as follows:

Note: If you need to find the correct locations in which to install the DIMMs, make sure to read the introductory material in “Installing or Removing a Memory DIMM” on page 57.

- a. Ensure the ejector latches are in the open position (leaning away from the slot).
- b. Hold the DIMM only by its edges and remove it from its antistatic package.
- c. Align the bottom edge of the DIMM with the keyed 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).
- d. Insert the bottom edge of the DIMM into the socket, and then press evenly on the DIMM until it seats correctly. Use extreme care when you install a DIMM. If you apply too much pressure, you can damage the socket. See Figure 3-11 for an example.

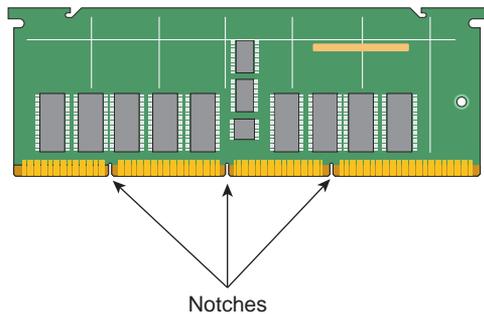


Figure 3-10 Locating the Notches on a DIMM

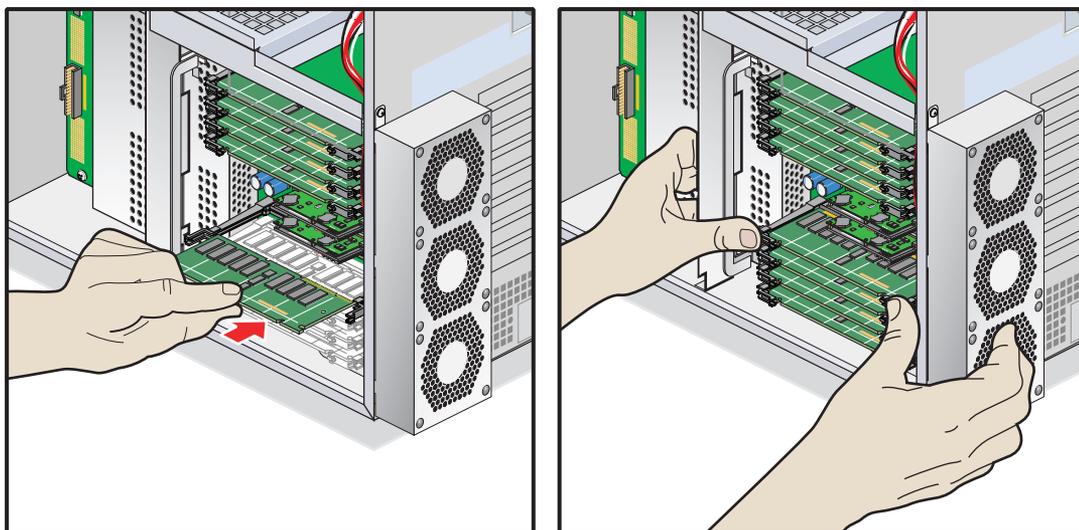


Figure 3-11 DIMM Installation Example

When the DIMM is fully seated in the connector, the ejector latches snap into place flush with each end of the DIMM.

Verifying Memory Installation

To verify the memory installation, follow these steps:

1. After you power on the system, check the amount of memory displayed for **Main Memory**. Use the `/usr/share/hwinfo` inquiry to determine if the new memory installation is recognized.

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 group is populated with four DIMMs, and that they are the same memory size and speed. You must have either 4, 8, or 12 DIMMs installed.

Installing or Removing Internal Hard Disk Drives

The Silicon Graphics Prism Deskside visualization system 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 65
- “Removing an Internal Hard Disk Drive” on page 67

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 has stopped spinning 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 3-12).

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 3-12).

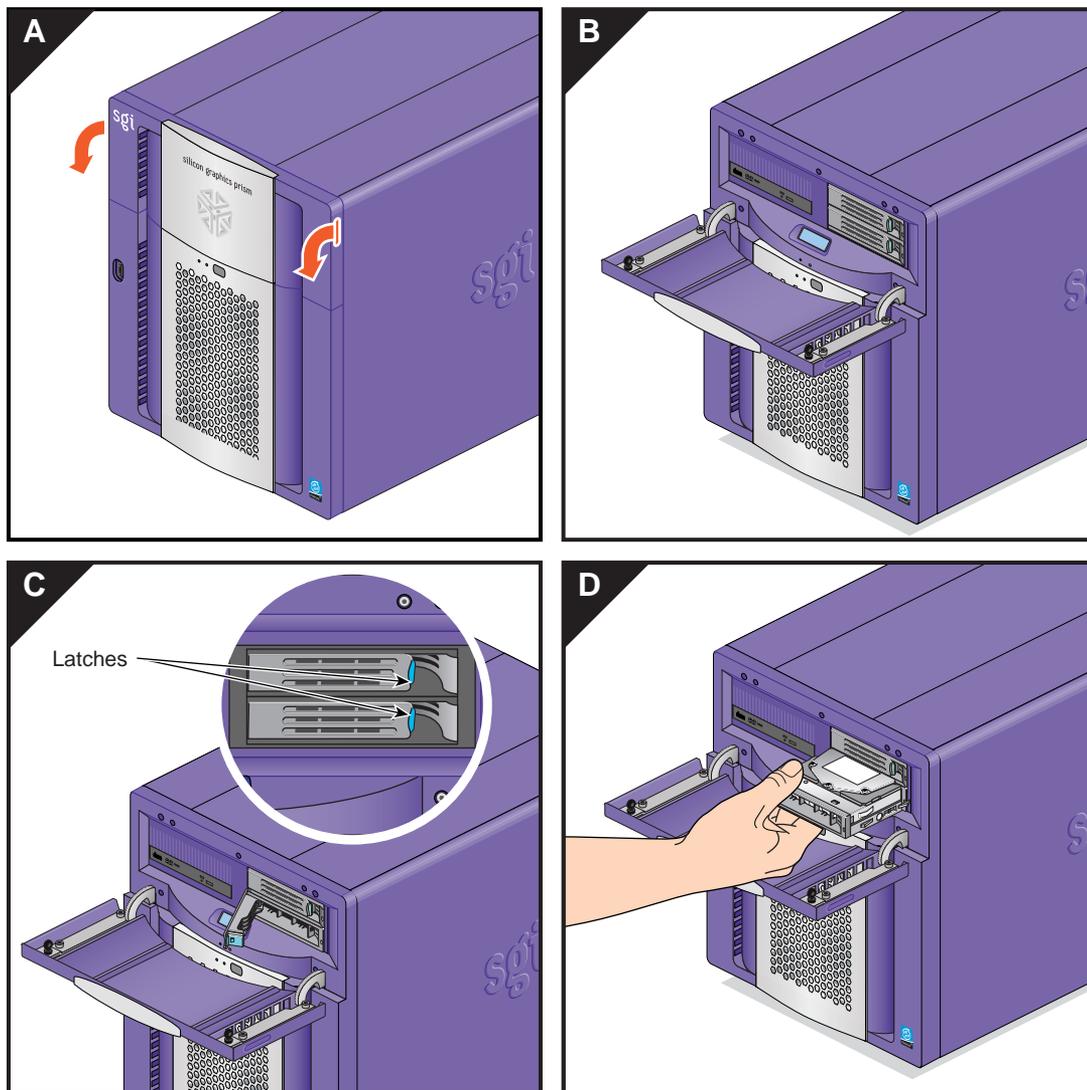


Figure 3-12 Installing an Internal Hard Disk Drive

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 stopped spinning before you remove it. If you are removing the drive in the lower drive bay, you must power down the system.

2. Press in on the right side of the locking handle; the handle will unlatch from the enclosure (see Figure 3-12).
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 3-12).
4. If you are not installing a replacement drive, install an empty drive sled to ensure proper airflow.

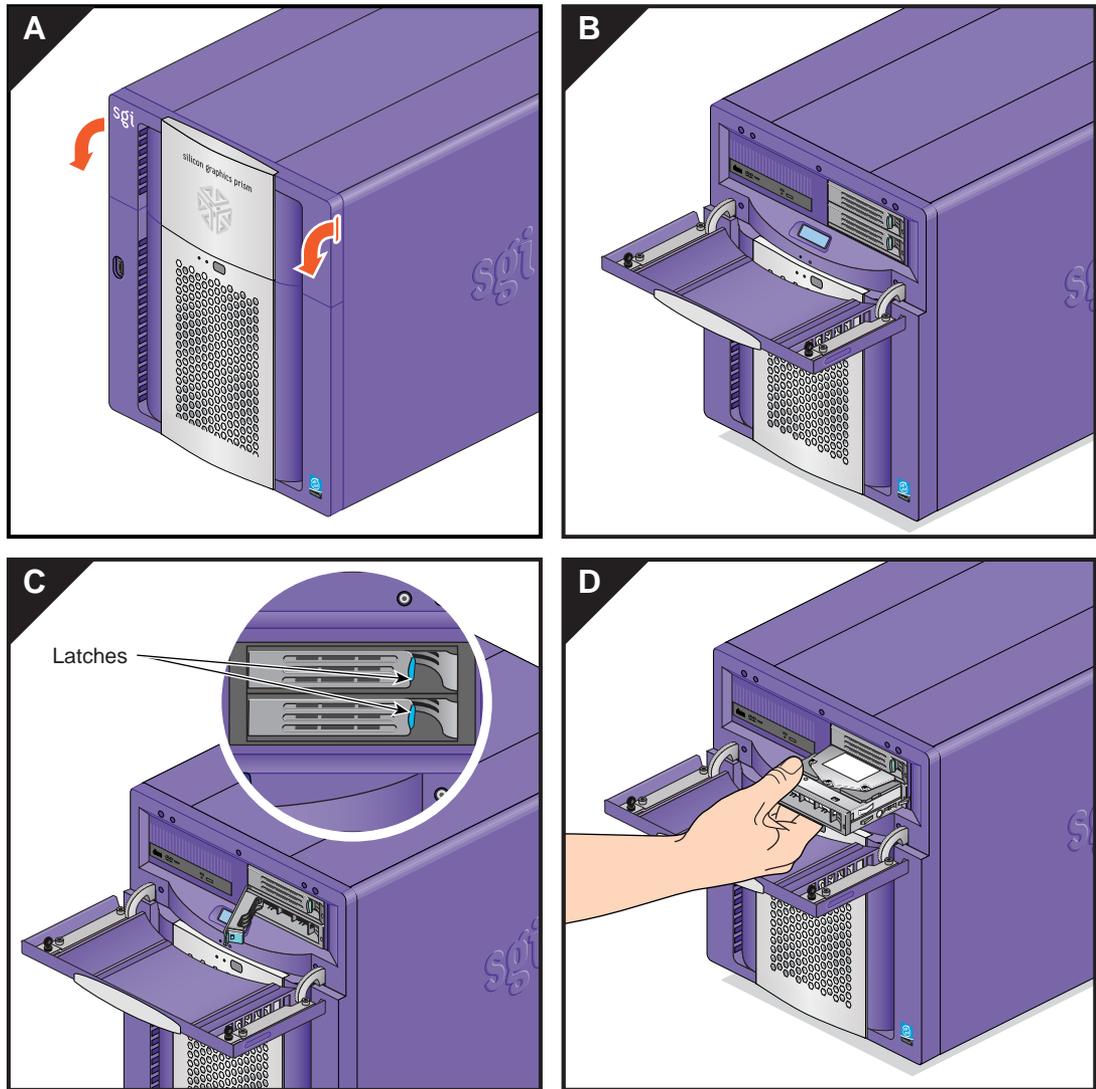


Figure 3-13 Removing an Internal Hard Disk Drive

Replacing the DVD-ROM Drive

The Silicon Graphics Prism Deskside visualization system 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 removing an existing drive and replacing it with a new DVD-ROM:

- “Removing the DVD-ROM Drive” on page 69
- “Installing a New DVD-ROM Drive” on page 71

Note: If you have not already done so, prepare your system for service. Refer to “Preparing the System for Service” on page 44. 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.

Removing the DVD-ROM Drive

Follow these steps to remove the DVD-ROM drive:

Note: You must remove the left side panel from the system before you can remove the DVD-ROM drive.

1. Disconnect the IDE and power cables from the rear of the DVD-ROM drive.
2. Undo the side retention screws that hold the drive in place in the slot; then slide the drive out of the drive cage (see Figure 3-14).
3. If you are replacing the drive with a new drive, refer to “Installing a New 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.

This completes the removal of the DVD-ROM drive. Go on to the next set of steps to replace the drive with a new unit. Or, to return the system to service, refer to “Returning the System to Service” on page 52.

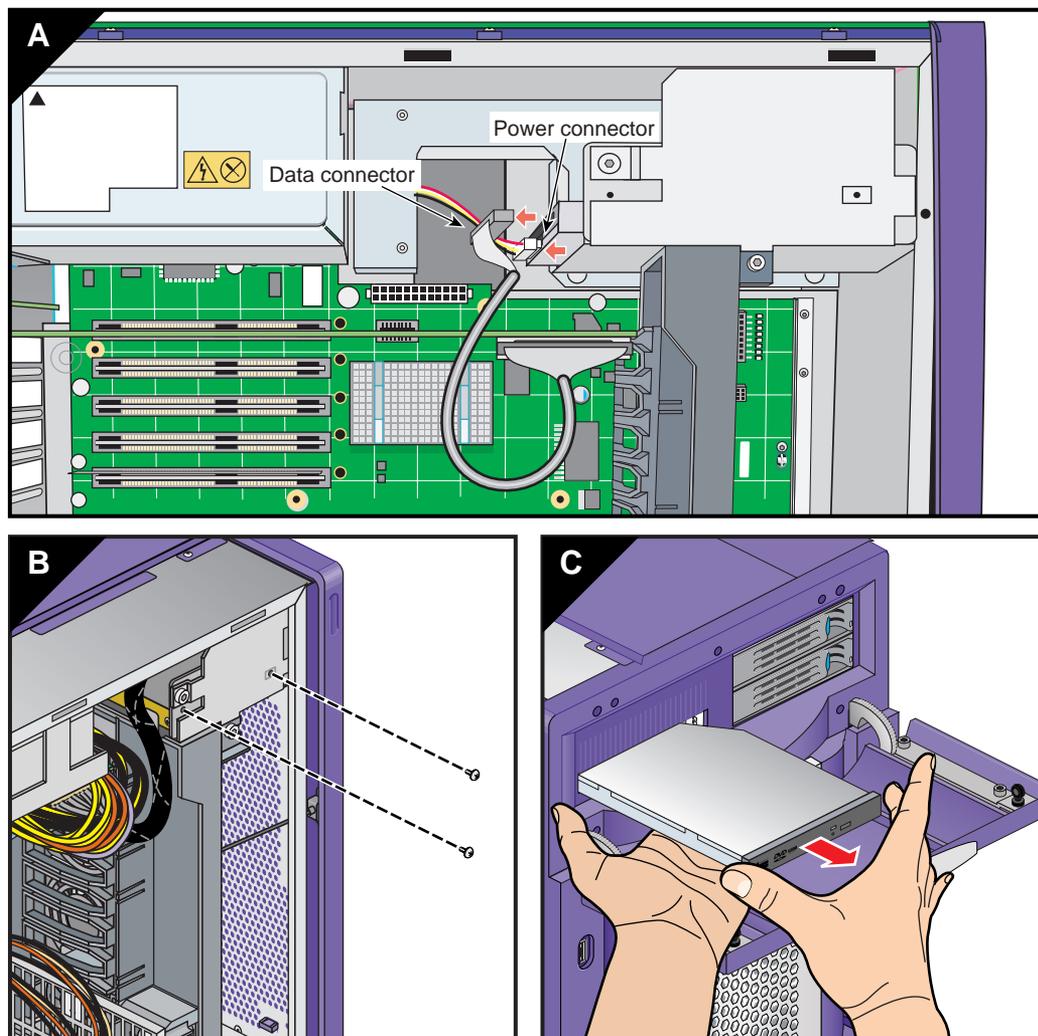


Figure 3-14 Removing the DVD-ROM Drive

Installing a New DVD-ROM Drive

Follow these steps to install a new DVD-ROM drive:

Note: You must remove the existing DVD-ROM drive before installing a new one. See the previous steps and Figure 3-14 on page 70 if you have not yet removed the installed drive.

1. Remove the metal blanking plate that covers the front of the DVD-ROM drive cage if it is in place.
2. Insert the drive until it is flush with the front of the system, then secure it in place with the two side retention screws.
3. Connect the IDE cable as follows (see Figure 3-15):
 - a. Insert one end of the IDE cable into the IDE connector on the rear of the DVD-ROM drive.
 - b. Open the latches of the IDE connector on the base I/O board. Then, insert the other end of the IDE cable into the base I/O board's IDE connector.
 - c. Close the latches on the I/O board IDE connector. Press the base I/O board into the interface board connectors to ensure that it is properly seated.
4. Connect the power cable to the rear of the drive (see Figure 3-15).

This completes the DVD-ROM drive installation. To return the system to service, see "Returning the System to Service" on page 52.

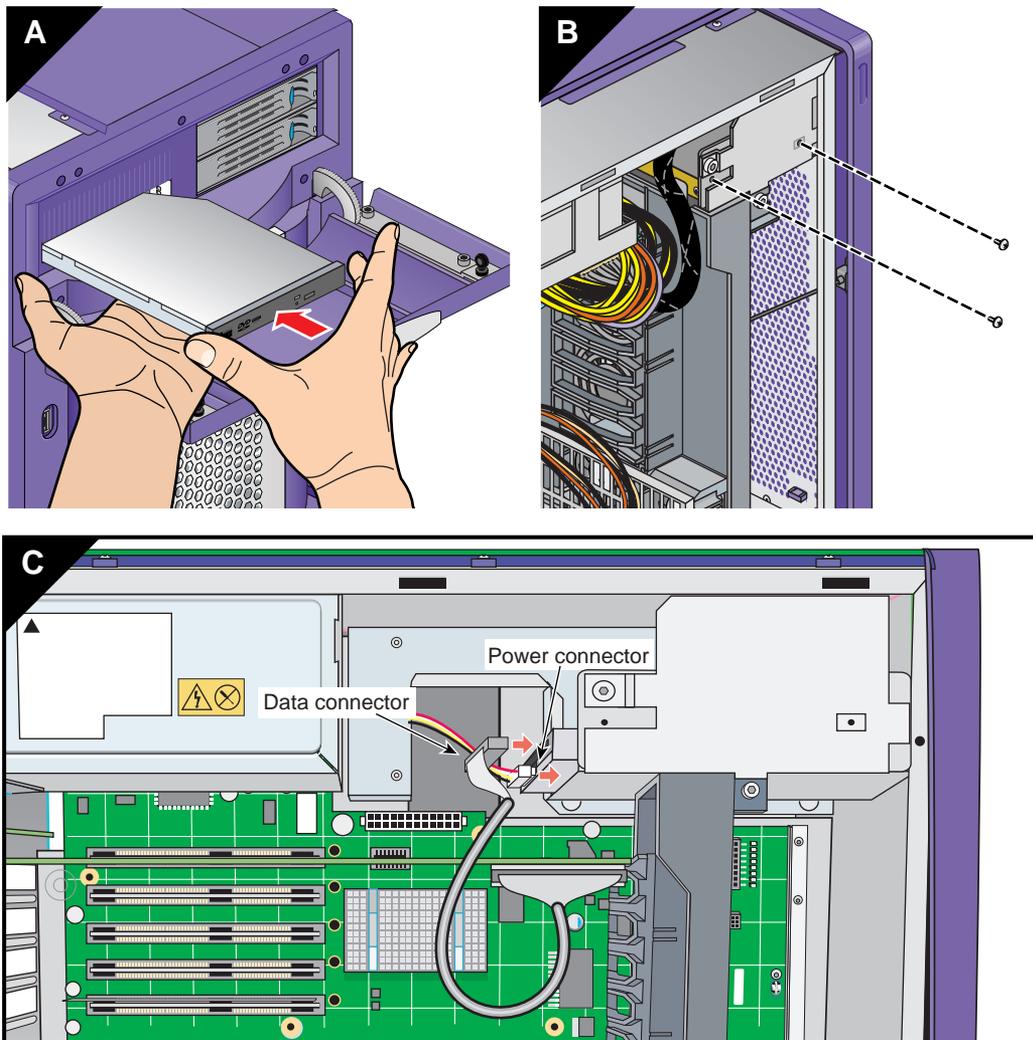


Figure 3-15 Installing the DVD-ROM Drive

Replacing the Base I/O Board

The base I/O board provides basic I/O functions for the system. It also provides connectivity between the hard-disk drives, DVD-ROM drive, and the interface board.

Note: If you remove the base I/O board, you must install a replacement I/O board. The system will not function without the base I/O board installed.

The following sections provide instructions that show you how to remove and install the base I/O board:

- “Removing the Base I/O Board” on page 74
- “Installing the Base I/O Board” on page 76

Note: If you have not already done so, prepare your system for service. Refer to “Preparing the System for Service” on page 44. In order to replace the base I/O board, you must remove the left side panel.

Removing the Base I/O Board

Follow these steps to remove the base I/O board:

1. Disconnect the SATA and IDE cables from the base I/O board. Then loosen the PCI retention strap (see Figure 3-16).

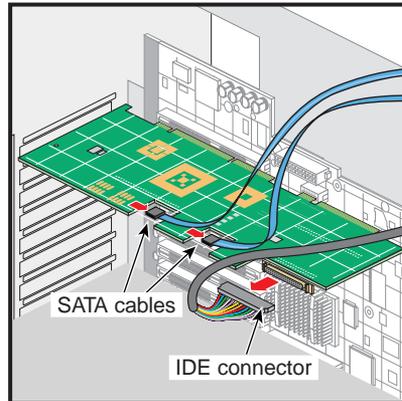


Figure 3-16 Disconnecting the Cables and Retention Strap

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

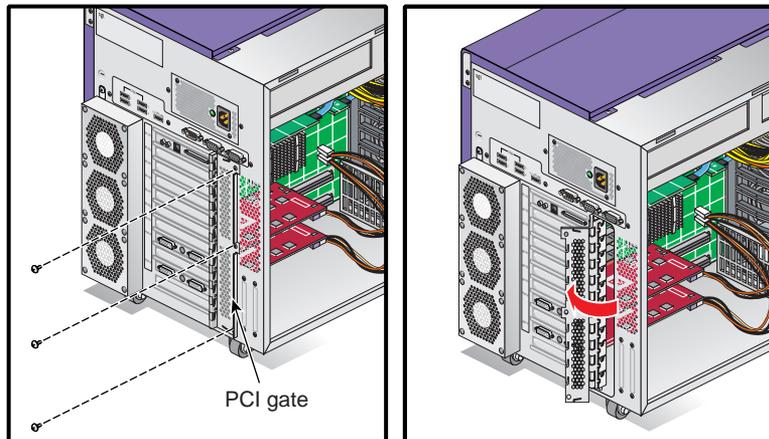


Figure 3-17 Opening the PCI Gate

3. Gently grasp both ends of the base I/O board. Then pull it straight out until it clears the PCI slot. Tilt the front end of the I/O board upward until it clears the edge of the chassis. Then remove the I/O board from the enclosure and place it in an antistatic bag in a safe location (see Figure 3-18).

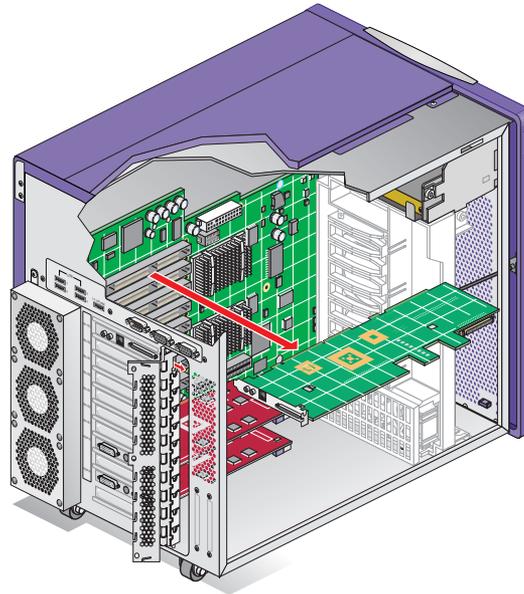


Figure 3-18 Removing the Base I/O Board

This completes the base I/O board removal. To install a new base I/O board, proceed to the next section.

Installing the Base I/O Board

Follow these steps to install a replacement base I/O board:

1. Remove the three screws that secure the PCI gate to the enclosure; then open the PCI gate (see Figure 3-19).

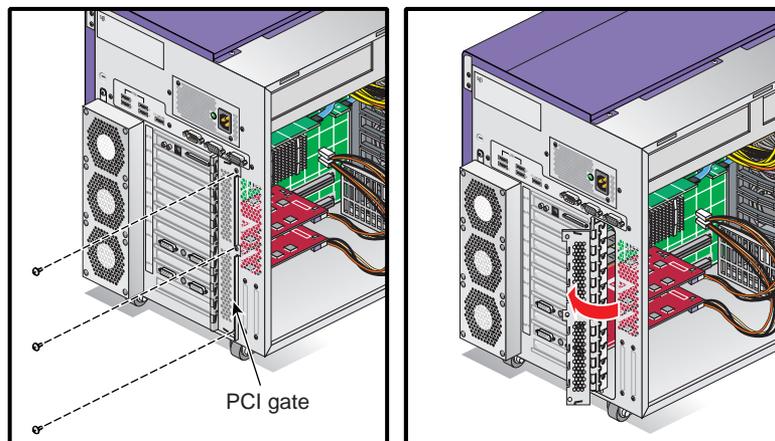


Figure 3-19 Opening the PCI Gate

2. If another base I/O PCI board is installed in the slot where you will install the new board, you must remove it before you can install the new base I/O PCI board. See “Removing a PCI Board” on page 84.
3. Align the base I/O board with PCI slot 1 on Bus 1.
4. Position the I/O board in the enclosure’s PCI slot. Press in to seat the board in the PCI connector on the interface board (see Figure 3-20).

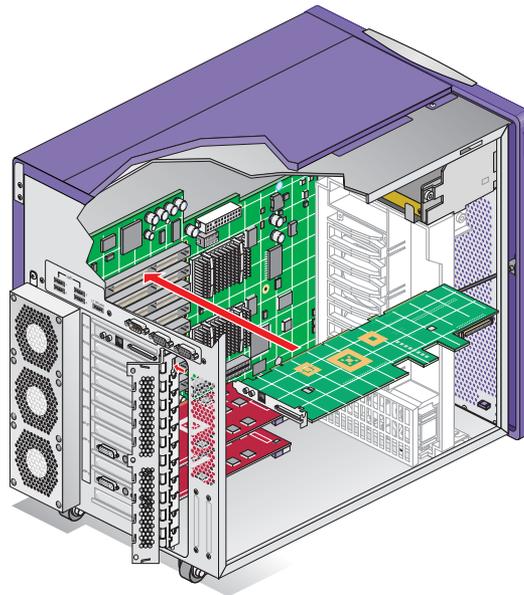


Figure 3-20 Installing the Base I/O Board

5. Connect the SATA and IDE cables to the base I/O board. To connect a cable, align the cable connector with the socket on the I/O board and press down (see Figure 3-21).

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

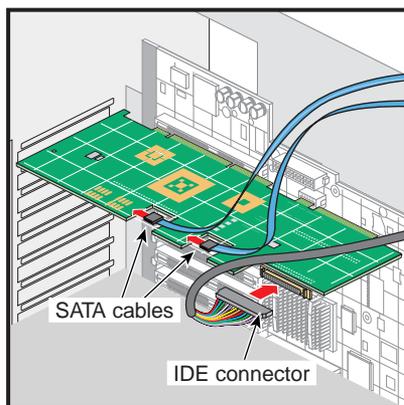


Figure 3-21 Connecting the Base I/O SATA and IDE Cables

6. Ensure that the base I/O 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 3-22).

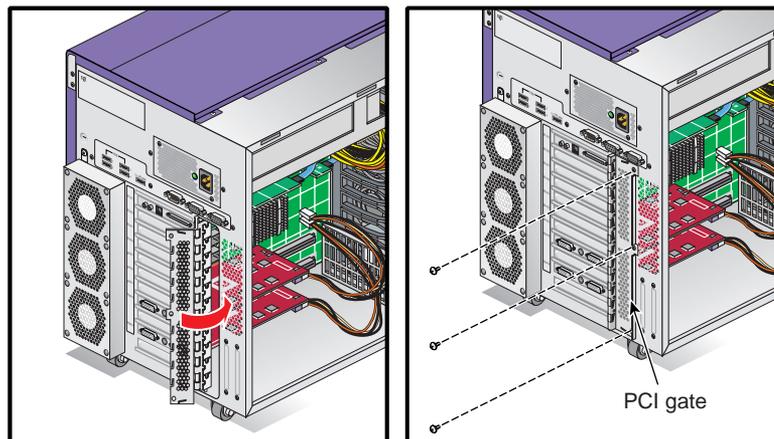


Figure 3-22 Closing the PCI Gate

This completes the installation of the deskside system's I/O board. To return the system to service, refer to "Returning the System to Service" on page 52.

Installing or Removing PCI Boards

The desktide systems support six optional PCI/PCI-X boards. The base I/O board always occupies the top available PCI/PCI-X slot. 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 32.

Note: If you have not already done so, prepare your system for service. Refer to “Preparing the System for Service” on page 44. 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 81
- “Removing a PCI Board” on page 84

Note: All of the figures in these sections depict systems with an optional second graphics card installed in the unit.

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 3-23).

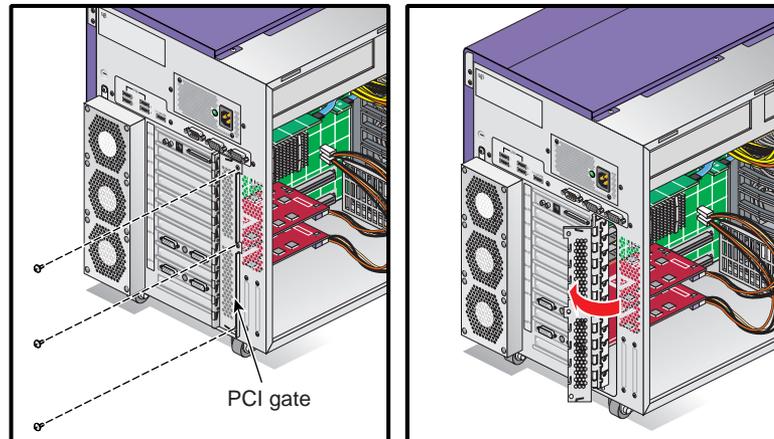


Figure 3-23 Opening the PCI Gate

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 84.

3. Align the PCI board with the PCI slot. Then lower it into the enclosure with the connector end angled slightly downward (see Figure 3-24).
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 3-24).

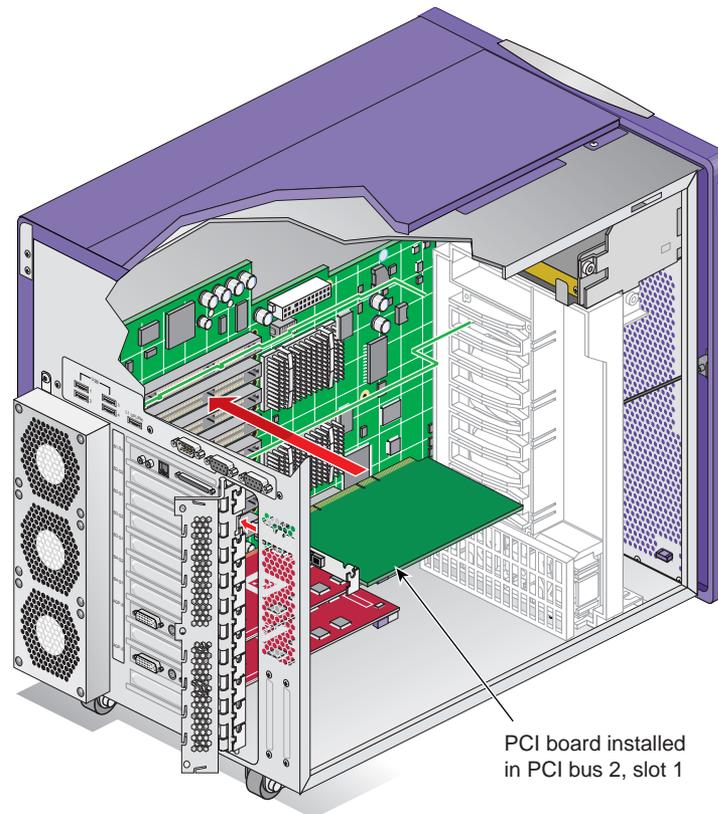


Figure 3-24 Installing the PCI Board

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 3-25).

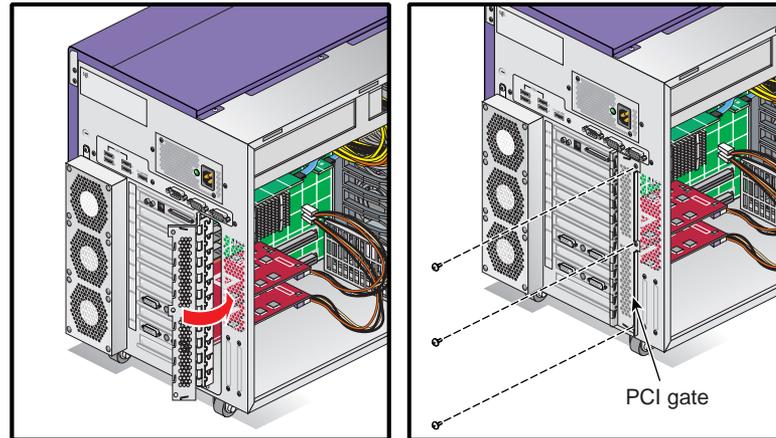


Figure 3-25 Closing the PCI Gate

This completes the PCI board installation. To return the system to service, refer to “Returning the System to Service” on page 52.

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 3-26).

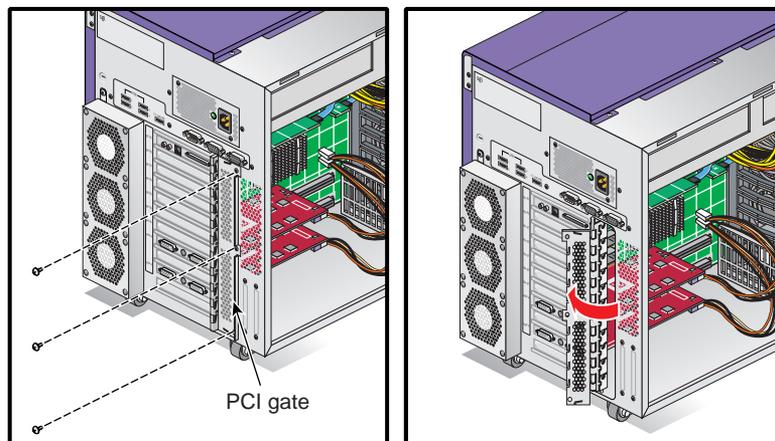


Figure 3-26 Opening the PCI Gate

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.

Important: If the PCI board you are removing is a graphics card, you should check to see if it uses a 7-pin synchronization cable (connected to the underside of the board). If so, carefully remove the cable before pulling the card from the unit (see Figure 3-27). The 7-pin synchronization cable is used with graphics systems that utilize an ImageSync option board.

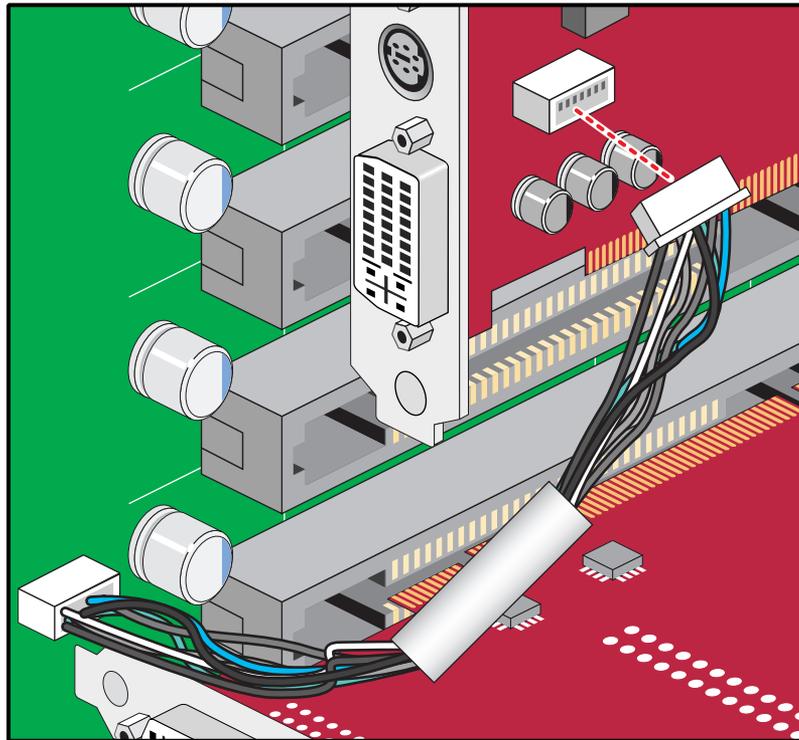


Figure 3-27 Graphics Card Synchronization Cable Example

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 3-28).

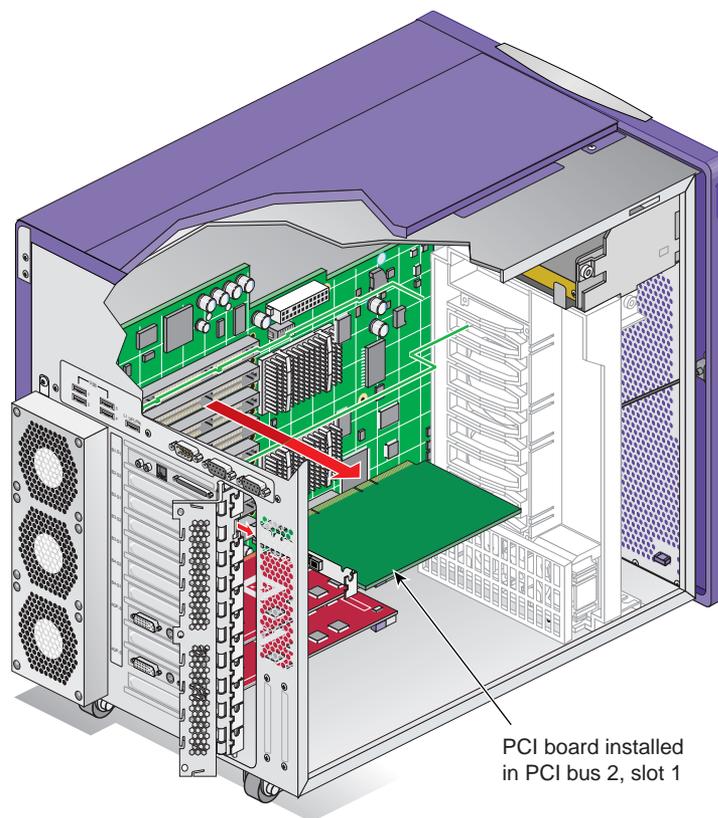


Figure 3-28 Removing a PCI Board

4. If you will be replacing the PCI board, see “Installing a PCI Board” on page 81.
5. If you are finished removing PCI boards, close the PCI gate. Then install the three screws that secure the gate to the enclosure.

This completes the PCI board removal. To return the system to service, refer to “Returning the System to Service” on page 52.

Installing or Removing External Devices

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

Replacing Cooling System Components

This section provides instructions for the following procedures:

- “Replacing the Fan Wall” on page 87
- “Replacing the Hard Disk Drive Fan” on page 89
- “Replacing the Rear Fan Assembly” on page 92

Caution: Never operate the unit without all of the cooling system components in place. Operating the system 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 3-29).

Note: If you have not already done so, prepare your system for service. Refer to “Preparing the System for Service” on page 44. 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.

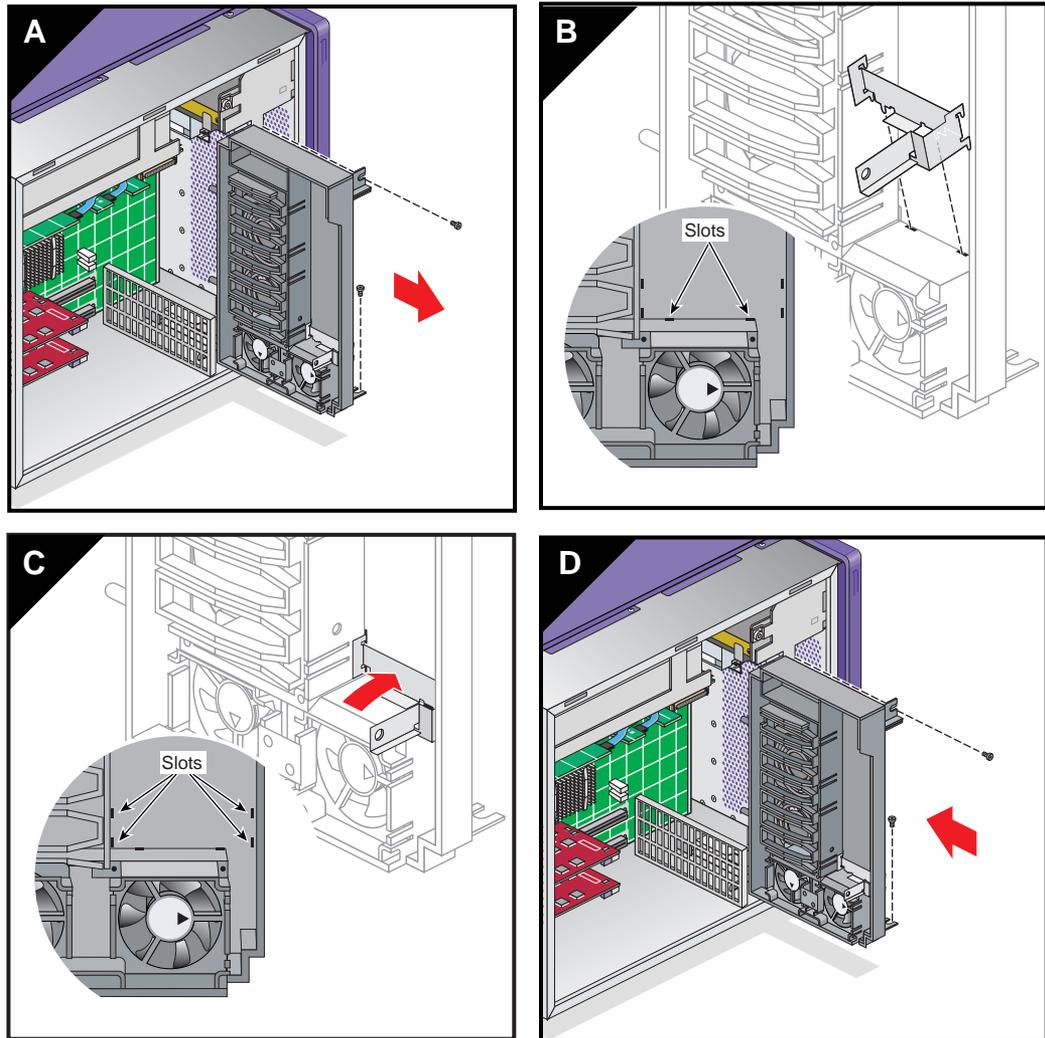


Figure 3-29 Replacing the Fan Wall

This completes the fan wall replacement. To return the system to service, see to “Returning the System to Service” on page 52.

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 System for Service” on page 44. 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 3-30).
2. Carefully remove the fan from the enclosure (see Figure 3-30).

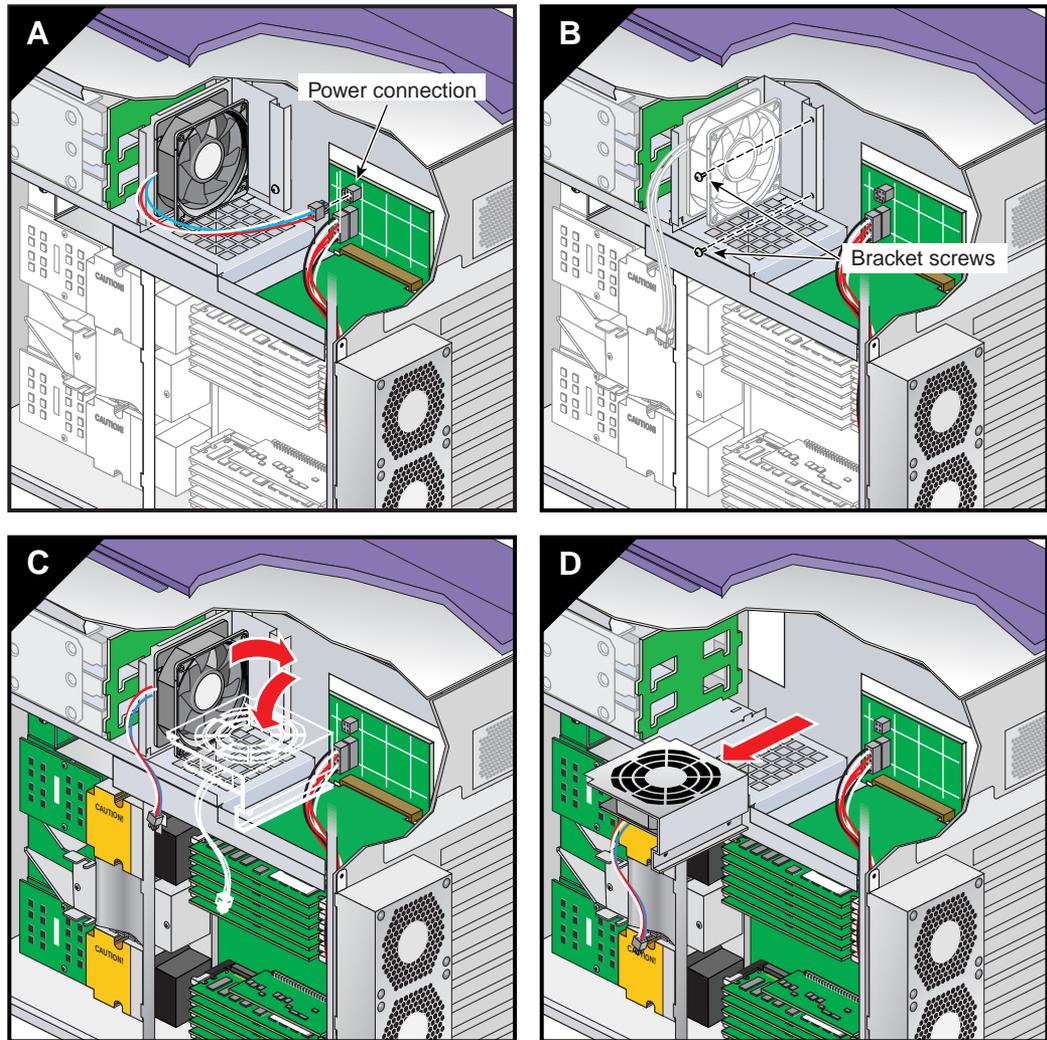


Figure 3-30 Removing the Hard Disk Drive Fan

3. Insert the new fan assembly into the enclosure (see Figure 3-31).
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 3-31).

5. Connect the disk drive fan power cable to the interface board (see Figure 3-31).

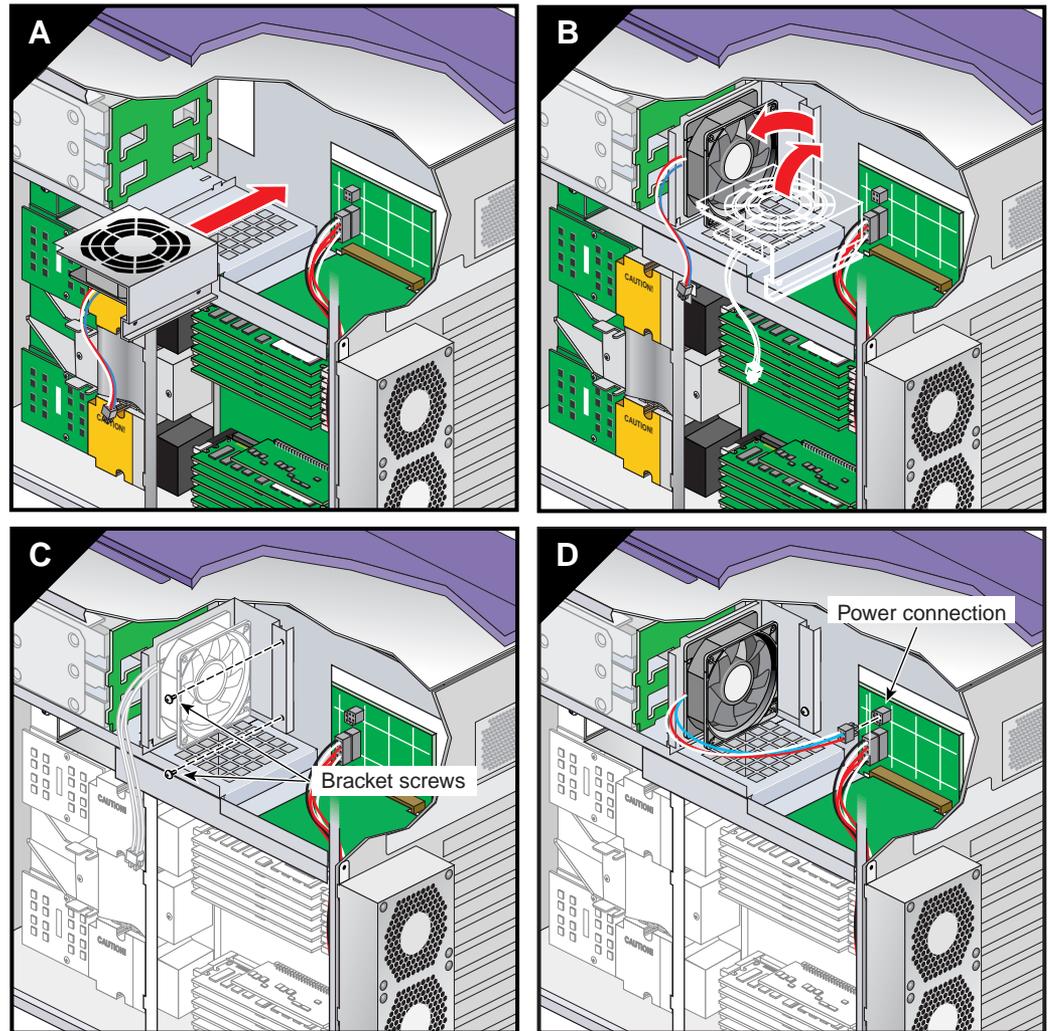


Figure 3-31 Installing the Hard Disk Drive Fan

This completes the replacement of the hard disk drive fan. To return the system to service, see “Returning the System to Service” on page 52.

Replacing the Rear Fan Assembly

Follow these steps to replace the rear fan assembly (see Figure 3-32):

Note: If you have not already done so, prepare your system for service. Refer to “Preparing the System for Service” on page 44. 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 on the replacement fan assembly with the slots 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.

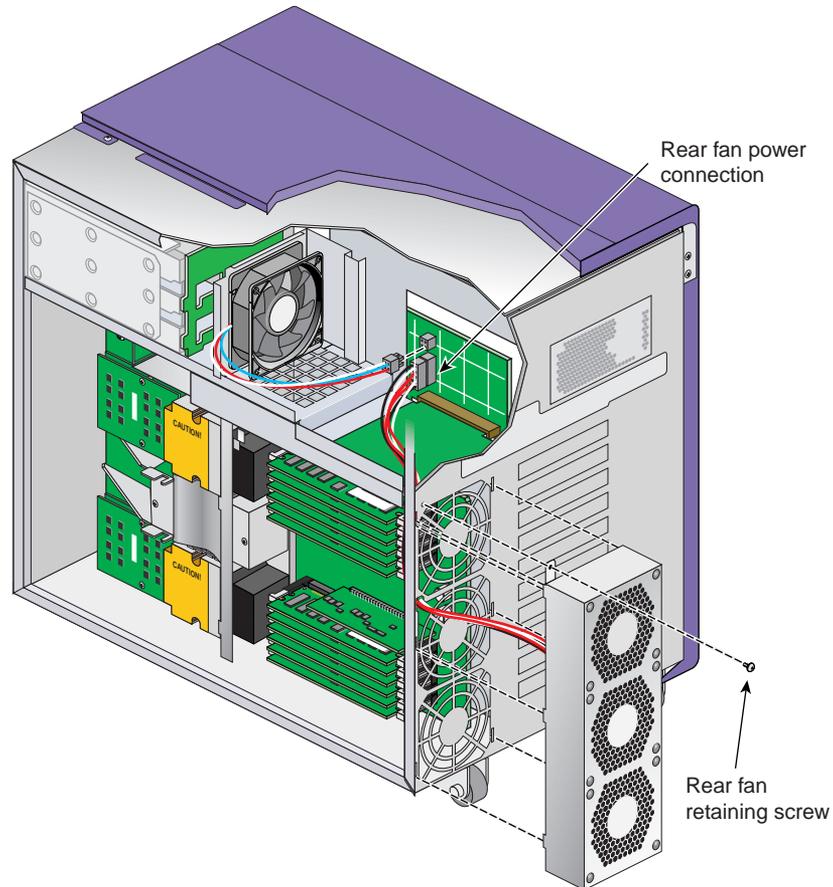


Figure 3-32 Replacing the Rear Fan Assembly

This completes the replacement of the rear fan assembly. To return the system to service, see “Returning the System to Service” on page 52.

Replacing Internal Cables

The following sections contain instructions for replacing internal cables:

- “Replacing the L1 Display Cable” on page 94
- “Replacing the LED Cable” on page 98
- “Replacing the DVD-ROM Drive Cable” on page 99

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 System for Service” on page 44. 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 3-33).
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 3-33).
4. Gently disconnect the L1 display cable from the display board. Place the L1 display board in a secure location (see Figure 3-33).
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 3-33).

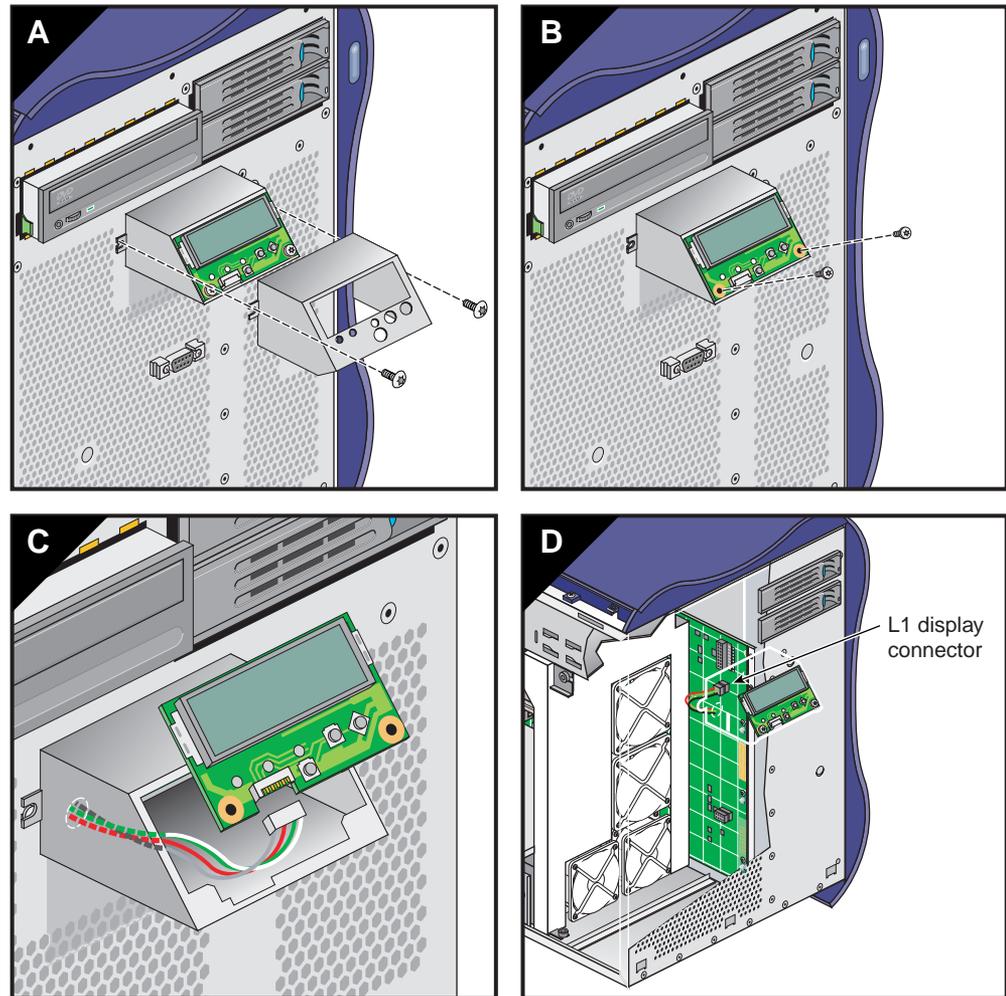


Figure 3-33 Removing the L1 Display Cable

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 3-34).

9. Connect the replacement L1 display cable to the interface board and the L1 display board (see Figure 3-34).
10. Install the two screws that secure the L1 display board to its bracket (see Figure 3-34).
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 3-34).
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 3-34).

This completes the replacement of the L1 display cable. To return the system to service, see to “Returning the System to Service” on page 52.

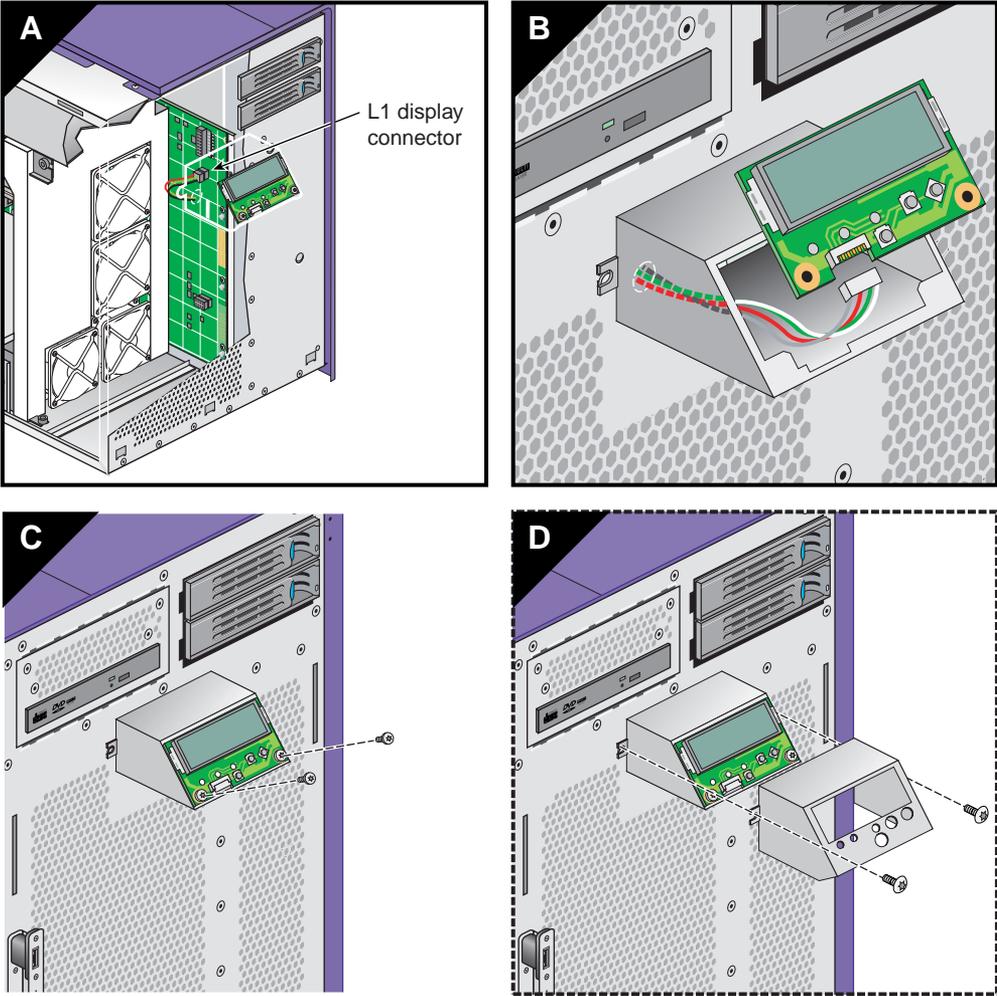


Figure 3-34 Installing the L1 Display Cable

Replacing the LED Cable

Follow these steps to replace the LED cable (see Figure 3-35).

Note: If you have not already done so, prepare your system for service. Refer to “Preparing the System for Service” on page 44. 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.

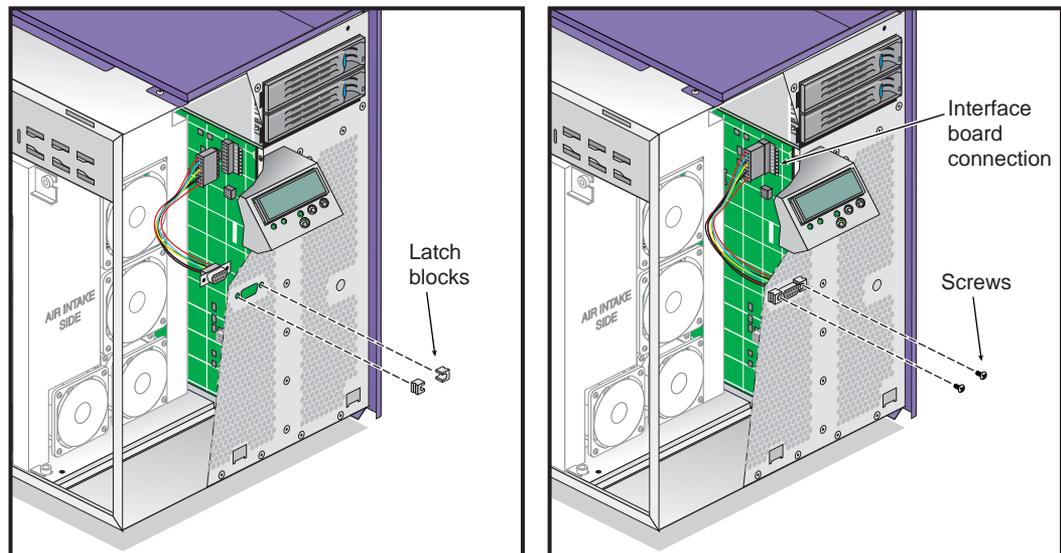


Figure 3-35 Replacing the LED Cable

This completes the replacement of the LED cable. To return the system to service, see “Returning the System to Service” on page 52.

Replacing the DVD-ROM Drive Cable

Follow the steps in this section to replace the DVD-ROM drive cable (see Figure 3-36).

Note: If you have not already done so, prepare your system for service. Refer to “Preparing the System for Service” on page 44. 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 (located near the rear) on the base I/O board. Then gently disconnect the DVD-ROM drive cable from the 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 base I/O 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 IO10 board into the interface board to ensure that it is firmly seated in its connectors.

This completes the replacement of the DVD-ROM drive cable. To return the system to service, see “Returning the System to Service” on page 52.

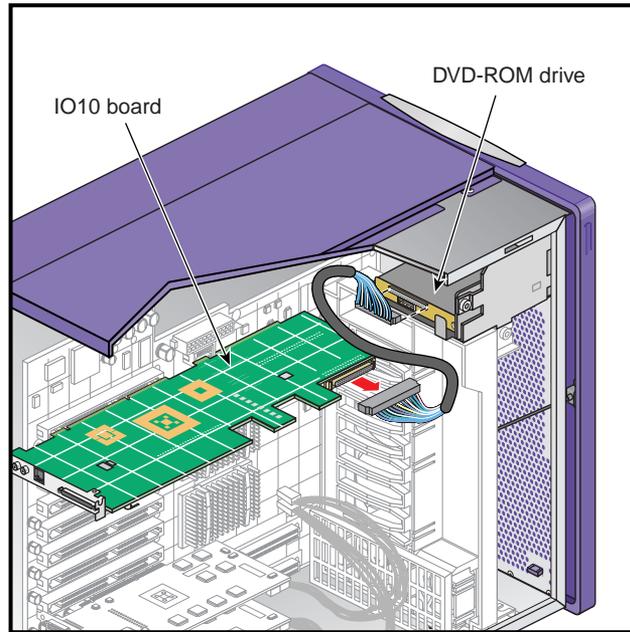


Figure 3-36 Replacing the IDE DVD-ROM Drive Cable

Replacing Enclosure Components

This section provides instructions for the following procedures:

- “Replacing the Enclosure Plastics” on page 101
- “Replacing the L1 Display” on page 102

Replacing the Enclosure Plastics

This section contains the following procedures:

- “Replacing the Bezel Assembly” on page 101
- “Replacing the Side Plastics” on page 101

Replacing the Bezel Assembly

See “Removing the Enclosure Bezel” on page 48 and “Installing the Enclosure Bezel” on page 52 for instructions on replacing the bezel assembly.

Replacing the Side Plastics

See “Removing the Left or Right Side Panel” on page 47 and “Installing the Side Panels” on page 54 for instructions on replacing the side panels.

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 System for Service” on page 44. In order to replace the L1 display, you must remove the front bezel and door assembly.

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 3-37).
2. Lift the L1 display housing upward until the hooks on the housing clear the holes in the enclosure (see Figure 3-37).
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 3-37).
4. Gently disconnect the L1 display cable from the L1 display board. Place the L1 display board in a secure location (see Figure 3-37).

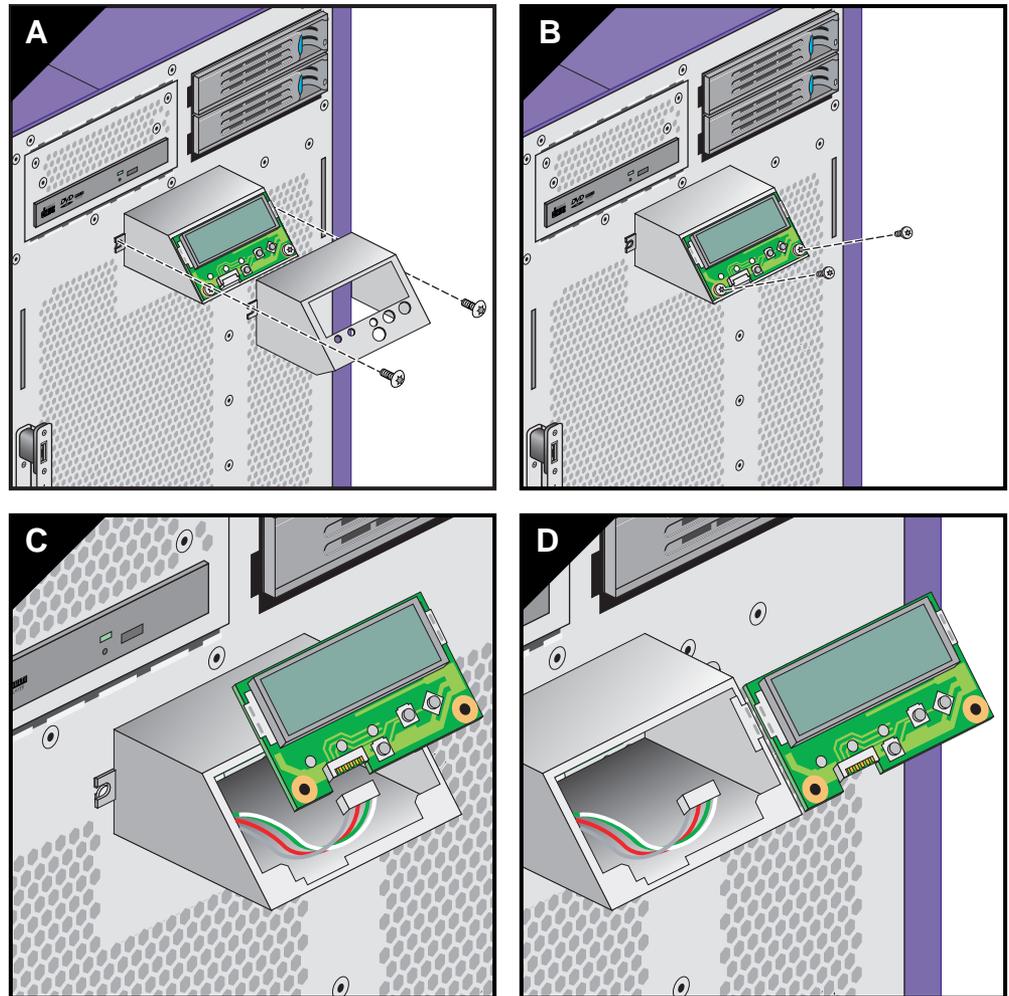


Figure 3-37 Removing the L1 Display Board

5. Connect the L1 display cable to the replacement L1 display board (see Figure 3-38).
6. Install the two screws that secure the L1 display board to its bracket (see Figure 3-38).
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 3-38).

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 3-38).

This completes the replacement of the L1 display board. To return the system to service, see “Returning the System to Service” on page 52.

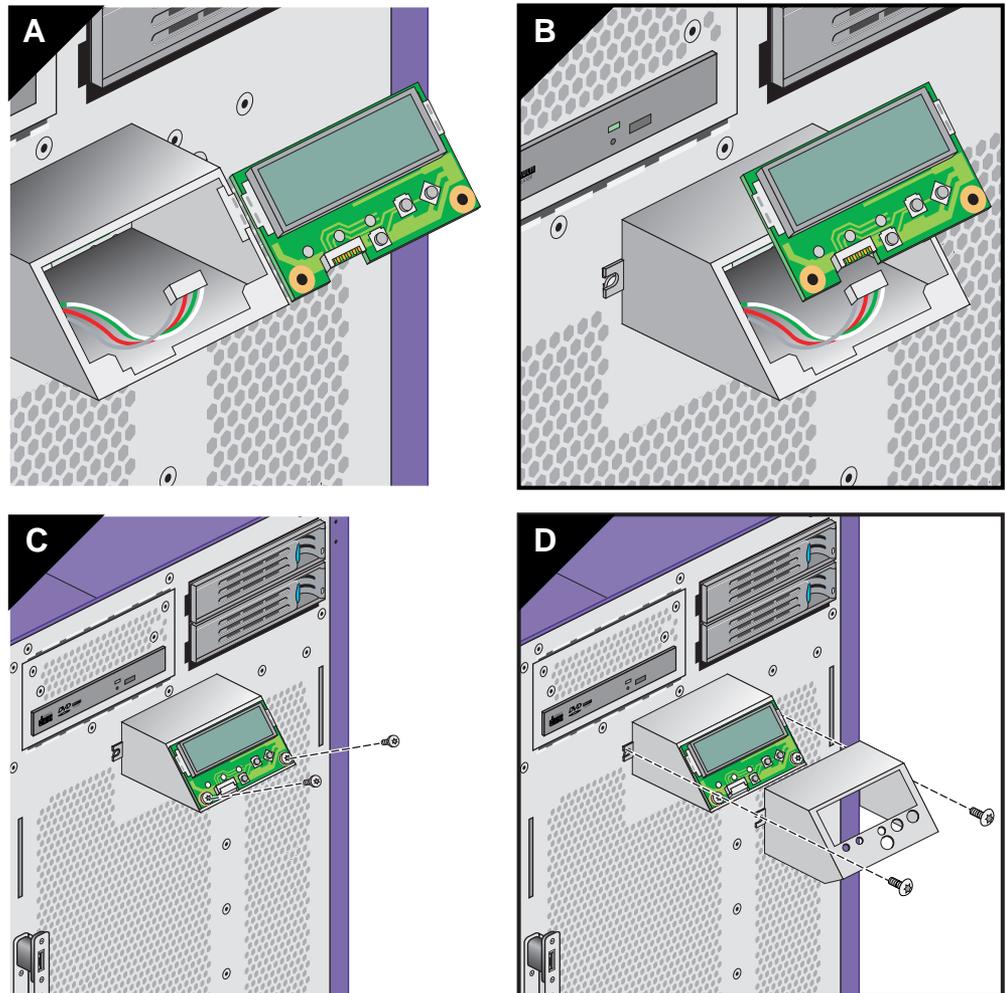


Figure 3-38 Installing the L1 Display Board

Troubleshooting and Diagnostics

If you are experiencing problems with your Silicon Graphics Prism Deskside visualization system, 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:

- “General Troubleshooting” on page 106
- “Diagnostics” on page 116
- “XF86Config File Changes” on page 122

General Troubleshooting

This section covers the following topics:

- “Environmental Fault Monitoring” on page 106
- “Troubleshooting Chart” on page 106
- “L1 Controller Error Messages” on page 107

Environmental Fault Monitoring

The system 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 system is powering off unexpectedly, check for these conditions.

Troubleshooting Chart

Table 4-1 lists recommended actions for problems that can occur on your system. For problems that are not listed in this table, use the SGI Electronic Support system to help solve your problem or contact your SGI system support engineer (SSE). More information about the SGI Electronic Support system is provided later in this chapter.

Table 4-1 Troubleshooting Chart

Problem Description	Recommended Action
The system will not power on.	Ensure that the power cord is seated properly in the power receptacle. Ensure that any receptacle circuit breaker is on. If the power cord is plugged in and the circuit breaker is on, contact your SSE.
The system will not boot the operating system.	Check the L1 boot error codes listed in Table 4-3 on page 110. Contact your SSE as needed.

Table 4-1 Troubleshooting Chart (continued)

Problem Description	Recommended Action
The red service-required LED illuminates.	View the L1 display of the failing system; see Table 4-2 for a description of the error message.
The PWR LED of a populated PCI slot is not illuminated.	Reseat the PCI card and reboot the system.
The fault LED of a populated PCI slot is illuminated.	Reseat the PCI card and reboot the system. If the fault LED remains on, replace the PCI card.
The amber LED of a disk drive is illuminated.	Replace the disk drive.

L1 Controller Error Messages

Table 4-2 lists error messages that the L1 controller generates and displays on the L1 display. This display is located on the front of the desktide system. For serial number related errors, check with your service provider for documentation on prevention and solutions.

The serial number error messages listed at the end of Table 4-2 can come across the L1 console from the L1 log. Obtain the contents by using the `log` command from an L1 prompt.

Actions that could cause serial number error messages include:

- Replacing the interface board of a system.
- L1 NVRAM memory failure.

Note: In Table 4-2, a voltage warning occurs when a supplied level of voltage is below or above the nominal (normal) voltage by 10 percent. A voltage fault occurs when a supplied level is below or above the nominal voltage by 20 percent.

Table 4-2 L1 Controller Messages

L1 System Controller Message	Message Meaning and Action Needed
Internal voltage messages:	
ATTN: x.xV high fault limit reached @ x.xxV	30-second power-off sequence for the module.
ATTN: x.xV low fault limit reached @ x.xxV	30-second power-off sequence for the module.
ATTN: x.xV high warning limit reached @ x.xxV	A higher than nominal voltage condition is detected.
ATTN: x.xV low warning limit reached @ x.xxV	A lower than nominal voltage condition is detected.
ATTN: x.xV level stabilized @ x.xV	A monitored voltage level has returned to within acceptable limits.
Fan messages:	
ATTN: FAN # x fault limit reached @ xx RPM	A fan has reached its maximum RPM level. The ambient temp may be too high. Check for failed fans.
ATTN: FAN # x warning limit reached @ xx RPM	A fan has increased its RPM level. Check the ambient temperature. Check to see if the fan stabilizes.
ATTN: FAN # x stabilized @ xx RPM	An increased fan RPM level has returned to normal.

Table 4-2 L1 Controller Messages (continued)

L1 System Controller Message	Message Meaning and Action Needed
Temperature messages: low alt.	
ATTN: TEMP # advisory temperature reached @ xxC xxF	The ambient temperature at the module's air inlet has exceeded 30° C.
ATTN: TEMP # critical temperature reached @ xxC xxF	The ambient temperature at the module's air inlet has exceeded 35° C.
ATTN: TEMP # fault temperature reached @ xxC xxF	The ambient temperature at the module's air inlet has exceeded 40° C.
Temperature messages: high alt.	
ATTN: TEMP # advisory temperature reached @ xxC xxF	The ambient temperature at the module's air inlet has exceeded 27° C.
ATTN: TEMP # critical temperature reached @ xxC xxF	The ambient temperature at the module's air inlet has exceeded 31° C.
ATTN: TEMP # fault temperature reached @ xxC xxF	The ambient temperature at the module's air inlet has exceeded 35° C.
Temperature stable message:	
ATTN: TEMP # stabilized @ xxC/xxF	The ambient temperature at the module's air inlet has returned to an acceptable level.
Power off messages:	
Auto power down in xx seconds	The L1 controller has registered a fault and is shutting down. The message displays every five seconds until shutdown.
Base module appears to have been powered down	The L1 controller has registered a fault and has shut down.
Serial number messages:	
Invalid System Serial Number format	See L1 log for details.
No assigned System Serial Number	See L1 log for details.

Under certain circumstances a system software or hardware error can occur prior to the graphics console's ability to display information. In this case you can see the error only on the L1 controller panel or from an optional system console connected to the Console serial port on the back of the system. In these cases an error message is displayed on the L1 display of the form <geoid> ERR <error code> or <geoid> POD <error code>. Most of the time, these errors indicate a serious problem and customer service should be called (please provide the error code to the service representative). See Table 4-3 for a partial list of the L1 Hexadecimal boot error codes.

Table 4-3 L1 Controller Hexadecimal Boot Error Codes

Error code	Message Meaning or Action Needed
0x80	The unit has no DIMM memory - insure that DIMM group 0 is fully populated. See the information in "Installing or Removing a Memory DIMM" on page 57.
0x81	Write to system controller timed out.
0x82	Request for system reset failed.
0x83	Local master arbitration failed.
0x84	No memory available to allocate hardware configuration structure.
0x85	Can't initialize klconfig.
0x87	Disabled by environment variable.
0x88	Call to unimplemented chip specific function.
0x89	System controller communication initialization failed.
0x8b	Nasid assignment failed.
0x8c	Route calculation failed.
0x8d	Critical system controller transaction failed.
0xb0	PAL early self test failed.
0xb1	SAL entered with invalid function code.
0xb2	SAL invoked for firmware recovery.
0xb3	SAL_RESET called with bad parameters.
0xb4	main () returned.
0xb5	PAL_CACHE_INFO failed looking for cache to reload.

Table 4-3 L1 Controller Hexadecimal Boot Error Codes

Error code	Message Meaning or Action Needed
0xb6	Cache preloading PAL call failed.
0xb7	Scratch area overflowed the CPU's caches.
0xb8	PAL_MEM_FOR_TEST failed.
0xb9	Bad address calculated for PAL_TEST_PROC
0xba	PAL_COPY_INFO failed.
0xbb	Bad PAL shadow address calculated.
0xbc	PAL_COPY_PAL failed.
0xbd	SDA transfer area overflowed.
0xbe	No PROM segment (e.g. EFI) found.
0xbf	PROM segment (e.g. EFI) exited.
0xc0	Out of SAL->EFI handoff memory.
0xc1	Cache tests failed.
0xc2	Error flashing PROM.
0xc3	Could not write new value to cr.lid.
0xd8	This unit has illegal DIMM population. Check and replace memory, see "Installing or Removing a Memory DIMM" on page 57.
0xf0	Waiting for primary lock.

Reading Power Supply Status LEDs

Use the LED located on the rear of the power supply to read the condition of the power supply. Table 4-4 shows the LED status and the power supply condition the LED status indicates.

Table 4-4 LED Status and Power Supply Condition

LED Status	Power Supply Condition Indicated
Off	An unlit LED indicates that the power supply is not receiving AC power. Power supplies will not be receiving AC power because either the module is not plugged into power, or an electrical fuse has blown.
Amber	Indicates a fault condition for one of the following reasons: <ul style="list-style-type: none">- The voltage limit has been exceeded.- The temperature limit has been exceeded.- The current limit has been exceeded.
Blinking Green	The power supply is receiving AC power, but the main primary DC power has not yet activated.
Green	The power supply is operating properly.

SGI Electronic Support

SGI Electronic Support provides system support and problem-solving services that function automatically, which helps resolve problems before they can affect system availability or develop into actual failures. SGI Electronic Support integrates several services so they work together to monitor your system, notify you if a problem exists, and search for solutions to the problem.

Figure 4-1 shows the sequence of events that occurs if you use all of the SGI Electronic Support capabilities.

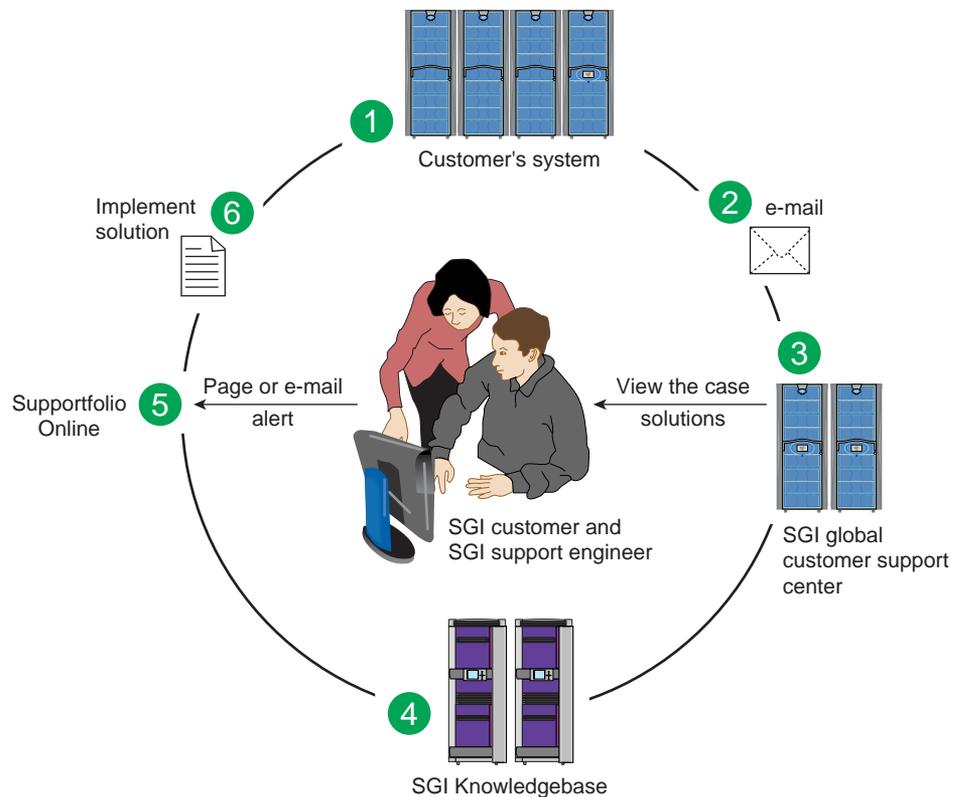


Figure 4-1 Full Support Sequence Example

The sequence of events can be described as follows:

1. Embedded Support Partner (ESP) monitors your system 24 hours a day.
2. When a specified system event is detected, ESP notifies SGI via e-mail (plain text or encrypted).
3. Applications that are running at SGI analyze the information, determine whether a support case should be opened, and open a case if necessary. You and SGI support engineers are contacted (via pager or e-mail) with the case ID and problem description.
4. SGI Knowledgebase searches thousands of tested solutions for possible fixes to the problem. Solutions that are located in SGI Knowledgebase are attached to the service case.
5. You and the SGI support engineers view and manage the case by using Supportfolio Online as well as search for additional solutions or schedule maintenance.
6. The solution is implemented.

Most of these actions occur automatically, and you may receive solutions to problems before they affect system availability. You also may be able to return your system to service sooner if it is out of service.

In addition to the event monitoring and problem reporting, SGI Electronic Support monitors both system configuration (to help with asset management) and system availability and performance (to help with capacity planning).

The following three components compose the integrated SGI Electronic Support system:

SGI Embedded Support Partner (ESP) is a set of tools and utilities that are embedded in the operating system. ESP can monitor a single system or group of systems for system events, software and hardware failures, availability, performance, and configuration changes, and then perform actions based on those events. ESP can detect system conditions that indicate potential problems, and then alert appropriate personnel by pager, console messages, or e-mail (plain text or encrypted). You also can configure ESP to notify an SGI call center about problems; ESP then sends e-mail to SGI with information about the event.

SGI Knowledgebase is a database of solutions to problems and answers to questions that can be searched by sophisticated knowledge management tools. You can log on to SGI Knowledgebase at any time to describe a problem or ask a question. Knowledgebase

searches thousands of possible causes, problem descriptions, fixes, and how-to instructions for the solutions that best match your description or question.

Supportfolio Online is a customer support resource that includes the latest information about patch sets, bug reports, and software releases.

The complete SGI Electronic Support services are available to customers who have a valid SGI Warranty, FullCare, FullExpress, or Mission-Critical support contract. To purchase a support contract that allows you to use the complete SGI Electronic Support services, contact your SGI sales representative. For more information about the various support contracts, see the following website:

<http://www.sgi.com/support/customerservice.html>

For more information about SGI Electronic Support, see the following website:

<http://www.sgi.com/support/es>

Diagnostics

The Silicon Graphics Prism Deskside visualization system is equipped with diagnostics to test the system hardware and diagnose component/part failures. These diagnostics are grouped into the following 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 117 for more information about POD.
- **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 118 for more information.

All diagnostics are loaded on your system 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 Prism visualization systems. 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
- Super Hub (SHub) ASIC
- PROM
- Memory DIMMs
- Secondary cache
- TIO ASICs
- PCI slots
- Serial ports
- Serial Advanced Technology Attach (SATA) controller
- Graphics pipe(s)

If the power-on diagnostics complete successfully, 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.

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 Linux 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 devices.)
- Extensive mode performs more disruptive I/O testing. (Ethernet is unavailable.) 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 Linux 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 4-5 for descriptions of the command-line options.

Table 4-5 `runalldiags` Command-line Options

Option	Description
<code>-h -help</code>	Displays help information
<code>-basic</code>	Runs the script in basic mode
<code>-normal</code>	Runs the script in normal mode (default)
<code>-extensive</code>	Runs the script in extensive mode
<code>-host <host></code>	Specifies a system to target for network tests
<code>-d <directory></code>	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.1.01enet`). Output from the script indicates the actual name of the file. When a diagnostic fails, the script continues to run the remaining diagnostics.

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. The following two examples show a successful and unsuccessful diagnostic.

Example 1: A Successful Execution

```
[root@snapper bin]# ./runalldiags -basic
Using
/lib/modules/2.4.21-sgi305a8/kernel/arch/ia64/sn/io/drivers/pciba.o
Warning: loading
/lib/modules/2.4.21-sgi305a8/kernel/arch/ia64/sn/io/drivers/pciba.o
will taint the kernel: no licenseSee
http://www.tux.org/lkml/#export-tainted for information about tainted
modules
```

```
Module pciba loaded, with warnings
Running online diagnostics at Basic level
Time: Tue Mar 17 08:02:51 CST 2005
System Information: Linux snapper.americas.sgi.com 2.4.21-sgi305a8 #1
SMP Fri Dec 17 22:44:01 PST 2004 ia64 ia64 ia64 GNU/Linux
```

```
Plan on running: torpedo olcmt pandora
torpedo - CPU Floating Point Unit Diagnostic
PASS(torpedo)
olcmt - Cache/Memory Test      (Check /var/log/messages for error
message)
PASS(olcmt)
```

```
pandora - System Stress Test
PASS(pandora)
Finished running at Tue Mar 17 08:47:14 CST 2005
Ran: 3  Failed: 0
```

Example 2: An Unsuccessful Execution

```
[root@snapper bin]# ./runalldiags -basic
Using
/lib/modules/2.4.21-sgi305a8/kernel/arch/ia64/sn/io/drivers/pciba.o
Warning: loading
/lib/modules/2.4.21-sgi305a8/kernel/arch/ia64/sn/io/drivers/pciba.o
will taint the kernel: no license
  See http://www.tux.org/lkml/#export-tainted for information about
tainted modules
Module pciba loaded, with warnings

Running online diagnostics at Basic level
Time: Tue Mar 17 09:00:00 CST 2005
System Information: Linux snapper.americas.sgi.com 2.4.21-sgi305a8 #1
SMP Fri Dec 17 22:44:01 PST 2004 ia64 ia64 ia64 GNU/Linux
Plan on running: torpedo olcmt pandora

torpedo - CPU Floating Point Unit Diagnostic
PASS(torpedo)
olcmt - Cache/Memory Test      (Check /var/log/messages for error
message)
PASS(olcmt)
pandora - System Stress Test
FAIL(pandora): see /tmp/diagFailure.0.pandora

Finished running at Tue Mar 17 09:44:17 CST 2005
Ran: 2  Failed: 1
```

XF86Config File Changes

The following sections provide information about customizing the XF86Config file for various special configurations.

Important: When using a compositor, you must always connect the graphics output cable to the left side (as viewed from the rear of the system) graphics connector.

Configuring a System for Stereo

This section describes how to configure a system to display stereo images.

Stereo sync is supported only on systems using optional ImageSync boards.

Note: Simultaneously running stereo and full scene anti-aliasing can require more graphics-card memory than is available, and thus may not always work correctly.

Note: Stereo may be enabled on either channel of a pipe, but may not be enabled on both channels simultaneously.

1. Create a copy of the XF86Config file to be customized for stereo:

```
# cp /etc/X11/XF86Config /etc/X11/XF86Config.Stereo
```

2. Edit the XF86Config.Stereo file to include the following line at the end of each “Device” section:

```
Option "Stereo" "1"  
Option "StereoSyncEnable" "1"
```

(see the “Example “Device” Section for Stereo” on page 124).

3. Edit the new XF86Config.Stereo file to include the appropriate stereo modes in the “Monitor” section:
 - a. Create an appropriate mode (see “Sample Stereo Mode Entries” on page 124).
 - b. Add that mode to the “Monitor” section of your XF86Config.Stereo file (see the “Example “Monitor” Section for Stereo” on page 124).

Note: “Mode” and “Modeline” are two alternative formats used to present the same information.

4. Ensure that the monitor supports the high horizontal sync rate setting. Refer to the documentation for the monitor to determine the horizontal sync rate. Modify the HorizSync setting in the “Monitor” section of the XF86Config.Stereo file. For example:

```
HorizSync 22-105
```

5. Modify the “Screen” section so that you use the appropriate mode setting. For example:

```
Modes "1280x1024@96"
```

(see the “Example “Screen” Section for Stereo” on page 124).

6. Make a backup copy of the default /etc/X11/gdm/gdm.conf file:


```
# cp /etc/X11/gdm/gdm.conf /etc/X11/gdm/gdm.conf-old
```
7. Edit the /etc/X11/gdm/gdm.conf file to use the new XF86Config.Stereo file you created:

Replace the line:

```
command=/usr/X11R6/bin/X
```

with:

```
command=/usr/X11R6/bin/X -xf86config /etc/X11/XF86Config.Stereo
```

8. Save the gdm.conf file and reboot the system to restart graphics in stereo mode.

Note that a stereo sync signal will not be present until you run a stereo application. One such application is `ivview`. If your system has `ivview` installed, you can use it to test the stereo configuration by running:

```
ivview /usr/share/data/models/X29.iv
```

and right click to activate the stereo setting on the preferences panel.

Example “Device” Section for Stereo

```
Section "Device"
    Identifier "SGI SG-0"
    Driver     "fglrx"
    BusId     "PCI:23:0:0"
# === QBS Management ===
    Option "Stereo" "1"
    Option "StereoSyncEnable" "1"
EndSection
```

Sample Stereo Mode Entries

```
Modeline "1024x768@96" 103.5 1024 1050 1154 1336 768 771 774 807
Modeline "1280x1024@96" 163.28 1280 1300 1460 1600 1024 1027 1033 1063
Modeline "1024x768@100" 113.309 1024 1096 1208 1392 768 769 772 814
Modeline "1024x768@120" 139.054 1024 1104 1216 1408 768 769 772 823 +hsync +vsync
Modeline "1280x1024@100" 190.960 1280 1376 1520 1760 1024 1025 1028 1085 +hsync +vsync
Mode "1280x1024_96s_mirage"
    DotClock 152.928
    HTimings 1280 1330 1390 1500
    VTimings 1024 1026 1030 1062
EndMode
```

Example “Monitor” Section for Stereo

```
Section "Monitor"
    Identifier "Stereo Monitor"
    HorizSync 30-96 # multisync
    VertRefresh 50-160 # multisync
    Modeline "1024x768@96" 103.5 1024 1050 1154 1336 768 771 774 807
EndSection
```

Example “Screen” Section for Stereo

```
Section "Screen"
    Identifier "Screen SG-0"
    Device     "SGI SG-0"
    Monitor    "Stereo Monitor"
    DefaultDepth 24
    SubSection "Display"
        Depth 24
        Modes "1280x1024@96"
    EndSubSection
EndSection
```

Configuring a System for Full Scene Anti-Aliasing

This section describes how to configure a system for global or per-window full scene anti-aliasing.

Note: Simultaneously running stereo and full scene anti-aliasing can require more graphics-card memory than is available, and thus may not work correctly.

1. Create a copy of the XF86Config file to be customized for full scene anti-aliasing:

```
# cp /etc/X11/XF86Config /etc/X11/XF86Config.AntiAlias
```

Note: Automatically-generated XF86Config files should contain the customized multi-sample positions shown in “Example “Device” Section for Full Scene Anti-Aliasing” on page 126. If these values are not already present, adding them can significantly improve the quality of your output.

2. Edit the new XF86Config.AntiAlias file to include the following line at the end of each “Device” section:

```
Option "FSAAScale" "X"
```

where *X* is 1, 2, 4, or 6 (see the example “Device” section “Example “Device” Section for Full Scene Anti-Aliasing” on page 126).

Note: Per-window full scene anti-aliasing is accomplished by setting “FSAAScale” to 1. The anti-aliasing level may then be set by the appropriate selection of visuals. Global anti-aliasing is accomplished by setting “FSAAScale” to 2, 4, or 6. In this case, the setting will apply to all OpenGL windows, regardless of the visual being displayed.

3. Make a backup copy of the default /etc/X11/gdm/gdm.conf file:

```
# cp /etc/X11/gdm/gdm.conf /etc/X11/gdm/gdm.conf-old
```

4. Edit the /etc/X11/gdm/gdm.conf file to use the new XF86Config.AntiAlias file you created:

Replace the line:

```
command=/usr/X11R6/bin/X
```

with:

```
command=/usr/X11R6/bin/X -xf86config /etc/X11/XF86Config.AntiAlias
```

5. Save the `gdm.conf` file:

6. Restart graphics: # <CTRL> <ALT> <BKSPC>

Example “Device” Section for Full Scene Anti-Aliasing

```
Section "Device"
    Identifier "SGI SG-0"
    Driver      "fglrx"
    BusId       "PCI:23:0:0"
# === FSAA Management ===
    Option "FSAAScale"                "1"
    Option "FSAADisableGamma"         "no"
    Option "FSAACustomizeMSPos"       "yes"
    Option "FSAAMSPosX0"               "0.250000"
    Option "FSAAMSPosY0"               "0.416666"
    Option "FSAAMSPosX1"               "0.083333"
    Option "FSAAMSPosY1"               "0.083333"
    Option "FSAAMSPosX2"               "0.416666"
    Option "FSAAMSPosY2"               "0.750000"
    Option "FSAAMSPosX3"               "0.750000"
    Option "FSAAMSPosY3"               "0.916666"
    Option "FSAAMSPosX4"               "0.583333"
    Option "FSAAMSPosY4"               "0.250000"
    Option "FSAAMSPosX5"               "0.916666"
    Option "FSAAMSPosY5"               "0.583333"
EndSection
```

Configuring a System for Dual-Channel Operation

To configure a system for dual-channel operation, follow the steps in this section.

Note: If any pipes managed by an X server have their second channel enabled, then every pipe managed by that X server must have its second channel enabled.

Note: Both channels on a pipe must have the same display resolution.

1. Create a copy of the XF86Config file to be customized for dual-channel operation:

```
# cp /etc/X11/XF86Config /etc/X11/XF86Config.DualChannel
```

2. Edit the new XF86Config.DualChannel file to include the following line at the end of each “Device” section:

```
Option "DesktopSetup" mode
```

where *mode* is one of the following:

```
"0x00000100" [this mode clones the managed area]
```

```
"0x00000200" [this mode scales the managed area by 2 horizontally]
```

```
"0x00000300" [this mode scales the managed area by 2 vertically]
```

(see “Example “Device” Section for Dual Channel” on page 128).

Note: All pipes managed by the same X server must be set to the same mode.

3. When using monitors or monitor cables which do not conform to the VESA Display Data Channel (DDC) standard, append the following entry in the “Device” section to enable proper display configuration:

```
Option "NoDDC" "on"
```

4. Make a backup copy of the default /etc/X11/gdm/gdm.conf file:

```
# cp /etc/X11/gdm/gdm.conf /etc/X11/gdm/gdm.conf-old
```

5. Edit the `/etc/X11/gdm/gdm.conf` file to use the new `XF86Config.DualChannel` file you created:

Replace the line:

```
command=/usr/X11R6/bin/X
```

with:

```
command=/usr/X11R6/bin/X -xf86config /etc/X11/XF86Config.DualChannel
```

6. Save the `gdm.conf` file:

7. Restart graphics:

```
# <CTRL> <ALT> <BKSPC>
```

Example “Device” Section for Dual Channel

```
Section "Device"
    Identifier   "SGI SG-0"
    Driver      "fglrx"
    BusId       "PCI:23:0:0"
    Option      "DesktopSetup" "0x00000200"
EndSection
```

Enabling Overlay Planes

To enable overlay planes, follow these steps:

Note: The option to enable overlay planes only applies to the first channel on the pipe.

1. Edit the `/etc/X11/XF86Config` file to include the following line in each “Device” section for which you want overlay planes enabled:

```
Option "OpenGLOverlay" "On"
```

2. Log out from the desktop, then log back in.

Example “Device” Section to Enable Overlay Planes

```
Section "Device"  
    Identifier "SGI SG-0"  
    Driver     "fglrx"  
    BusId     "PCI:23:0:0"  
    Option    "OpenGLOverlay" "On"  
EndSection
```

Configuring a System for External Genlock or Framelock

External genlock and framelock may be used on systems with at least one optional ImageSync board.

To configure your system to receive an external genlock or framelock signal you must run the `setmon` command with the appropriate options.

Before running `setmon`, use `printenv DISPLAY` to ensure that the `DISPLAY` environment variable is set to the local system (for example, `:0.0`). If it is not, use `setenv DISPLAY :0.0` to change it (substituting other numbers for `:0.0` if appropriate).

To set the system for genlock, execute the following command:

```
# setmon -ppipenumber -g graphicsformat
```

where *pipenumber* is the pipe to which this setting should be applied, and *graphicsformat* is one of the timings (modes) listed in the “Monitor” section of the `/etc/X11/XF86Config` file.

To set the system for framelock, execute the following command:

```
# setmon -ppipenumber -Lvideoformat graphicsformat
```

where *pipenumber* is the pipe to which this setting should be applied, *videoformat* is the input video format to be used as a framelock source, and *graphicsformat* is one of the framelock-certified timings (modes) listed in the “Monitor” section of the `/etc/X11/XF86Config` file that is compatible with the chosen input video format (Table 4-6 on page 131 provides a list of compatible formats).

Note: The default behavior of `setmon` is to load the new format for the current session only and to prompt for input to determine if the format should be saved as the default. To save the new format as the default you must be logged in as root.

For more information about the `setmon` command, see the `setmon` man page (`man setmon`).

Note: Framelock-certified timings will include an “f” appended to their name (i.e., “1280x1024_5994f” is certified for NTSC (525 line) video timing).

Table 4-6 Input Video Formats (Framelock)

Input Video Format (Framelock Source)	Format Name	Compatible Graphics Formats
525 line at 59.94Hz (NTSC)	525 (or use the alias NTSC)	1280x1024_5994f 1920x1154_5994f
625 line at 50Hz (PAL)	625 (or use the alias PAL)	1280x1024_50f 1920x1154_50f
720-line progressive-scan at 59.94Hz	720p_5994	1920x1154_5994f
720-line progressive-scan at 60Hz	720p_60	1280x1024_60f 1920x1154_60f 1920x1200_60f
1080-line progressive-scan at 25Hz	1080p_25	1280x1024_50f 1920x1154_50f
1080-line interlaced at 25Hz	1080i_25	1280x1024_50f 1920x1154_50f
1080-line progressive-scan at 29.97Hz	1080p_2997	1920x1154_5994f
1080-line interlaced at 29.97Hz	1080i_2997	1920x1154_5994f
1080-line progressive-scan at 30Hz	1080p_30	1280x1024_60f 1920x1154_60f 1920x1200_60f
1080-line interlaced at 30Hz	1080i_30	1280x1024_60f 1920x1154_60f 1920x1200_60f

Configuring Monitor Positions

When an X-Server is managing multiple monitors, it needs to know their relative positions in order to properly handle cursor cross-over locations.

The monitor positions are specified in the “ServerLayout” section of the `/etc/X11/XF86Config` file as follows:

Each screen is listed, followed by a list of the screens above, below, to the left, and to the right of it (in that order). Figure 4-2 and the following subsection show an example of four monitors arranged in a line.

Programs started by clicking on an icon appear on the screen from which you invoked them. Note that once a program has been launched, it is not possible to move it from one screen to another.



Figure 4-2 Four Monitors in a Line

Example “ServerLayout” Section for Four Monitors in a Line

```
Section "ServerLayout"
    Identifier "Four-in-a-Line"
    Screen "Screen SG-0"      ""      ""      ""      "Screen SG-1"
    Screen "Screen SG-1"      ""      ""      "Screen SG-0"  "Screen SG-2"
    Screen "Screen SG-2"      ""      ""      "Screen SG-1"  "Screen SG-3"
    Screen "Screen SG-3"      ""      ""      "Screen SG-2"  ""
    InputDevice "Mouse1"     "CorePointer"
    InputDevice "Keyboard1"  "CoreKeyboard"
EndSection
```

Figure 4-3 and the subsection following it show an example of four monitors arranged in a square.

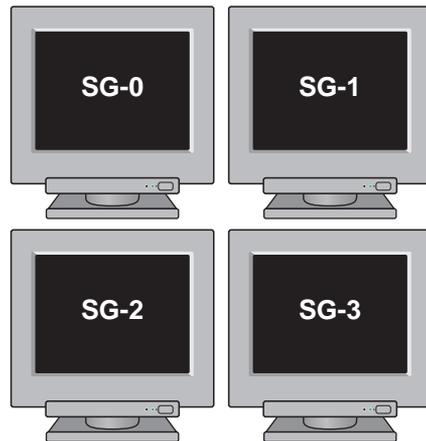


Figure 4-3 Four Monitors in a Square

Example “ServerLayout” Section for Four Monitors in a Square

```
Section "ServerLayout"
    Identifier "Four-in-a-Square"
    Screen "Screen SG-0"      ""          "Screen SG-2"      ""          "Screen SG-1"
    Screen "Screen SG-1"      ""          "Screen SG-3"      "Screen SG-0"  ""
    Screen "Screen SG-2"      "Screen SG-0"  ""          ""          "Screen SG-3"
    Screen "Screen SG-3"      "Screen SG-1"  ""          "Screen SG-2"  ""
    InputDevice "Mouse1" "CorePointer"
    InputDevice "Keyboard1" "CoreKeyboard"
EndSection
```

Configuring Monitor Types

The system graphics cards support both analog and digital monitors. The type of monitor connected to each graphics card is specified in the “Device” sections of the `/etc/X11/XF86Config` file.

Table 4-7 lists the allowable options for the `MonitorLayout` line. If the line is not present, both channels default to `AUTO`.

Table 4-7 Options for Monitor Layout

Monitor Type	Meaning
AUTO	Automatically select monitor type (default)
TMDS	Digital monitor
CRT	Analog monitor
NONE	No monitor

The format is:

```
Option      "MonitorLayout" "channel1type, channel2type"
```

where *channel1type* is the type (`AUTO`, `TMDS`, `CRT` or `NONE`) of monitor attached to channel 1 (the left DVI-I connector) for this pipe, and *channel2type* is the type (`AUTO`, `TMDS`, `CRT` or `NONE`) of monitor attached to channel 2 (the right DVI-I connector) for this pipe.

Example “Device” Section for Use With Two Analog Monitors

```
Section "Device"  
    Identifier "SGI SG-0"  
    Driver     "fglrx"  
    BusId     "PCI:23:0:0"  
    Option    "MonitorLayout" "CRT, CRT"  
EndSection
```

Configuring a System for Multiple Xservers (ProPack™ 3, Service Pack 4 or later)

Multiple Xservers allows specific subsets of the keyboards, pointing devices, and monitors attached to a Silicon Graphics Prism system to each be managed by a different Xserver.

Note: This section only applies to systems with ProPack 3. For systems with ProPack 4, Service Pack 2 or later, use the configuration described in “Configuring a System for Multiple Xservers (ProPack 4, Service Pack 2 or Later)” on page 144. (To determine which ProPack version a system is running, look in the `/etc/sgi-release` file.)

Note: The use of multiple Xservers requires ProPack 3, Service Pack 4 or a later release of the software.

This section describes a relatively simple configuration. Much more complex configurations are possible, however, and may be accomplished by extending the instructions provided here.

Note: When configuring multiple seats, the best method is to first attach all devices (keyboards, pointing devices, and monitors) and configure the system with a single Xserver. Once this is done, the configuration may be modified to assign individual subsets of these devices to be managed by separate Xservers.

Configuring a system for multi-seat operation involves the following steps, each described in a separate subsection below:

1. Identify the correct event devices (that is, keyboards and pointing devices) for each seat.
2. Create and edit an `XF86Config.Nserver` file for the desired configuration.
3. Point X to the newly-created `XF86Config.Nserver` file.

Identifying Event Devices

An “event device” is a keyboard or pointing device. All event devices connected to the system are listed at boot time on lines beginning with the string “input.” These boot messages may be displayed at a Linux command prompt using the `dmesg` command. The output from the `dmesg` command can be quite long, and therefore is usually filtered with a `grep` command. For example:

```
# dmesg | grep ^input
input0: USB HID v1.10 Keyboard [NOVATEK Generic USB Keyboard] on usb1:4.0
input1: USB HID v1.00 Mouse [Logitech N43] on usb1:5.0
input2: USB HID v1.00 Mouse [Logitech N43] on usb1:6.0
input3: USB HID v1.10 Keyboard [NOVATEK Generic USB Keyboard] on usb1:7.0
input4: USB HID v1.00 Keyboard [SILITEK USB Keyboard and Mouse] on usb1:9.0
input5: USB HID v1.00 Mouse [SILITEK USB Keyboard and Mouse] on usb1:9.1
input6: USB HID v1.00 Mouse [Logitech N43] on usb1:10.0
```

All input devices detected during boot-up will have device nodes created for them in the `/dev/input` directory as follows:

- Each keyboard will have an associated event* device node.
- Each pointing device will have both an associated event* device node and an associated mouse* device node.

The mapping of devices to nodes is by number (that is, `input0` maps to `event0`, `input1` maps to `event1`, and so on). The first input that is a pointing device gets mapped to `mouse0`, the next input that is a pointing device gets mapped to `mouse1`, and so on.

The `dmesg` output shown above would therefore create the following mapping:

```
input0: event0
input1: event1, mouse0
input2: event2, mouse1
input3: event3
input4: event4
input5: event5, mouse2
input6: event6, mouse3
```

This mapping can then be used to edit the `XF86Config.Nserver` file, as described in the next subsection, “Creating a Multi-Seat `XF86Config` File” on page 137.

Creating a Multi-Seat XF86Config File

A multiple-Xserver configuration requires a customized XF86Config file containing a separate ServerLayout section for each Xserver you will be running.

Note: The original ServerLayout section (always identified as “Main Layout”) is typically left unchanged, allowing the system to easily be reconfigured as a single-Xserver system.

Creating a New XF86Config File

Start out by creating a new XF86Config file. The easiest way to do this is to simply make a copy of the system’s regular XF86Config file, as follows:

```
# cp /etc/X11/XF86Config /etc/X11/XF86Config.Nservers
```

(where *N* is the number of servers you will be configuring).

Configuring the Input Devices

Next, configure the input devices as follows:

1. Copy the section beginning:

```
Section "InputDevice"
    Identifier "Keyboard1"
```

and insert a duplicate copy (or copies) below the existing section, until there is one copy for each keyboard (including the original copy in this count).

2. Edit all the keyboard InputDevice sections, in each one changing the driver from “keyboard” to “evdev” and adding an Option line identifying the appropriate event device (in this example, “/dev/input/event0”). The resulting InputDevice sections will look something like the following:

```
Section "InputDevice"
    Identifier "Keyboard1"
    Driver "evdev"
    Option "Device" "/dev/input/event0"
    # ...
EndSection
```

Note: See “Identifying Event Devices” on page 136 for instructions on how to determine the appropriate event device for each section.

Note: You may assign any number of keyboards to a single Xserver, but no keyboard may be assigned to more than one Xserver.

3. Copy the section beginning:

```
Section "InputDevice"
    Identifier "Mouse1"
```

and insert a duplicate copy (or copies) below the existing section, until there is one copy for each pointing device (including the original copy in this count).

4. Edit all the mouse InputDevice sections, changing the Option “Device” line from the default “/dev/input/mice” to one identifying the appropriate event device (in this example, “/dev/input/mouse0”). The resulting InputDevice sections will look something like the following:

```
Section "InputDevice"
    Identifier "Mouse1"
```

```
Driver "mouse"  
Option "Device" "/dev/input/mouse0"  
# ...  
EndSection
```

Note: See “Identifying Event Devices” on page 136 for instructions on how to determine the appropriate event device.

Note: You may assign any number of pointing devices to a single Xserver, but no pointing device may be assigned to more than one Xserver.

Configuring the New ServerLayout Sections

In this new `XF86Config.Nservers` file, perform the following steps:

1. Copy the section beginning:

```
Section "ServerLayout"
    Identifier "Main Layout"
```

and insert a duplicate copy (or copies) below the existing section, until there is one copy for each Xserver you will have (do NOT include the original "Main Layout" copy in this count).

2. While leaving the original ServerLayout section identified as "MainLayout," give each new ServerLayout section a new name. For example, the first server might be named "Layout0":

```
Identifier "Layout0"
```

the next "Layout1," and so on.

3. Within each new Server Layout section, disable (delete or comment out) every screen that will not be used in that layout:

```
Screen "Screen SG-0"      ""      ""      ""      "Screen SG-1"
#   Screen "Screen SG-1"  ""      ""      "Screen SG-0"  ""
```

Note: You may assign any number of screens to a single Xserver, but no screen may be assigned to more than one Xserver.

4. Edit each Server Layout section to make sure than no remaining uncommented screen lists as adjacent another screen that will be managed by a different Xserver:

```
Screen "Screen SG-0"      ""      ""      ""      ""
#   Screen "Screen SG-1"  ""      ""      "Screen SG-0"  ""
```

5. Within each Server Layout section, change the input devices to the correct ones for that Xserver. For example, the first Xserver might use:

```
InputDevice "Mouse1" "CorePointer"
InputDevice "Keyboard1" "CoreKeyboard"
```

6. Save the `XF86Config.Nservers` file.

For an example ServerLayout section from an `XF86Config.3server` file, see "Example "ServerLayout" Sections for Three Xservers" on page 141. In this example, the first two Xservers manage one screen each, while the third Xserver manages two screens.

Example "ServerLayout" Sections for Three Xservers

```
# *****
# ServerLayout sections.
# *****

Section "ServerLayout"
    Identifier "Main Layout"
    Screen "Screen SG-0"      ""      ""      ""      "Screen SG-1"
    Screen "Screen SG-1"      ""      ""      "Screen SG-0"  "Screen SG-2"
    Screen "Screen SG-2"      ""      ""      "Screen SG-1"  "Screen SG-3"
    Screen "Screen SG-3"      ""      ""      "Screen SG-2"  ""
    InputDevice "Mouse1" "CorePointer"
    InputDevice "Keyboard1" "CoreKeyboard"
EndSection

Section "ServerLayout"
    Identifier "Layout0"
    Screen "Screen SG-0"      ""      ""      ""      ""
    InputDevice "Mouse1" "CorePointer"
    InputDevice "Keyboard1" "CoreKeyboard"
EndSection

Section "ServerLayout"
    Identifier "Layout1"
    Screen "Screen SG-1"      ""      ""      ""      ""
    InputDevice "Mouse2" "CorePointer"
    InputDevice "Keyboard2" "CoreKeyboard"
EndSection

Section "ServerLayout"
    Identifier "Layout2"
    Screen "Screen SG-2"      ""      ""      ""      "Screen SG-3"
    Screen "Screen SG-3"      ""      ""      "Screen SG-2"  ""
    InputDevice "Mouse3" "CorePointer"
    InputDevice "Keyboard3" "CoreKeyboard"
EndSection
```

Pointing X to the New XF86Config.Nserver File

Once you have created the new `XF86Config.Nserver` file, the last step is to tell X to use the new layouts it contains, rather than the default server layout. To do so, perform the following steps:

1. Make a backup copy of the default single-server `/etc/X11/gdm/gdm.conf` file:

```
# cp /etc/X11/gdm/gdm.conf /etc/X11/gdm/gdm.conf-old
```
2. Edit the `/etc/X11/gdm/gdm.conf` file to use the new server layouts you defined in the `XF86Config` file:

In the `[servers]` section, comment out the standard server, then add the new server layouts you will be using:

```
#0=Standard  
0=Layout0  
1=Layout1  
2=Layout2
```

3. Define each new server layout. For example:

```
[server-Layout0]  
name=Layout0 server  
command=/usr/X11R6/bin/X :0 -xf86config /etc/X11/XF86Config.3server -layout Layout0  
flexible=true
```

For an example of a multi-Xserver `[servers]` section, see “Example `/etc/X11/gdm/gdm.conf` Servers Section for Three Xservers” on page 143.

4. Save the `gdm.conf` file and reboot the system.

Example /etc/X11/gdm/gdm.conf Servers Section for Three Xservers

```
[servers]

#0=Standard
0=Layout0
1=Layout1
2=Layout2

[server-Standard]
name=Standard server
command=/usr/X11R6/bin/X
flexible=true

[server-Layout0]
name=Layout0 server
command=/usr/X11R6/bin/X :0 -xf86config /etc/X11/XF86Config.3server -layout Layout0
flexible=true

[server-Layout1]
name=Layout1 server
command=/usr/X11R6/bin/X :1 -xf86config /etc/X11/XF86Config.3server -layout Layout1
flexible=true

[server-Layout2]
name=Layout2 server
command=/usr/X11R6/bin/X :2 -xf86config /etc/X11/XF86Config.3server -layout Layout2
flexible=true
```

Configuring a System for Multiple Xservers (ProPack 4, Service Pack 2 or Later)

Multiple Xservers allows specific subsets of the keyboards, pointing devices, and monitors attached to a Silicon Graphics Prism system to each be managed by a different Xserver.

Note: This section only applies to systems with ProPack 4, Service Pack 2 or later. For systems with ProPack 3, use the configuration described in “Configuring a System for Multiple Xservers (ProPack™ 3, Service Pack 4 or later)” on page 135. (To determine which ProPack version a system is running, look in the `/etc/sgi-release` file.)

This section describes a relatively simple configuration. Much more complex configurations are possible, however, and may be accomplished by extending the instructions provided here.

Note: When configuring multiple seats, the best method is to first attach all devices (keyboards, pointing devices, and monitors) and configure the system with a single Xserver. Once this is done, the configuration may be modified to assign individual subsets of these devices to be managed by separate Xservers.

Configuring a system for multi-seat operation involves the following steps, each described in a separate subsection below:

1. Identify the correct event devices (that is, keyboards and pointing devices) for each seat.
2. Create and edit an `XF86Config.Nserver` file for the desired configuration.
3. Point `X` to the newly-created `XF86Config.Nserver` file.

Identifying Keyboards and Pointing Devices

This section explains how to uniquely refer to keyboards and pointing devices for later reference in the `XF86Config.Nserver` file.

Adding USB Device Rules

Some systems will need rules added to the `/etc/udev/udev.rules` file to ensure that the keyboard and mouse appear in a predictable location at each reboot. Follow these steps to ensure that the rules are present:

1. Open the `/etc/udev/udev.rules` file in a text editor.
2. Search for the following two lines:

```
KERNEL="event*",BUS="usb",SYSFS{bInterfaceClass}="03",SYSFS{bInterfaceProtocol}="02",NAME="input/%k",SYMLINK="input/evmouse-%b"
KERNEL="event*",BUS="usb",SYSFS{bInterfaceClass}="03",SYSFS{bInterfaceProtocol}="01",NAME="input/%k",SYMLINK="input/evkbd-%b"
```

3. If the lines are already present, proceed to “Creating a Multi-Seat XF86Config File” on page 146.
4. If the lines are not present, insert them before any existing `KERNEL="event*"` lines.

Finding the Device Names

Follow these steps to find the device names for the keyboards and mice:

1. Look in the `/dev/input/` directory for files beginning with “evkbd” and “evmouse.” For example:


```
evkbd-2-1:1.0
evkbd-2-2:1.0
evmouse-1-1:1.0
evmouse-1-2:1.0
```
2. Record these device names for use when editing the `XF86Config.Nserver` file, as described in the next subsection, “Creating a Multi-Seat XF86Config File” on page 137.
3. These device names include the USB path where the device is located. As long as the device remains connected to the same USB port, these device names should remain the same.

Creating a Multi-Seat XF86Config File

A multiple-Xserver configuration requires a customized XF86Config file containing a separate ServerLayout section for each Xserver you will be running.

Note: The original ServerLayout section (always identified as “Main Layout”) is typically left unchanged, allowing the system to easily be reconfigured as a single-Xserver system.

Creating a New XF86Config File

Start out by creating a new XF86Config file. The easiest way to do this is to simply make a copy of the system’s regular XF86Config file, as follows:

```
# cp /etc/X11/XF86Config /etc/X11/XF86Config.Nservers
```

(where *N* is the number of servers you will be configuring).

Configuring the Input Devices

Next, configure the input devices as follows:

1. Copy the section beginning:

```
Section "InputDevice"
    Identifier "Keyboard1"
```

and insert a duplicate copy (or copies) below the existing section, until there is one copy for each keyboard (including the original copy in this count).

2. Give each new section a unique identifier (for example, "Keyboard2," "Keyboard3," etc.)
3. Edit all the keyboard InputDevice sections, in each one changing the driver from "keyboard" to "evdev" and adding an Option line identifying the appropriate device name (in this example, "/dev/input/evkbd-2-1:1.0"). The resulting InputDevice sections will look something like the following:

```
Section "InputDevice"
    Identifier "Keyboard1"
    Driver "evdev"
    Option "Device" "/dev/input/evkbd-2-1:1.0"
    # ...
EndSection
```

Note: See "Identifying Keyboards and Pointing Devices" on page 145 for instructions on how to determine the appropriate device names for each section.

Note: You may assign any number of keyboards to a single Xserver, but no keyboard may be assigned to more than one Xserver.

4. Copy the section beginning:

```
Section "InputDevice"
    Identifier "Mouse1"
```

and insert a duplicate copy (or copies) below the existing section, until there is one copy for each pointing device (including the original copy in this count).

5. Give each new section a unique identifier (for example, "Mouse2," "Mouse3," etc.)

6. Edit all the mouse InputDevice sections, in each one changing the driver from “mouse” to “evdev” and changing the Option “Device” line from the default “/dev/input/mice” to one identifying the appropriate device name (in this example, “/dev/input/evmouse-1-1:1.0”). The resulting InputDevice sections will look something like the following:

```
Section "InputDevice"
    Identifier "Mouse1"
    Driver "evdev"
    Option "Device" "/dev/input/evmouse-1-1:1.0"
    # ...
EndSection
```

Note: See “Identifying Keyboards and Pointing Devices” on page 145 for instructions on how to determine the appropriate device names for each section.

Note: You may assign any number of pointing devices to a single Xserver, but no pointing device may be assigned to more than one Xserver.

Configuring the New ServerLayout Sections

In this new `XF86Config.Nservers` file, perform the following steps:

1. Copy the section beginning:

```
Section "ServerLayout"
    Identifier "Main Layout"
```

and insert a duplicate copy (or copies) below the existing section, until there is one copy for each Xserver you will have (do NOT include the original "Main Layout" copy in this count).

2. While leaving the original ServerLayout section identified as "MainLayout," give each new ServerLayout section a new name. For example, the first server might be named "Layout0":

```
Identifier "Layout0"
```

the next "Layout1," and so on.

3. Within each new Server Layout section, disable (delete or comment out) every screen that will not be used in that layout:

```
Screen "Screen SG-0"      ""      ""      ""      "Screen SG-1"
#   Screen "Screen SG-1"  ""      ""      "Screen SG-0"  ""
```

Note: You may assign any number of screens to a single Xserver, but no screen may be assigned to more than one Xserver.

4. Edit each Server Layout section to make sure than no remaining uncommented screen lists as adjacent another screen that will be managed by a different Xserver:

```
Screen "Screen SG-0"      ""      ""      ""      ""
#   Screen "Screen SG-1"  ""      ""      "Screen SG-0"  ""
```

5. Within each Server Layout section, change the input devices to the correct ones for that Xserver. For example, the first Xserver might use:

```
InputDevice "Mouse1"  "CorePointer"
InputDevice "Keyboard1" "CoreKeyboard"
```

6. Save the `XF86Config.Nservers` file.

For an example ServerLayout section from an `XF86Config.3server` file, see "Example "ServerLayout" Sections for Three Xservers" on page 141. In this example, the first two Xservers manage one screen each, while the third Xserver manages two screens.

Example “ServerLayout” Sections for Three Xservers

```
# *****
# ServerLayout sections.
# *****

Section "ServerLayout"
    Identifier "Main Layout"
    Screen "Screen SG-0"      ""      ""      ""      "Screen SG-1"
    Screen "Screen SG-1"      ""      ""      "Screen SG-0"  "Screen SG-2"
    Screen "Screen SG-2"      ""      ""      "Screen SG-1"  "Screen SG-3"
    Screen "Screen SG-3"      ""      ""      "Screen SG-2"  ""
    InputDevice "Mouse1" "CorePointer"
    InputDevice "Keyboard1" "CoreKeyboard"
EndSection

Section "ServerLayout"
    Identifier "Layout0"
    Screen "Screen SG-0"      ""      ""      ""      ""
    InputDevice "Mouse1" "CorePointer"
    InputDevice "Keyboard1" "CoreKeyboard"
EndSection

Section "ServerLayout"
    Identifier "Layout1"
    Screen "Screen SG-1"      ""      ""      ""      ""
    InputDevice "Mouse2" "CorePointer"
    InputDevice "Keyboard2" "CoreKeyboard"
EndSection

Section "ServerLayout"
    Identifier "Layout2"
    Screen "Screen SG-2"      ""      ""      ""      "Screen SG-3"
    Screen "Screen SG-3"      ""      ""      "Screen SG-2"  ""
    InputDevice "Mouse3" "CorePointer"
    InputDevice "Keyboard3" "CoreKeyboard"
EndSection
```

Pointing X to the New XF86Config.Nserver File

Once you have created the new XF86Config.Nserver file, the last step is to tell X to use the new layouts it contains, rather than the default server layout. To do so, perform the following steps:

1. Make a backup copy of the default single-server /etc/X11/xdm/Xservers file:

```
# cp /etc/X11/xdm/Xservers /etc/X11/xdm/Xservers-old
```

2. Edit the /etc/X11/xdm/Xservers file to reference each of the new server layouts you defined in the XF86Config file. To do this, for each server (i.e., each line):
 - remove the word “reserve”
 - append the option “-novtswitches”
 - append a reference to the appropriate XF86Config file.

For example, a 3-server version might look like this:

```
:0 local /usr/X11R6/bin/X -nolisten tcp -br vt7 -novtswitches -xf86config
/etc/X11/XF86Config.3server -layout Layout0
:1 local /usr/X11R6/bin/X -nolisten tcp -br :1 vt8 -novtswitches -xf86config
/etc/X11/XF86Config.3server -layout Layout1
:2 local /usr/X11R6/bin/X -nolisten tcp -br :2 vt9 -novtswitches -xf86config
/etc/X11/XF86Config.3server -layout Layout2
:3 local reserve /usr/X11R6/bin/X -nolisten tcp -br :3 vt10
:4 local reserve /usr/X11R6/bin/X -nolisten tcp -br :4 vt11
:5 local reserve /usr/X11R6/bin/X -nolisten tcp -br :5 vt12
```

3. Save the Xservers file and reboot the system.

Note: The procedures in this section only apply when the default session manager (KDE) is active. To start Xwindows using the default session manager, use the command `init 5`.

Technical Specifications and Pinouts

This chapter contains technical information about the Silicon Graphics Prism Deskside visualization system. The following topics are covered:

- “Physical and Environmental Specifications” on page 154
- “I/O Port Specifications” on page 156
- “Serial Cables and Adapter Specifications” on page 162

Physical and Environmental Specifications

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

Table A-1 Physical Environment Specifications

Feature	Specification
Deskside system dimensions	13.5 in. (34.3 cm) tall 16.1 in. (40.1 cm) wide 21.4 in. (54.4 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	Approximately 60 lb. (27.2 kg) May vary based on internal options
Power requirements	50-60 Hz and 100-120/200-240 VAC
Voltage and frequency	100-240 VAC, 50-60 Hz, (750 W max)
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	2,560 Btu/h maximum (750 W)
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
Vibration, random (operating)	0.582 Grms (5-300Hz) for 15 minutes each axis

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

Feature	Specification
Vibration, random (non-operating)	1.15 Grms (3-200 Hz) 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 pressure	Approximately 65 dBA at operator position

I/O Port Specifications

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

- “Ethernet 10-100-1000 Base-T Port” on page 157
- “Keyboard and Mouse Ports” on page 159
- “Serial Console Port” on page 160
- “Serial Cables and Adapter Specifications” on page 162

Ethernet 10-100-1000 Base-T Port

The desktide system auto-selects the Ethernet port speed and type when the desktide system is booted, based on what it is connected to. The connector is a standard RJ-45 female. Figure A-1 shows the Ethernet port.

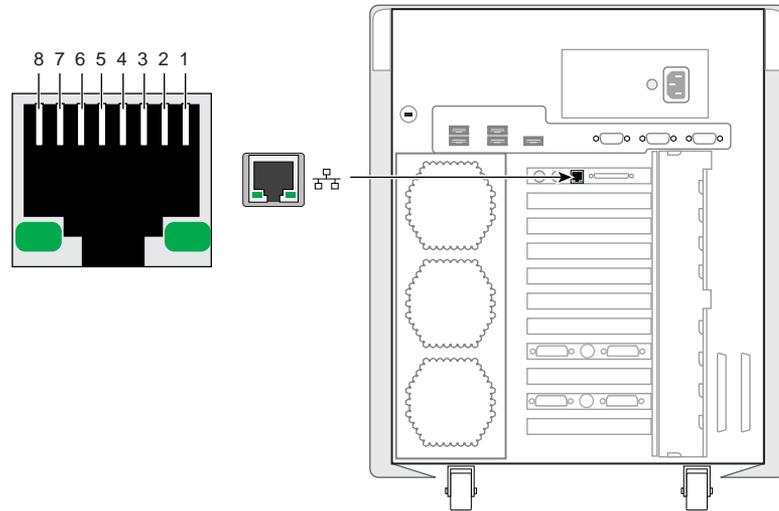


Figure A-1 Ethernet 10-100-1000 Base-T Port Pinout and Location

Table A-2 shows the cable pinout assignments for the Ethernet port.

Table A-2 Ethernet Port Pinout

Pin	Assignment
1	Transmit+
2	Transmit-
3	Receive+
4	(Reserved)
5	(Reserved)
6	Receive-

Table A-2 Ethernet Port Pinout

Pin	Assignment
7	(Reserved)
8	(Reserved)

Keyboard and Mouse Ports

The deskside system uses USB keyboard and mouse devices. Figure A-2 shows the keyboard and mouse ports.

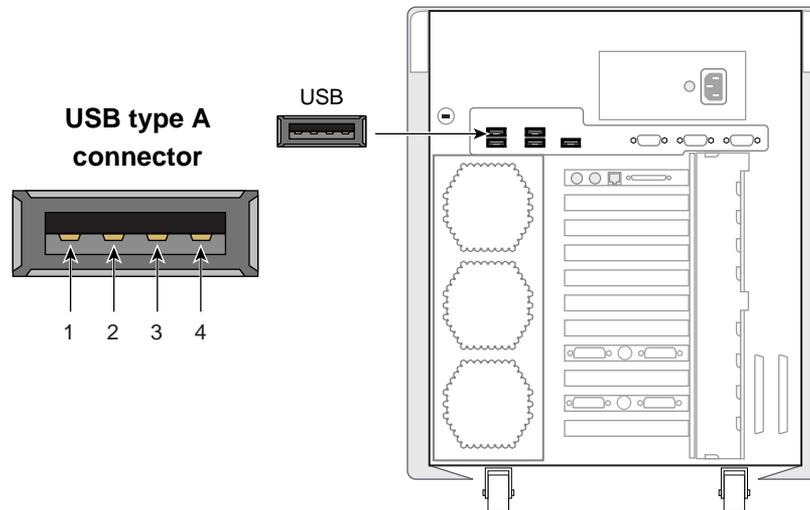


Figure A-2 USB (Type A) Keyboard and Mouse Port Pinouts and Locations

Table A-3 shows the pinout assignments for the USB keyboard and mouse ports.

Table A-3 USB Type A Port Pinout

Pin	Assignment
1 Red	VCC
2 White	-Data
3 Green	+Data
4 Black	Ground

Serial Console Port

The desktide system features one 9-pin serial console port. Figure A-3 shows the serial console port. The port is capable of transferring data at rates as high as 230 KB/s. Other features of the port include:

- Programmable data, parity, and stop bits
- Programmable baud rate and modem control

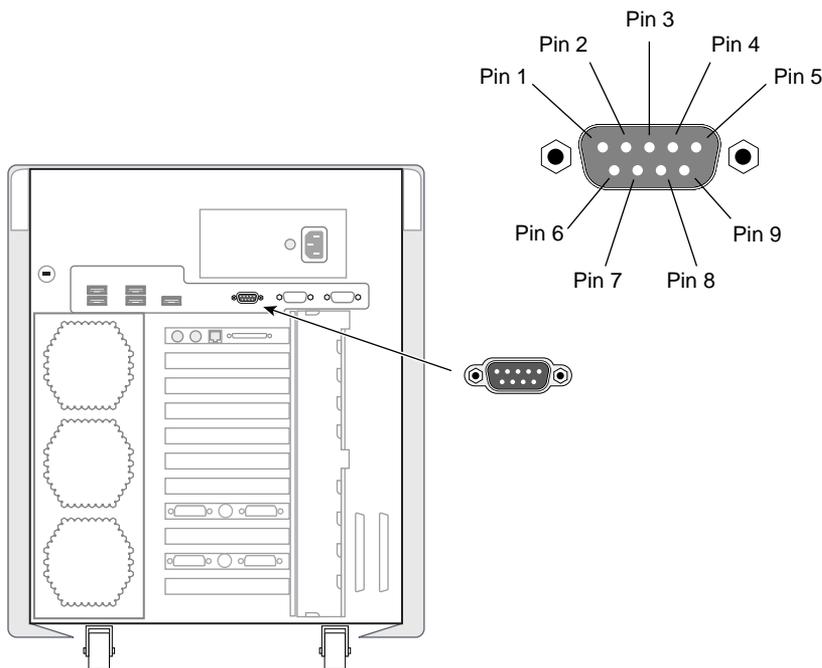


Figure A-3 System Console Serial Port Pinout and Location

Table A-4 shows pinout assignments for the 9-pin male DB-9 serial console connector.

Table A-4 9-Pin Serial Port Pinout

Pin	Assignment	Description
1	DCD	Data carrier detect
2	RXD	Receive data

Table A-4 9-Pin Serial Port Pinout (**continued**)

Pin	Assignment	Description
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 desktide system. It also describes SGI serial port converters. The following topics are covered:

- “External Multi-port Serial Adapter Connector” on page 162
- “Serial Port Adapter Cables” on page 164

External Multi-port Serial Adapter Connector

Figure A-4 shows the connector pin locations for the 36-pin multi-port serial adapter connector located on the base I/O PCI card.

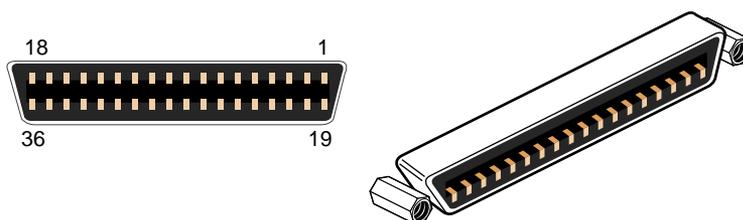


Figure A-4 Pin Number Locations for 36-pin MDR Connector

Table A-5 lists the pin assignments for the multi-port serial adapter connector.

Table A-5 Multi-port Serial Adapter Pinouts

Pin	Assignment	Pin	Assignment
1	GND	19	S0 DSR
2	S0 DCD	20	S0 RTS
3	S0 RXD	21	S0 CTS
4	S0 TXD	22	S0 RI
5	S0 DTR	23	GND
6	S1 DSR	24	S1 DCD

Table A-5 Multi-port Serial Adapter Pinouts (continued)

Pin	Assignment	Pin	Assignment
7	S1 RTS	25	S1 RXD
8	S1 CTS	26	S1 TXD
9	S1 RI	27	S1 DTR
10	GND	28	S2 DSR
11	S2 DCD	29	S2 RTS
12	S2 RXD	30	S2 CTS
13	S2 TXD	31	S2 RI
14	S2 DTR	32	GND
15	S3 DSR	33	S3 DCD
16	S3 RTS	34	S3 RXD
17	S3 CTS	35	S3 TXD
18	S3 RI	36	S3 DTR

Serial Port Adapter Cables

The desktide system's serial ports conform to the PC standard pinout for EIA standard RS-232 signals. The Linux drivers available for serial devices will vary, and no assumption is made regarding hardware or software support.

The purpose of the adapter cable is to allow the desktide system to use standard PC serial devices. Table A-6 shows the adapter cable pinout for a standard PC or Macintosh serial port.

Table A-6 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-7 shows the pinout for a female DB-9 to female DB-9 adapter cable.

Table A-7 Female DB-9 to Female DB-9 Adapter Cable Pinout

Female DB-9 Connected to deskside system	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.

Graphics Board I/O Port Specifications

This section provides specifications for the following ports:

- “DVI-I Video Port” on page 166

DVI-I Video Port

Figure A-5 shows the DVI-I video port.

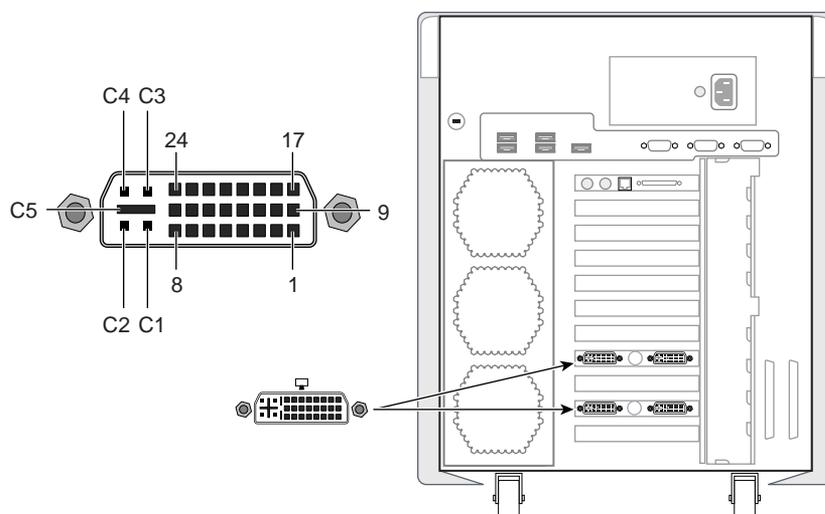


Figure A-5 DVI-I Port Pinout and Location

Table A-8 shows the port pinout assignments for DVI-I port(s).

Table A-8 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	DATA 1+	C1	A_RED
11	SHIELD 1/3	C2	A_GREEN
12	DATA 3-	C3	A_BLUE
13	DATA 3+	C4	HYNSC
14	+5V DC_POWER	C5	A_GROUND2
15	A_GROUND1	C6	A_GROUND3

Regulatory Specifications

This appendix provides regulatory statements about your system as follows:

- “CMN Number” on page 169
- “CE Notice and Manufacturer’s Declaration of Conformity” on page 170
- “Electromagnetic Emissions” on page 170
- “Shielded Cables” on page 172
- “Electrostatic Discharge” on page 173
- “Laser Compliance Statement” on page 173
- “Lithium Battery Compliance Statement” on page 173

The Silicon Graphics Prism Deskside visualization system 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 system 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 n'émet pas de perturbations radioélectriques dépassant les normes applicables aux appareils numériques de Classe A prescrites dans le Règlement sur les interférences 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 Prism Deskside visualization system is FCC-compliant under test conditions that include the use of shielded cables between the unit and its peripherals. Your system 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 system 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 system. The shielded cables that came with the system 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 system.



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: Pär isto voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.



Warning: Varoitus: Pär isto 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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