CHALLENGE™ S Server
Owner's Guide

CHALLENGE™ S Server Owner's Guide
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Introduction

This chapter explains where to find the information you need to set up and use the Challenge S server. It describes available documentation (on-line information and printed manuals), and suggests optional documentation.

Introduction

Welcome to the CHALLENGE™ S server. The *Challenge S Server Owner's Guide* is your guide to installing, troubleshooting, and maintaining your Challenge S server. It also includes information on installing optional software products. Chapter 1 sources of information about the Challenge S server. Chapter 2 provides an overview of the system, includes descriptions of the various system components and connectors, and describes the general theory of operation (system buses, I/O channels, and memory configurations).

In addition, this manual tells you how to:

- set up the Challenge S server, turn it on, log in, and add user accounts (Chapter 3)

- install and remove SIMMs (Single In-line Memory Modules) (Chapter 4)

- install and remove GIO (Graphics Input/Output bus) option boards such as video, network, or Fast SCSI-2 (Small Computer System Interface) controller boards (Chapter 5)

- install and remove internal and external peripherals, including serial devices (Chapter 6)

- install and remove optional software products (Chapter 7)

- diagnose hardware problems (Chapter 8)

- order and replace faulty parts (Chapter 9)

- create a safe and comfortable environment for working with the Challenge S server, and maintain the system correctly (Chapter 10)

Appendices provide the following information:

- descriptions of connector pin-outs (Appendix A)

- descriptions of serial cables that you can use to connect modems, printers, terminals, and other serial devices to the server (Appendix B)

- floptical drive settings (Appendix C)

- a short list of supported terminals and how to specify them when logging in on a character-based terminal (Appendix D)

Finding the Information You Need

The Challenge S server ships with the sources of information illustrated in Figure 1-1:
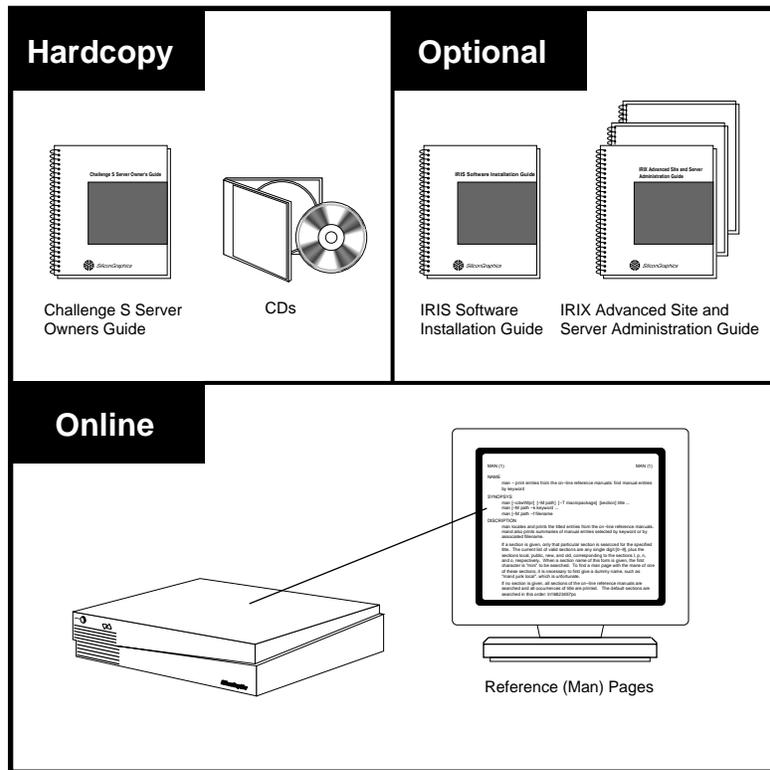
Figure 1-1   Sources of Information for the Challenge S Server

The following sections describe each of the sources of information illustrated above.

- "Challenge S Server Owner's Guide"

- "Online Reference (Manual) Pages"

- "Release Notes"

You should also read this section:

- "Optional Documentation"

Challenge S Server Owner's Guide

Figure 1-2   Documentation

Refer to the *Challenge S Server Owner's Guide* to set up the system and install hardware options, or whenever you suspect there is a hardware problem. In addition, you can refer to this guide when you install or remove optional software.

The system and all the procedures in this guide are designed so that you may maintain the system without the help of a trained technician. However, do not feel that you *must* work with the hardware yourself. You can always contact your maintenance provider to have an authorized service provider work with the hardware instead.

Online Reference (Manual) Pages

The Challenge S server comes with a set of IRIX reference (manual) pages, formatted in the standard UNIX "man page" style. These are found online on the internal system disk, and are displayed using the *man* command. For example, to display the reference page for the *Add_Disk* command, enter the following command at a shell prompt:

```
man Add_Disk
```

Important system configuration files as well as commands are documented on reference pages. References in the documentation to these reference pages include the name of the command and the section number in which the command is found. For example, "Add_Disk(1)" refers to the *Add_Disk* command and indicates that it is found in section 1 of the IRIX reference.

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

In addition, the *apropos* command locates reference pages based on keywords. For example, to display a list of reference pages that describe disks, enter the following command at a shell prompt:

```
apropos disk
```

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

Release Notes

You can view the Release Notes for a variety of Silicon Graphics products and software subsystems using one of two utilities:

relnotes   Text-based viewer for on-line Release Notes.

grelnotes   Graphical viewer for on-line Release Notes.

To see a list of available Release Notes, type the following at a shell prompt:

```
relnotes
```

For more information, see the *relnotes*(1) and *grelnotes*(1) reference pages.

Optional Documentation

These two optional books are strongly recommended:

- *IRIS Software Installation Guide* – This book describes a variety of software installation scenarios, including how to install software from CD-ROM, from tape, and from the hard disk of a remote system. It also includes instructions for setting up a software distribution on a server (so that other workstations on the network can install software without CD-ROM drives) and instructions for copying software distributions onto tape.

- *IRIX Advanced Site and Server Administration Guide* – This book contains detailed information about running and managing servers and workstations. It includes information about configuring network

software and mail, performing backups, adding and partitioning hard
disks, and keeping the systems secure.

These books are included online. You can display them from a graphics
workstation using the IRIS InSight™ viewer. If you cannot use InSight,
contact your sales representative for information about obtaining printed
copies of these books.

Conventions

This *Challenge S Server Owner's Guide* uses these conventions:

- References to documents are in *italics*.

- References to other chapters and sections within this guide are in
  quotation marks.

- References to commands that you type at the shell prompt are in *italics*.

- Names of IRIX reference (manual) pages are in *italics* and are followed
  by the section number of the reference page. For example "*who*(1)"
  refers to the *who* command, which is found in section 1 of the IRIX
  reference.

- Names of menu choices are in quotation marks.

- Steps to perform tasks are in numbered sentences. When a numbered
  step needs more explanation, the explanation follows the step and is
  preceded by a square bullet. For example:

  ...

1. Connect the Ethernet AUI cable to the Ethernet AUI port on the back of
   the Challenge S server.

   - Make sure the sliding bracket on the Ethernet port on the system is
     pushed all the way left.

   - Plug the cable into the port.

   - Slide the bracket right to hold it in place.

About the CD Software Media

You received one or more compact discs (CDs) with your Challenge S server. The CDs include optional software that you might find useful, and a copy of the operating system and software installation tool that are already on your system disk. If your server was shipped with a Silicon Graphics system disk, you don't need the CDs to set up and use your system. Store the them in a safe and convenient place so you can find them when you need to install new software, or in case of a system failure.

Where to Go From Here

To learn about the Challenge S system, turn to Chapter 2, "Chassis Tour and Theory of Operation."

To set up the Challenge S server and start using the system, turn to Chapter 3, "Getting Started."

Chassis Tour and Theory of Operations

This chapter provides an overview of the Challenge S server. It describes system buses, I/O channels, system boards, and system specifications. It also shows the various components that make up the Challenge S server.

Chassis Tour and Theory of Operation

This chapter provides an overview of the Challenge S chassis and the components that make up the system. In particular, it describes:

- differences between available models; see "Overview"

- locations and functions of buttons; see "Front-Panel Controls"

- locations and functions of back-panel connectors; see "Locations and Functions of Back-Panel Connectors"

- the power supply, including input and output voltages, amps, and watts; see "Power Supply"

- internal drive options; see "Internal Drive Options"

- system boards; see "System Boards"

- system buses, memory, and I/O channels; see "System Buses and I/O Channels"

- system specifications, including dimensions, weight, heat dissipation, and environmental considerations; see "System Physical Specifications"

Overview

The Challenge S server is available in two basic configurations:

*   Challenge S-100

*   Challenge S-150

These two models are visually identical and have the same connectors on the back of the chassis. Figure 2-1 and Figure 2-2 show the Challenge S models:

Front View
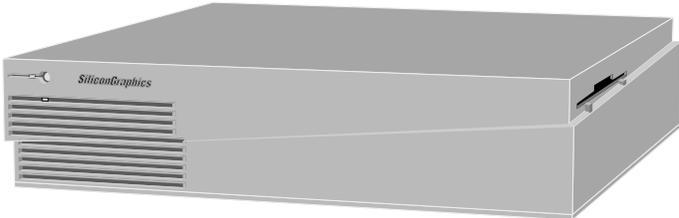
Figure 2-1   Challenge S-100 and S-150 External View, Front

Rear View
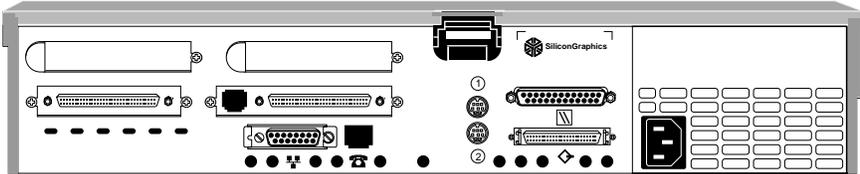
Figure 2-2   Challenge S-100 and S-150 External View, Rear

Table 2-1 briefly describes each of these systems.

Table 2-1   Overview of Challenge S models

Model	CPU and Cache	Memory	Available I/O Channels
S-100	MIPS R4600, 133 MHz internal, 66 MHz external 16 KB each instruction and data caches	32 MB	Three SCSI controllers (0, 4, & 5). Controller 0 is 16-bit, single-ended, 10 megatransfers per second (MTS)[a], shared between internal and external devices, 7 devices maximum (but limited to 2 meters cable length for all external devices). Controllers 4 and 5 are 16-bit, differential, 20 MTS, external only, 15 devices per controller maximum. Graphics Input/Output (GIO) bus with 1 or 2 additional GIO board capacity (depending upon the specific board) Single parallel port (bi-directional). Two serial ports, switchable between RS-232 and RS-422 ISDN basic-rate, RJ-45 connector Ethernet AUI and Ethernet 10 BASE-T
S-150	MIPS R4400SC, 150 MHz internal, 75 MHz external 16 KB each instruction and data caches 1 MB secondary cache	32 MB	(Identical to S-100)

a. Megatransfers are the number of million operations per bus cycle and are based on a bus's burst data rate.

Note: SCSI controllers on Challenge S are numbered 0, 4, and 5. Controllers 2 and 3 are reserved.

Front-Panel Controls

There are four controls on the front panel of the Challenge S:

- Power on/off button
- System reset button (recessed – accessible with a pen or pencil tip)
- Volume up (non-functional)
- Volume down (non-functional)

The volume controls do not function on the Challenge S server because there is no audio subsystem on the system board.

Figure 2-3 shows the front-panel controls:
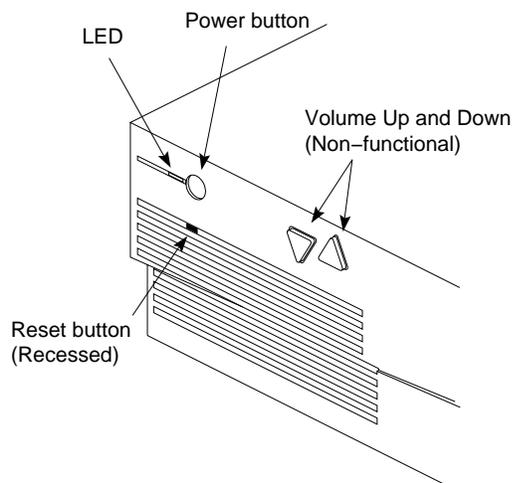
Figure 2-3   Challenge S Front-Panel Controls

Locations and Functions of Back-Panel Connectors

Figure 2-4 shows the connectors on the backplane:
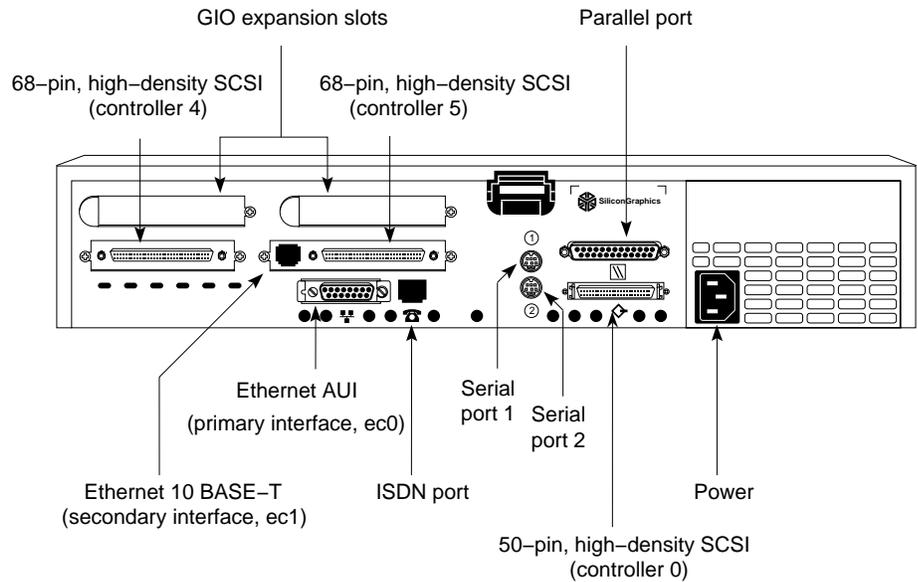
Figure 2-4   Challenge S Back-Panel Connectors

Note: Before using the ISDN port on a network, you need a software upgrade and a certification label. Contact your service provider to obtain the software upgrade package, which includes the certification label and instructions. You cannot connect the Challenge S to an ISDN network without the software upgrade.

Pinouts for all of the connectors are provided in Appendix A, "Cable Pinout Assignments."

Correspondence of Connectors to IRIX Special Device Files

Table 2-2 shows how the various connectors correspond to IRIX (operating system) special device files.

Table 2-2   Correspondence of connectors to IRIX Special Device Files

Connector	Device File
Serial port 1 (system console)	*/dev/tty[d,f,m]1*
Serial port 2	*/dev/tty[d,f,m]2*
Parallel port	*/dev/plp* (standard parallel interface)
	/dev/plpbi (bi-directional interface)
50-pin, high-density SCSI, controller 0	*/dev/dsk/dks0** (disks, CD-ROM)
	/dev/[r]mt/tps0* (generic SCSI tape)
68-pin, high-density SCSI, controller 4	*/dev/dsk/dks4** (disks, CD-ROM)
	/dev/[r]mt/tps4* (generic SCSI tape)
68-pin, high-density SCSI, controller 5	*/dev/dsk/dks5** (disks, CD-ROM)
	/dev/[r]mt/tps5* (generic SCSI tape)

For more information about serial devices, see *serial*(7). For information about the parallel port, see *plp*(7). For more information about SCSI devices and device names, see *dks*(7M) (for disks) and *tps*(7M) (for tape drives).

Power Supply

Features of the Challenge S power supply are:

- Autoranging input, from 100 VAC-132 VAC (4.5 A) to 200 VAC-264 VAC (2.4 A), at 47 to 63 Hz

- 170 watt output, +5 VDC (25 A), +3.3 VDC (7 A), +12 VDC (4.5 A), -12VDC (0.75 A), and +5 VAUX (1 MA)

- Double-pole/neutral fusing

- Contains system cooling fan

Figure 2-5 shows the Challenge S power supply:
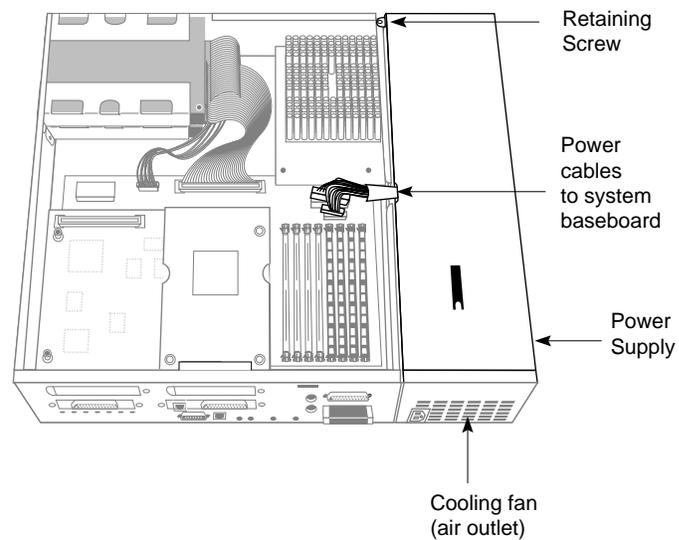
Figure 2-5   Challenge S Power Supply

Internal Drive Options

The Challenge S chassis is designed to hold the system disk and one additional drive, either a floptical or an option disk drive. These drives are driven by SCSI controller 0, which is also available on the external, 50-pin connector. (See Figure 2-4.) Controller 0 supports up to seven SCSI devices: up to two internally, and the remainder externally (provided the external cable length does not exceed 2 meters).

Note: Because of cable-length restrictions, you may be limited to three external devices on SCSI controller 0. For example, if you use a one-meter cable to attach the first device, and half-meter cables for each additional device, this totals two meters of cable – the maximum cable length.

The floptical must be installed in the top bracket. The system disk and option disks can be installed in either the top or bottom brackets.

Warning: **Always install the drive mounting brackets in the Challenge S chassis, even if the brackets are empty. The brackets are part of the chassis structural support.**

Internal drives are secured in removable mounting brackets with screws. The mounting brackets latch to the chassis by means of a catch, and can be installed and removed without additional tools.

Figure 2-6 shows the drive release button on a floptical drive. The release button for the system disk is identical.
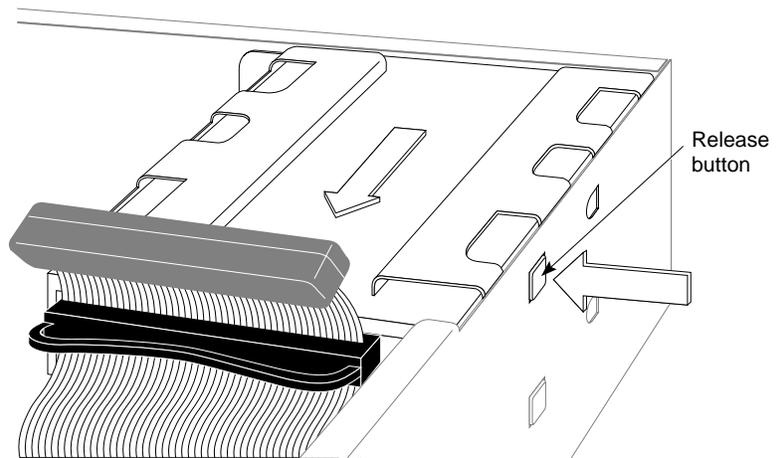
Figure 2-6   Example Drive Release Button

System Boards

The three standard boards in the Challenge S server are:

•   CPU module

•   system board

•   IOPLUS board

Optional boards are installed on the GIO slot connectors of the IOPLUS board. Figure 2-7 shows the various standard boards, the GIO slot numbers, and an optional board.

GIO slot 1

CPU module

System
board

IOPLUS board

(Optional single-width board
installed in GIO slot 0)
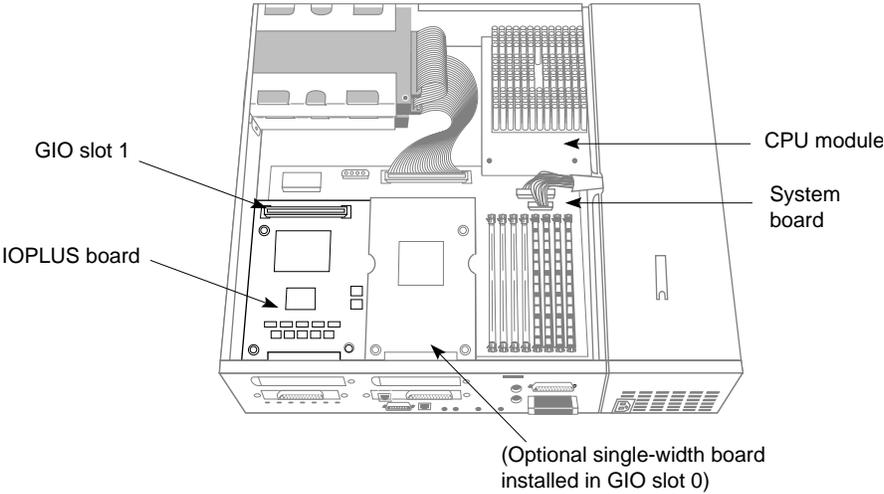
Figure 2-7   Challenge S System Boards and GIO Slot Numbers

Note: Some systems may contain the GIO slot extender board. It occupies
the same area as the IOPLUS (providing GIO slots 0 and 1), but does not
contain SCSI controllers and Ethernet 10 BASE-T.

CPU Module

The module consists of the CPU (either an R4600 or R4400) with built-in floating-point unit (FPU) and primary cache, a 1 MB secondary cache (R4400 only), and an oscillator to set the processor speed. The CPU module is connected to the memory subsystem by a 64-bit (plus parity) multiplexed address and data CPU Bus.

The CPU module is replaceable separate from the system board. See Table 2-1 for a complete description of the CPU features.

System Board

This system board contains:

- 36-bit wide (72-pin) SIMMs installed in sockets

- system PROM

- GIO buses

- primary Ethernet controller (AUI)

- serial controllers (DUARTS)

- Fast SCSI-2 (10 megatransfers per second, 8 bits wide) as controller 0, supporting single-ended SCSI devices

- ISDN interface

The section "System Buses and I/O Channels," describes the architecture of the system.

IOPLUS

The IOPLUS board provides:

- two Fast/Wide SCSI-2 controllers (20 megatransfers per second) as controllers 4 and 5, supporting up to fifteen differential SCSI devices per controller

- Ethernet 10 BASE-T (secondary interface)

- connections (GIO slots 0 and 1) for either two single-width GIO option boards, or a single full-width GIO option board

The IOPLUS connects to the two GIO slots on the system board, and mounts on standoffs.

System Buses and I/O Channels

The next sections describe the various features of the Challenge S architecture.

Custom ASICs

The Challenge S contains several custom ASICs to aid communication between the system and the buses:

- The MC1 ASIC performs functions such as the GIO64 bus arbiter, which provides an interface between the CPU and the GIO64 bus. It is also the memory controller, allowing direct memory access (DMA) by devices other than the CPU. Note that DMA is supported only on GIO slot 0. See Figure 2-7.

- DMUX1 ASICs are data path chips, controlled by the MC1 chip, that isolate the CPU bus from the GIO64 bus. They also perform the memory interleaving functions.

- The HPC3 ASIC provides an interface to peripheral I/O and other devices on the P-Bus, connecting them to the GIO64 bus.

- The IOC1 ASIC provides interrupt control, two general purpose serial ports, and a parallel port.

CPU Superpipelining

The R4000 family of CPUs uses superpipelining to achieve fast internal speeds. In normal pipelining, the CPU breaks each instruction into separate one-cycle steps (usually fetch, read, execute, memory, and write back), then executes instructions at one-cycle intervals. Pipelining allows instructions to

overlap, providing close to one instruction per cycle instead of one instruction every five cycles.

At the fast R4000/R4400/R4600 CPU clock rates, some instruction steps such as cache reads and writes can't execute in a single pipelined cycle. Superpipelining executes each of these critically slow steps in a single cycle to provide higher throughput. To do so, it first breaks instruction steps into substeps. The substeps are then pipelined in a process separate from standard pipelining, which executes the full step in a single cycle. R4000 superpipelining is optimized so that it requires little control logic and instruction structure, unlike SuperScalar implementations.

The R4000 family of CPUs supports both the MIPS I and MIPS III instruction sets. Data pathways in MIPS III are 64 bits wide, enabling the system to load and store full floating point double words in a single machine cycle. The MIPS III instruction set also contains synchronization and advanced cache control primitives.

CPU Bus

The CPU subsystem is connected to the memory subsystem by a 64-bit wide (plus parity) data and address CPU bus. This bus consists of the R4600/R4400 bus and control signals from the memory subsystem.The R4600 bus (Challenge S-100) runs at 66 MHz as set by the CPU oscillator. The R4400 (Challenge S-150) runs at 75 MHz. Both can transfer data at a peak rate of 400 MB per second to and from the memory subsystem.

Memory Subsystem

The memory subsystem contains memory control, data bus routing, and 8 SIMM sockets for main memory. A 64-bit (plus parity) multiplex address and data GIO64 bus connects the memory subsystem to I/O and the GIO expansion subsystems.

The memory subsystem uses two types of custom chips, the MC1 ASIC and the DMUX1 ASIC, to give the CPU access to main memory and the GIO64 bus and to isolate the CPU bus from the GIO64 bus.

The MC1 ASIC, the Memory Controller (shown in Figure 2-8), is a custom Silicon Graphics chip connected to the CPU module by the CPU bus. It's also connected to the GIO64 bus (the I/O bus), and has address and control lines connected to main memory. It performs a number of functions:

- It controls the flow of data between main memory and the R4600/R4400 CPU.

- It serves as a DMA (Direct Memory Access) controller for all memory requests from the graphics system or any other devices on the GIO64 bus (installed GIO slot 0 only; see Table 2-3).

- It acts as a system arbiter for the GIO64 bus.

- It provides single-word accesses for the CPU to GIO64 bus devices.

- It passes on interrupts from the IOC1 ASIC to the CPU.

- It initializes the CPU on power-up, executes CPU requests, refreshes memory, and checks data parity in memory.
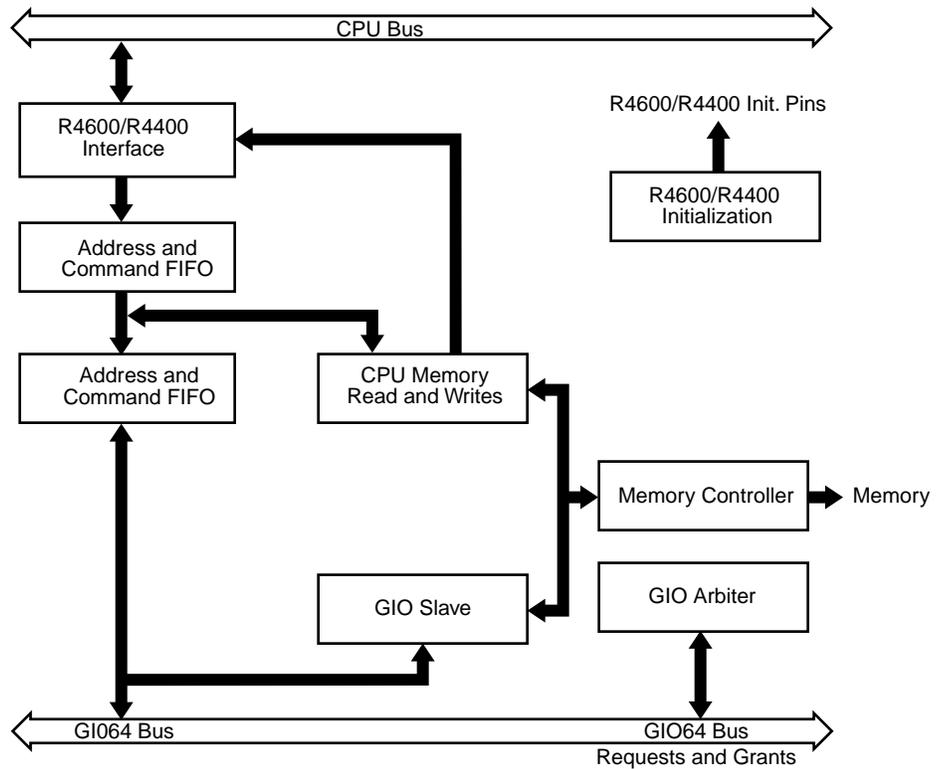
Figure 2-8   A Block Diagram of the MC1 ASIC

The DMUX1 ASICs are a two-chip slice of a data crossbar between the CPU, main memory, and the GIO64 bus. The two DMUX1 chips are, together, a data path with control signals generated by the MC1. They isolate the CPU bus from the memory system and the GIO64 bus. They also contain synchronization FIFOs to perform flow control between the various subsystems and they interleave main memory to increase peak memory bandwidth.

Main Memory

Main memory is controlled by the MC1 and DMUX1 ASICs. Memory consists of 72-pin, 36-bit wide DRAM SIMMs (which must have 80 ns RAS

access time and fast page-mode capability). Challenge S supports the following SIMM types:

- 4 MB

- 8 MB

- 16 MB

- 32 MB

SIMMS are arranged in slots and banks, as shown in Figure 2-9:
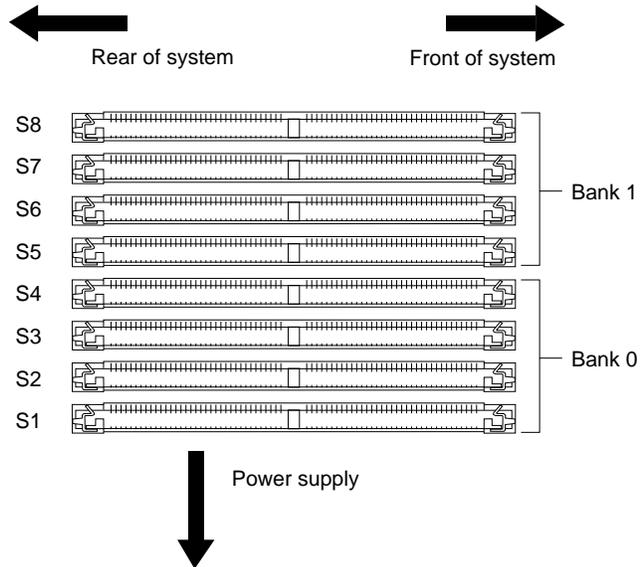
Figure 2-9   SIMM Bank and Slot Arrangement

DMUX1 chips interleave the SIMMs to create a 72-bit wide, two-way interleaved memory system. See Figure 2-10.
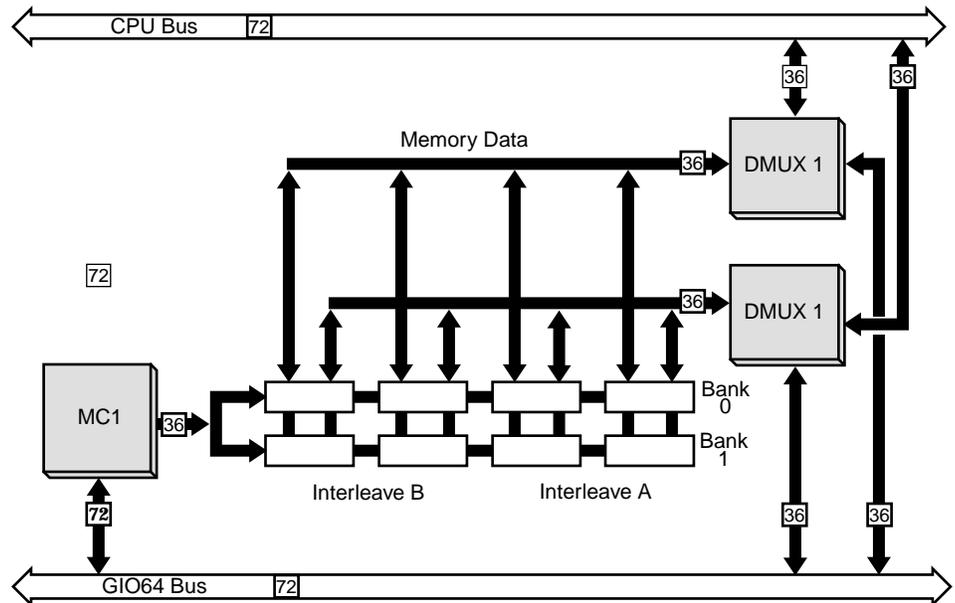
Figure 2-10   Memory Block on the Challenge S System Board

Main memory can be configured for between 16 MB and 256 MB. The system board has 8 SIMM sockets, arranged in two banks of four. Each bank must use SIMMs of the same size, but SIMM sizes can differ between banks.

GIO64 Bus

The GIO64 bus, the main system bus, provides a 64-bit wide (plus parity) data path and is designed for very high speed data transfer. It connects the Challenge S main systems: the CPU, memory, I/O, and GIO expansion slots. The GIO64 is a synchronous, multiplexed address/data burst mode bus that runs at 33 MHz and is clocked independently of the CPU. The GIO64 bus can transfer data between main memory and any device on the bus at up to 267 MB per second.

Note: The GIO interface is a published specification available to developers.

The I/O Subsystem

The HPC3 ASIC (High Performance Peripheral Controller) is the heart of the I/O subsystem. It is a custom Silicon Graphics chip that collects data from relatively slow peripherals, buffers it in FIFOs, then transfers it into main memory using high speed DMA transfers over the GIO64 bus. It also transfers data from main memory to peripheral devices in the same manner.

The HPC3 has direct interfaces to the GIO64 bus, to a SCSI-2 port, to an Ethernet port, and to the 16-bit P-Bus (peripheral bus). The SCSI-2 and Ethernet ports are connected directly for increased bandwidth. The P-Bus is a 20-bit address, 16-bit data bus used by the HPC3 for additional peripheral support. It connects the boot PROM, a real-time clock, the ISDN interface, and the IOC1 ASIC. The IOC1 integrates an interrupt handler, two general purpose serial ports, and a parallel port. There is a 384-byte memory buffer that is shared by all of the P-Bus devices to buffer DMA transfers to and from memory.

The IOPLUS I/O expansion subsystem includes its own HPC3 ASIC connected directly to the GIO64 bus. This additional HPCS supports the additional Ethernet controller and the two Fast/Wide SCSI-2 controllers provided by the optional subsystem.

Ethernet Ports

The standard Ethernet interface consists of an AUI Ethernet port supported by a controller that is connected directly to the HPC3 ASIC. The HPC3 supplies the logic required to retransmit packets when collisions occur and to manage the interface's 64-byte FIFO buffer. When the HPC3 receives a packet, it writes the packet into memory, then interrupts the CPU. When transmitting, it interrupts the CPU each time a packet is successfully sent or when 16 transmission attempts have all failed.

The IOPLUS I/O expansion subsystem provides an additional Ethernet 10 BASE-T port. Both Ethernet interfaces can be used at the same time.

SCSI-2 Ports

The standard 10 MB per second, Fast SCSI-2 interface consists of one controller (controller 0) shared between internal and external devices. The controller supports two internal SCSI devices, and up to five external SCSI devices (provided the external cable length does not exceed two meters), through a high-density, single-ended SCSI port on the rear of the system unit.

Note: Because of cable-length restrictions, you may be limited to three external devices on SCSI controller 0. For example, if you use a one-meter cable to attach the first device, and half-meter cables for each additional device, this totals two meters of cable – the maximum cable length.

The Fast SCSI-2 controller is supported by a SCSI controller connected directly to the HPC3 ASIC. The HPC3 uses a FIFO buffer to enable burst use of the GIO64 bus.

The IOPLUS I/O expansion subsystem provides two additional Fast/Wide/Differential SCSI-2 controllers (controllers 4 and 5) providing 20 MB of maximum bandwidth per controller (40 MB total). These controllers support a maximum of 18 meters of cable length.

Silicon Graphics defines bus speeds for it's SCSI controllers in *megatransfers* per second. Megatransfers are the number of million operations per bus cycle. An operation is either 8- or 16-bits in size. Megatransfers are based on a bus's burst data rate. Total data transfer rates depend on the bus bandwidth.

Parallel Port

The parallel interface consists of a 400 KB per second, bi-directional Centronics parallel port. The port is controlled by the IOC1 ASIC that connects to the P-Bus, and provides a FIFO buffer used to transfer data between main memory and the parallel port at up to 1.0 MB per second.

Serial Port

The serial interface consists of two serial ports, controlled by the IOC1 ASIC that connects to the P-Bus. The serial ports are software programmable for RS-422 (differential) and RS-232 standards, and support a transfer rate of up to 38.4 kilobits (Kb) per second. The RS-422 standard allows the use of common Macintosh peripherals such as laser printers and scanners. Support for MIDI timing is also provided.

ISDN Port

Challenge S supports a single ISDN basic rate interface integrated onto the system board. Access to the ISDN is provided at the "S" access point. The design provides a single hardware implementation that is certifiable throughout the world.

With IRIX 5.3, the subsystem *isdn_eoe* must be installed in order for the ISDN interface to operate. ISDN for the Challenge S has been working with the following switch protocols in the United States:

- DMS100

- 5ESS

- National ISDN1

ISDN on the Challenge S has been approved for the following switch protocols in the following countries:

- 1TR6 in Germany

- Euro-ISDN in Germany, Sweden, and Finland

- NTT in Japan

Countries other than those listed above may require testing and approval before ISDN can be used with the Challenge S in that country. Contact your local service provider or Silicon Graphics for more information.

The ISDN Basic Rate Interface on Challenge S server supports the Point-to-Point Protocol (PPP). PPP enables TCP/IP networking across ISDN B-channels, providing the full 64 kilobits (Kb) per second bandwidth of each B-channel. Both B channels can be combined using a round-robin packet

sending scheme to maximize throughput. This is sometimes called *inverse multiplexing*, and is similar to *bonding*.

The Application Software Interface (ASI) being developed by the National ISDN User's Forum is expected to become a standard in the USA. For information on programing with ASI, see the *isdn_eoe* Release Notes (available on-line using the *relnotes* command).

ISDN features include:

- single "S" RJ45 access connector

- hardware HDLC framing on both B-channels for data communications and networking applications

- 3 DMA channels (one channel to transmit and one for each receive direction on each B-channel)

- separate 64-byte transmit and receive FIFOs on each B-channel and on the D-channel

A block diagram of the Challenge S ISDN architecture is shown in Figure 2-11.

```
                    P–Bus
  2 B–channel HDLC              2B+D S Interface
  2 B–channel revc DMA   [8]    D–channel HDLC    [8]
  1 B–channel xmit DMA
```

S Interface	HDLC Controller

Isolation Transformers

T4–wire S

RJ45 Connector

Basic Rate "S" Interface
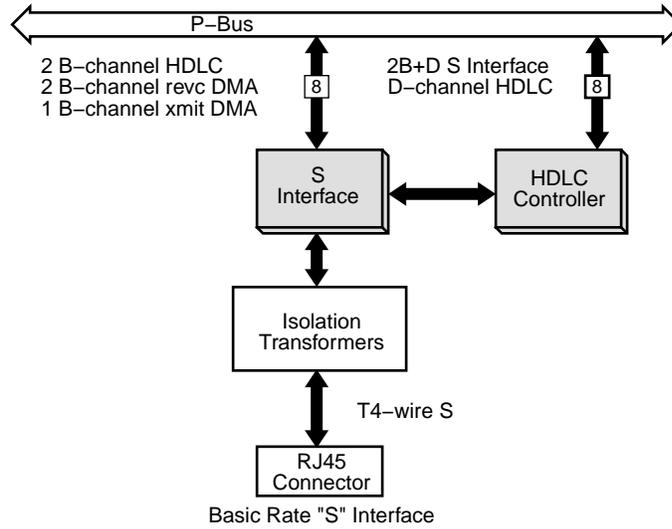
Figure 2-11   ISDN Interface Architecture.

The interface is based on the S interface chip and the HDLC controller chip. The S interface chip provides the interface to the 4-wire S interface, HDLC formatting on the D-channel, two FIFOs for the D-channel transmit and receive data, and host access to the D-channel data. The HDLC controller chip provides the DMA interface to the B-channels, HDLC formatting on the B-channels, and four FIFOs for the B-channel transmit and receive data. The isolation transformers provide the coupling and high voltage isolation between the S interface and the Challenge S system.

The S interface chip and the HDLC controller chip are both connected to the P-Bus in the Challenge S system. Both chips contain registers that may be accessed by the host CPU. The HDLC controller chip is connected to three DMA channels that are contained in the HPC3 ASIC.

GIO32-bis Expansion Subsystem

The two GIO32-bis expansion slots, connected directly to the GIO64 bus, provide direct access to the system for Silicon Graphics and third party plug-in boards for such applications as high-speed networking, image compression, video deck control, and additional I/O.

GIO32-bis is a cross between GIO32 and GIO64. It can be considered a 32-bit version of the non-pipelined GIO64 or a GIO32 with pipelined control signals.

Note: Only GIO slot 0 has DMA available for option boards. (See Figure 2-7.) If a GIO option board uses DMA, it must be installed in slot 0. The only exceptions to this rule are the Silicon Graphics GIO32 SCSI and Ethernet E++ boards.

Table 2-3 lists the GIO slot dependencies.

Table 2-3   GIO Slot Dependencies

GIO Slot	DMA Available	Board Restrictions
0	Yes	GIO32 SCSI and Ethernet (E++) boards may not be installed (any boards that use the HPC1.5 ASIC).
		Any other option board that requires DMA must be installed in this slot.
1	No	GIO32 SCSI and Ethernet (E++) boards must be installed in this slot (any boards that use the HPC1.5 ASIC).
		Note: if the GIO32 SCSI or E++ boards are installed, no other boards requiring DMA may be installed in the system, even in slot 0.

System Physical Specifications

Table 2-4 lists the physical specifications of the system.

Table 2-4   System Physical Specifications

Specification	Value
Dimensions	3" H x 16" W x 14" D
	(7.6 cm H x 40.6 cm W x 35.6 cm D)
Net Weight	16 lbs (7.2 kg)
Environmental (Non-Operating)	
Temperature	–40 to +65° C
Humidity	5% to 95% non-condensing
Altitude	40,000 MSL
Environmental (Operating)	
Temperature	+13 to +35° C
Humidity	10% to 80% non-condensing
Altitude	10,000 MSL
Noise	36 dBA
Vibration	0.02", 5-19 Hz
	0.35G, 5-500 Hz
Heat dissipation	1000 BTU/hr., maximum

Note: Power system specifications are described in the section "Power Supply".

Getting Started

This chapter explains how to connect the parts of Challenge S, how to turn on the system, log in, set up user accounts, and how to remove and replace the top cover.

Getting Started

This chapter tells you how to set up your Challenge S server. It includes instructions on:

- putting the pieces together
- connecting network cables
- turning on the system
- logging in and setting yourself up on a network
- turning off the system
- removing, replacing, and locking the top cover

Putting the Pieces Together

Overview of the System Connectors and Ports

When you assemble the Challenge S server, you will attach various cables (system console, power, network) to connectors on the back panel. The following figures provide an overview of the various connectors on the back of Challenge S systems.

Figure 3-1 shows the various back panel connectors on the Challenge S server
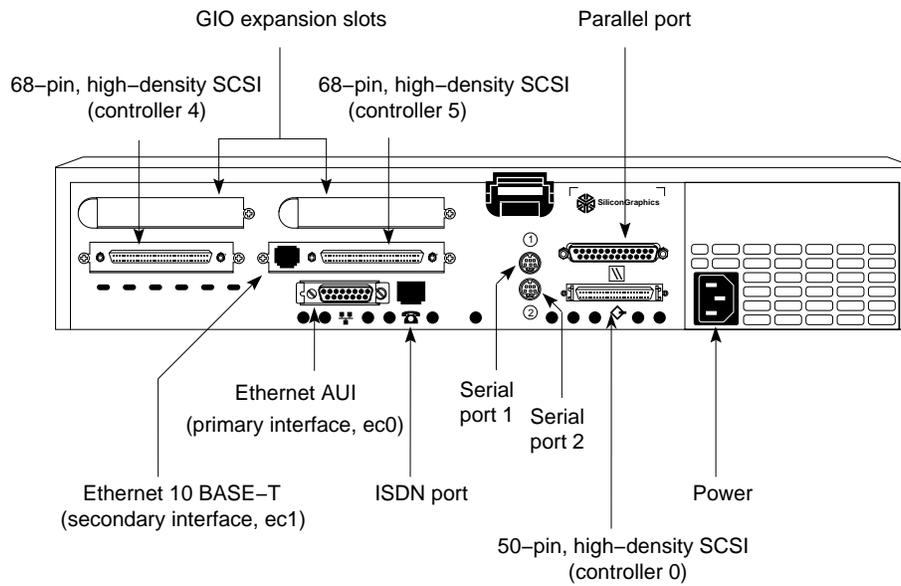
Figure 3-1   Challenge S Back Panel Connectors

For a complete description of these connectors, see Chapter 2, "Chassis Tour and Theory of Operation."

Safety Considerations

- Place the Challenge S chassis on a flat, hard surface. A soft surface such as a carpet interferes with the airflow through the bottom of the chassis and may cause overheating.

- The only way to disconnect power to this system is to unplug the power cable. To ensure the safety of the server, the electrical outlet must be close to the server and easily accessible.

- When opening the system chassis, for example to install additional peripherals, always observe proper electrostatic discharge (ESD) procedures. Make sure you are properly grounded with a wrist or heel strap before handling sensitive boards and drives. All Silicon Graphics peripheral options, including disks, option boards, and memory, are shipped with wrist straps.

Assembling the Server and Attaching the Console

Follow these steps to assemble the Challenge S server and attach a system console (ASCII terminal):

1. Unpack the system from the shipping carton and set up the chassis on a hard, flat surface. Allow several inches of clearance around the system for proper airflow, and do not place the chassis on a soft surface (such as a rug or carpet) that might block the vent on the bottom of the system.

2. If you wish to install any internal components (such as a system disk, an option disk, a floptical drive, additional memory, or an expansion board) do so now.

   - See "Removing the Top Cover" for instructions on removing the chassis cover.

   - To install additional memory, go to Chapter 4, "Installing Memory."

   - To install a GIO option board such as a video, network, or fast SCSI controller board, go to Chapter 5, "Installing GIO Option Boards."

   - To install an optional internal drive (floptical, or second hard disk drive), or external SCSI devices, go to Chapter 6, "Installing Internal and External Peripherals."

- See "Replacing the Top Cover" for instructions on replacing the chassis cover.

  After you have installed any additional internal components, or if you do not have any additional internal components to install, proceed to the next step.

3. Connect the RS-232 serial cable (provided) to an ASCII terminal. The cable is approximately 10 feet (3 meters) long. Plug the round, 8-pin DIN connector into serial port **1** on the back of the system, as shown in Figure 3-2.

Serial cable
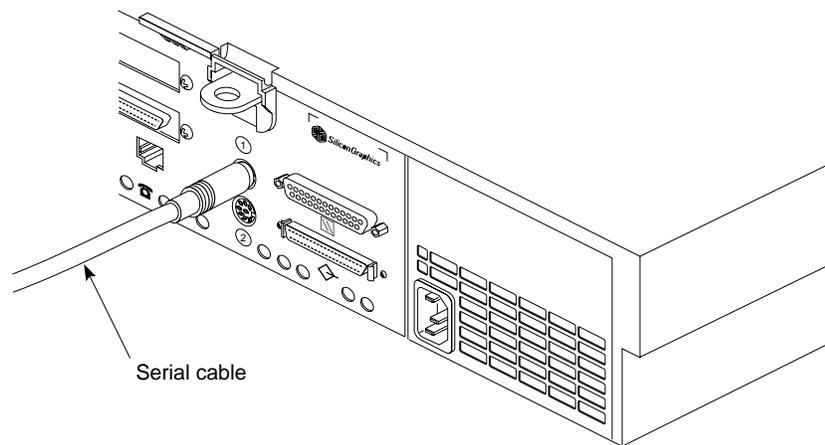
Figure 3-2   Connecting the System Console (ASCII Terminal)

4. Connect the power cable to the server and to the electrical outlet. The power cable supplied is approximately 10 feet (3 meters).

5. Connect the ASCII terminal's power cable to an electrical outlet.

When the system is powered on, it automatically uses serial port **1** as the system console.

Note: If your site has multiple Challenge S servers, you may wish to save at least one set of packing materials in the event that you need to return a system for upgrading or for service.

Now you are ready to connect any network cables.

Connecting Network Cables

The Challenge S server supports two types of Ethernet:

- an Access Unit Interface (AUI) connections on the main system board (all server models)

- an additional 10-BASE T connection on the IOPLUS board

Challenge S also provides an Integrated Services Digital Network (ISDN) connector.

- To connect an Ethernet AUI (Access Unit Interface) cable, turn to "Connecting an Ethernet AUI Cable".

- To connect an Ethernet 10-BASE T cable, turn to "Connecting an Ethernet 10-BASE T Cable (S-100 and S-150 Servers)".

- To connect an ISDN cable, turn to "Connecting an Integrated Services Digital Network (ISDN) Cable".

Connecting an Ethernet AUI Cable

To connect an Ethernet AUI cable to your system, follow these steps:

1. Obtain a drop cable that reaches from the wall to the back of the Challenge S server.

2. Connect the Ethernet AUI cable to the Ethernet AUI port on the back of the Challenge S server, as shown in Figure 3-3.
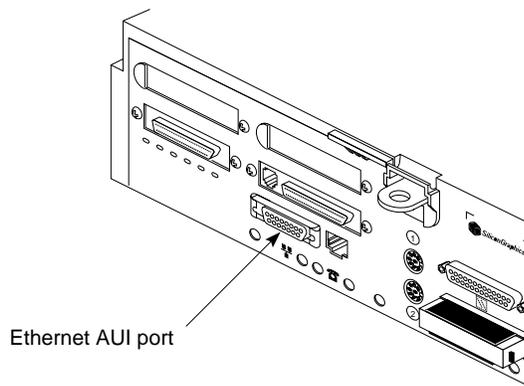
Ethernet AUI port

Figure 3-3   Connecting an Ethernet AUI Cable to the Challenge S Server
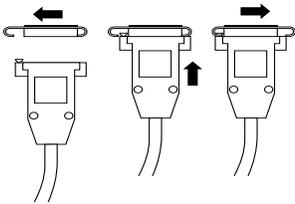
Figure 3-4
Ethernet AUI cable

- Make sure the sliding bracket on the Ethernet port on the system is pushed all the way left, as shown in Figure 3-4.

- Plug the cable into the port.

- Slide the bracket right to hold it in place.

You are finished installing the Ethernet AUI cable. If you do not have other network cables to install, turn to "About the Controls on the Front Panel" to power on the server.

Connecting an Ethernet 10-BASE T Cable (S-100 and S-150 Servers)

To connect an Ethernet 10-BASE T cable to the system, follow these steps:

1. Obtain a 10-BASE T cable that reaches from the wall to the back of your Challenge S server.

2. Plug one end of the cable into the port in between the two SCSI connectors on the back of the Challenge S server, as shown in Figure 3-5. Note that the Ethernet 10-BASE T and the ISDN port below it look similar. The Ethernet 10-BASE T port is the one on top, immediately next to the SCSI connector, as shown below.

Ethernet 10-BASE T port
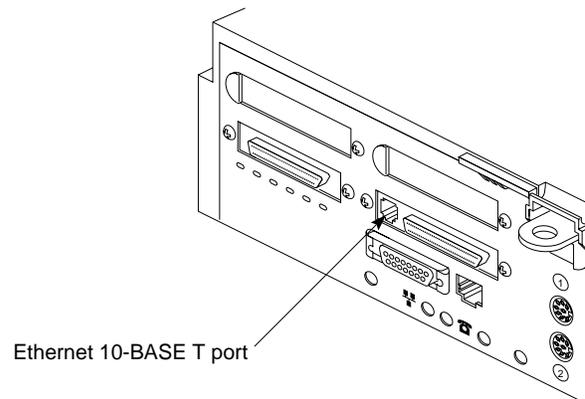
Figure 3-5 Connecting an Ethernet 10-BASE T Cable to the Challenge S Server (S-100 and S-150 Models)

You are finished installing the Ethernet 10-BASE T cable. If you do not have other network cables to install, turn to "About the Controls on the Front Panel" to power on the server.

Connecting an Integrated Services Digital Network (ISDN) Cable

Note: See "ISDN Port," in Chapter 2, "Chassis Tour and Theory of Operation" for more information about ISDN on the Challenge S.

To connect an ISDN cable to your system, follow these steps:

1. From your network administrator or your phone company, obtain an ISDN cable and an NT1 network terminator.

2. Plug one end of the ISDN cable into the port above the ISDN label on the back of the Challenge S server, as shown in Figure 3-6. Note that the ISDN port and the Ethernet 10-BASE T port above it look similar. The ISDN port is the one on the bottom, as shown below.

ISDN port
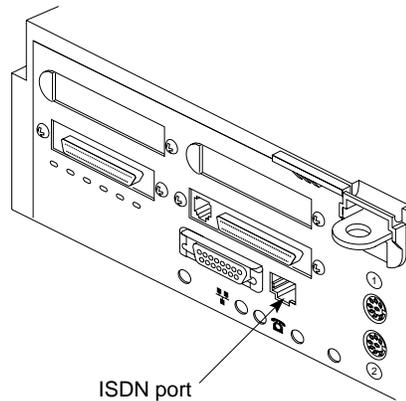
Figure 3-6   Connecting an ISDN Cable to the Challenge S Server

3. Plug the other end of the cable into the NT1 network terminator.

You are finished setting up your Challenge S server. Turn to "About the Controls on the Front Panel" to power on the server.

About the Controls on the Front Panel

Before turning on the server, you may want to familiarize yourself with the controls on the front panel of the Challenge S server, as shown in Figure 3-7.

- The **Power** button turns the server on and off. This is a "soft" power button that signals the Challenge S PROM to turn on or shut off internal power.

  – If the system is off, press the power button to start it.

  – If the system is on, press the power button once to *gracefully halt* the operating system and turn off power.

- The **Reset** button resets the hardware. Press it only if your system is malfunctioning and you cannot communicate with it. The button is recessed, so you need the tip of a pencil or an unwound paper clip to reach it. For more information, see Chapter 8, "Troubleshooting."

- The **Volume** buttons do not function, since there is no audio processor on the Challenge S.

Warning: **If you press the power button twice in a row while the system is on, the server will power off immediately without waiting for the operating system to halt gracefully.**
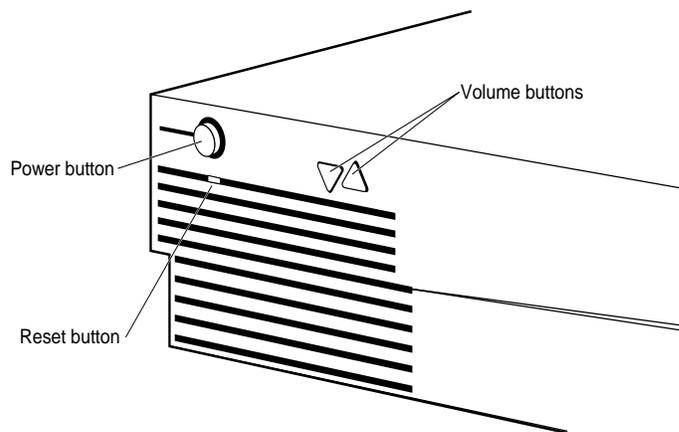
Figure 3-7   The Challenge S Server Control Buttons on the Front Panel

Starting the Server for the First Time

When you start the server for the first time, you do the following:

- power on the system

- start the system and log in as root

- configure the system to use any optional hard disks that you have installed

- install additional software or remove software that you do not need

- add additional user accounts (if needed)

The following sections describe each of these tasks.

Powering On the System

Follow these steps to power on the server:

1. Turn on the system console (ASCII terminal).

2. Turn on the system power.

   Press and release the power button to turn on the system, as shown in Figure 3-8.
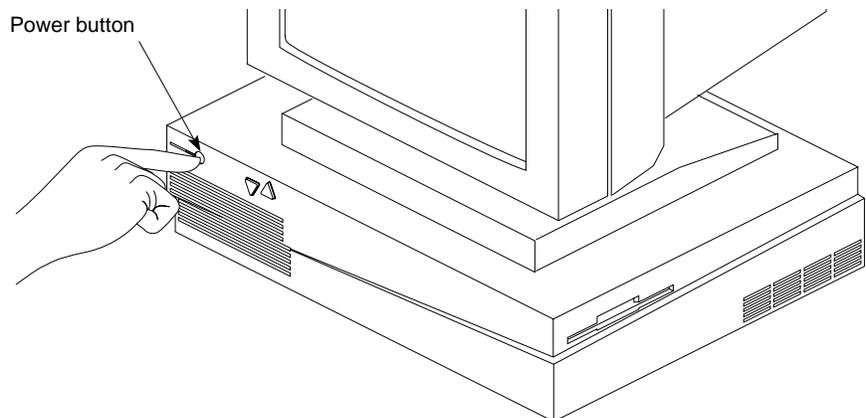
Figure 3-8   Turning On the Challenge S Server

When you power on your system, the power indicator LED on the front of the machine is amber for a few seconds, and then turns green.

The LED changes back to amber while the system runs the power-on diagnostics. You see the message shown in Example 3-1:

```
Running power-on diagnostics...
```

Example 3-1   Power-On Diagnostics Message

If the system passes all of the diagnostics tests, the light turns green, the system continues booting, and you see the System Maintenance Menu, shown in Example 3-2.

```
System Maintenace Menu

1) Start System
2) Install Software
3) Run Diagnostics
4) Recover System
5) Enter Command Monitor


Option?
```

Example 3-2   System Maintenance Menu

If the LED is red and does not turn green, or the System Maintenance Menu does not appear, there may be a problem. Go to Chapter 8, "Troubleshooting," to run some tests.

Starting the System and Logging In as root

To start the system from the System Maintenance Menu (shown in
Example 3-2), type **1**, then press **<Enter>**. You see start-up messages similar
to Example 3-3.

```
              Starting up the system...

IRIX Release 5.3 IP22 Version 02111257 System V
Copyright 1987-1994 Silicon Graphics, Inc.
All Rights Reserved.

System is coming up...

IRIS login:
```

Example 3-3   System Start-Up Messages

At the "IRIS login:" prompt, you are ready to log in and configure the
system. Type **root** and press **<Enter>**. You see some copyright messages
followed by a TERM = prompt, as shown in Example 3-4:

```
IRIX Release 5.3 IP22 Version 02111257 IRIS
Copyright 1987-1994 Silicon Graphics, Inc.
TERM = (vt100)
```

Example 3-4   Example System Login Messages and Terminal-Type Prompt

The default terminal type is VT-100. If you are using a VT-100 terminal, or
one that emulates a VT-100, press **<Enter>**. You can also type the short-hand
name of a supported terminal. Table 3-1 lists ten common supported
terminals and their short-hand names.

Table 3-1   Ten Common, Supported Terminals

Name	Short-Hand Name
Adds Viewpoint	viewpoint
Adm3a	adm3a
AT&T 4410/5410	4410
HP 2621	hp2621
IBM 3101-10	ibm

Table 3-1 (continued)   Ten Common, Supported Terminals

Name	Short-Hand Name
Qume Sprint 11	qume
TVI 912	tvi912
Visual 50	vi50
VT-100	vt100
Wyse 60	wy60

See Appendix D, "Supported Terminals" for more information. See also your terminal documentation for information about how to set the terminal's emulation mode, in the event that you have to change it to match one of the supported types.

Note: The default keyboard language is U.S. English.

Configuring Additional Hard Disks

To configure an additional disk as a single, mounted file system, you can use the *Add_Disk* command. For example, the following command configures a single disk that is set to SCSI ID 6 and is attached to the main SCSI connector (controller 0):

```
Add_Disk 0 6
```

SCSI controller 0 controls the main system disk, any disk or other SCSI device installed inside the system chassis, and any disk or other SCSI device attached to the main, external connector. The main connector is the one located beneath the parallel port on the rear of the chassis. See Figure 3-1.

The following command configures a disk that is set to SCSI unit ID 2 and is attached to one of the secondary, external SCSI ports, for example, controller 4 (Challenge S100 and S150 models only):

```
Add_Disk 4 2
```

See Figure 3-1 to determine the controller numbers of the available SCSI ports. for your model of Challenge S server. For complete information about

adding peripherals to the Challenge S, see Chapter 6, "Installing Internal and External Peripherals." For more information about formatting disks and using disk drives, see the *IRIX Advanced Site and Server Administration Guide*.

If you want to add a disk or disks using a different configuration, for example, several disks as a single file system, or if you want to stripe several disks for performance reasons, refer to the *IRIX Advanced Site and Server Administration Guide*.

Installing and Removing Software

You may receive software for your system from two different sources: Silicon Graphics, Inc., or other companies that write application software that runs on the Challenge S server. For basic information about installing and removing software from your Challenge S server, turn to Chapter 7, "Installing and Removing Software." For complete information about installing and removing software, see the *IRIS Software Installation Guide*.

Removing Unnecessary Subsystems

The default set of software subsystems that are installed at the factory are suitable for a variety of Silicon Graphics systems. However, you can save a great deal of disk space by removing packages that are not required (or usable) on your system.

For a list of software subsystems that you might be able to remove, as well as basic instructions for using the *versions* command to remove software, see "Removing Optional Software".

Setting Up Login Accounts

By default, the IRIX operating system provides several accounts that can be used to log in to the server. These are listed in Table 3-2:

Table 3-2   Default Login Accounts, Their Uses, and System Access

Name of Account	Use	May Access
root	System administration	All areas of the system
guest	Guest access to the system	Limited areas of the system
demos	Running demonstration programs	Limited areas of the system
4Dgifts	"Gift" software account	Limited areas of the system
EZsetup	Runs a graphical setup program (not usable on Challenge S systems)	Limited areas of the system
OutOfBox	Runs a graphical demonstration program (not usable on Challenge S systems)	Limited areas of the system

There are other accounts on the system (such as *bin* and *lp*), but these cannot (and should not) be used to log in to the server.

If you would like to set up additional accounts on the server, follow these steps:

1. Edit the file */etc/passwd* with your preferred text editor.

2. Find this line:

    ```
    guest:+:998:998:Guest Account:/usr/people/guest:/bin/csh
    ```

    Copy it, then add it to the end of the file.

3. Change the first field (*guest* in this example) to the name of the new account; for example, *alice*.

4. Remove the plus sign (+).

5. The first occurrence of "998" is the user ID of the account. Change it to a number that is 1 greater than the current highest user ID on your system. Do not use user ID numbers between 0 and 100, as these are reserved for system use.

6. The next field (the second "998") is the group ID number of the account. Check the file */etc/group* and pick a suitable group ID for the new user account. The */etc/group* file lists all the groups on the system by group ID, followed by a list of the current users who belong to that group.

7. Change the words *Guest Account* to the name of the new user, for example *Alice Cramden*. If you wish, you can add an "office" and "phone number" to this field. After the user's name, add a comma, then the office location, another comma, and the phone number. For example:

    ```
    :Alice Cramden, Brooklyn, (212) 555-1212:
    ```

8. Change the next field (*/usr/people/guest*) to the location of the user's home directory. For example, */usr/people/alice*.

    The last field (*/bin/csh*) is the user's login shell. For most users, the C shell (*/bin/csh*), Korn Shell (*/bin/ksh*), or Bourne shell (*/bin/sh*) is appropriate.

9. Repeat steps 1 through 9 for each user account you want to add.

10. Write the changes you made to */etc/passwd* and exit the file.

11. Use the *mkdir*(1) command to create home directories for each user account you added in steps 1 through 8. For example, to create a home directory for the user "alice":

    ```
    mkdir /usr/people/alice
    ```

    Make the directory owned by user *alice*, who is in group *bowling*:

    ```
    chown alice /usr/people/alice
    ```

    ```
    chgrp bowling /usr/people/alice
    ```

    Make sure the new home directory has the appropriate access permissions for your site. For a site with relaxed security:

    ```
    chmod 755 /usr/people/alice
    ```

    For more information on the *chown*(1), *chgrp*(1), and *chmod*(1) commands, see the respective reference pages.

12. Copy the shell start-up files to each new user's home directory.

    If the new account uses the C shell:

    `cp /etc/stdcshrc /usr/people/alice/.cshrc`

    `cp /etc/stdlogin /usr/people/alice/.login`

    If the new account uses the Korn or Bourne shell:

    `cp /etc/stdprofile /usr/people/alice/.profile`

13. Make these shell start-up files owned by the users. For C shell accounts, type:

    `chmod 755 /usr/people/alice/.cshrc`
    `/usr/people/alice/.login`

    For Korn or Bourne shell:

    `chmod 755 /usr/people/alice/.profile`

14. Issue the *pwck*(1M) command to check your work. This command performs a simple check of the */etc/passwd* file and makes sure that no user ID numbers have been reused and that all fields have reasonable entries. If your work has been done correctly, you should see output similar to the following:

```
sysadm:*:0:0:System V Administration:/usr/admin:/bin/sh
        Login directory not found

diag:*:0:996:Hardware Diagnostics:/usr/diags:/bin/csh
        Login directory not found

nuucp::10:10:Remote UUCP
User:/var/spool/uucppublic:/usr/lib/uucp/uucico
        Login directory not found
        Optional shell file not found

auditor:*:11:0:Audit Activity Owner:/auditor:/bin/sh
        Login directory not found

dbadmin:*:12:0:Security Database Owner:/dbadmin:/bin/sh
        Login directory not found

rfindd:*:66:1:Rfind Daemon and Fsdump:/var/rfindd:/bin/sh
        Login directory not found

EZsetup::992:998:System Setup:/var/sysadmdesktop/EZsetup:/bin/csh
        First char in logname not lower case alpha
        2 Bad character(s) in logname
```

```
OutOfBox::995:997:Out of Box Experience:/usr/people/tour:/bin/csh
        First char in logname not lower case alpha
        3 Bad character(s) in logname
        Login directory not found

4Dgifts::999:998:4Dgifts Account:/usr/people/4Dgifts:/bin/csh
        First char in logname not lower case alpha
        1 Bad character(s) in logname
        Login directory not found

nobody:*:-2:-2:original nobody uid:/dev/null:/dev/null
        Invalid UID
        Invalid GID
```

These messages are normal and expected from *pwck*. All errors generated by *pwck* are described in detail in the *pwck*(1M) reference page.

For more complete information about user accounts and groups, see the *IRIX Advanced Site and Server Administration Guide*.

Turning Off the Challenge S Server

You can shut down the system and turn off power inside the system chassis simply by pressing the power button on the front of the Challenge S server. Press and release the power button once, as shown in Figure 3-9.
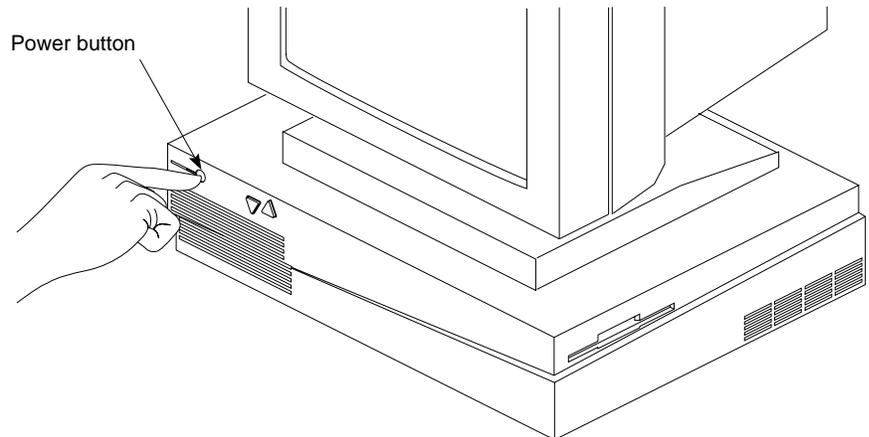
Figure 3-9   Turning Off the Challenge S Server

Warning: **If you press the power button twice before the system has shut down, the server will power off immediately without waiting for the software to shut down gracefully.**

Messages about the system shutdown are displayed and the LED on the front of the chassis blinks green and amber. Then the system powers off automatically within the next minute.

Although it is not necessary to shut down the system software before pressing the power button, we strongly recommend that you warn any other users that you are about to shut down the system and give them enough time to log off the server, or exit from any applications that depend upon the server. The *IRIX Advanced Site and Server Administration Guide* describes the proper method of warning users of an impending shutdown.

Note: The power button is software-controlled: this means that the system **does not** automatically shut down if it is unplugged or if power is interrupted (for example, by a power outage or by a power box being turned off).

Removing the Top Cover

Follow these steps to remove the top cover of your Challenge S server:

1. If the system is powered on, press and release the power button on the front of the system to shut down the software and power off the system.

2. Disconnect the power cable from the back of the Challenge S server.

3. Facing the front of the Challenge S server, place your right thumb on the small channel at the back of the cover, and your second and third fingers under the finger ledge, as shown in Figure 3-10.

4. Snap the cover loose by bracing your thumb against the lip and pushing up the finger ledge with the second and third fingers, followed by a small push toward the front.

5. Slide the cover forward about one inch and remove it.
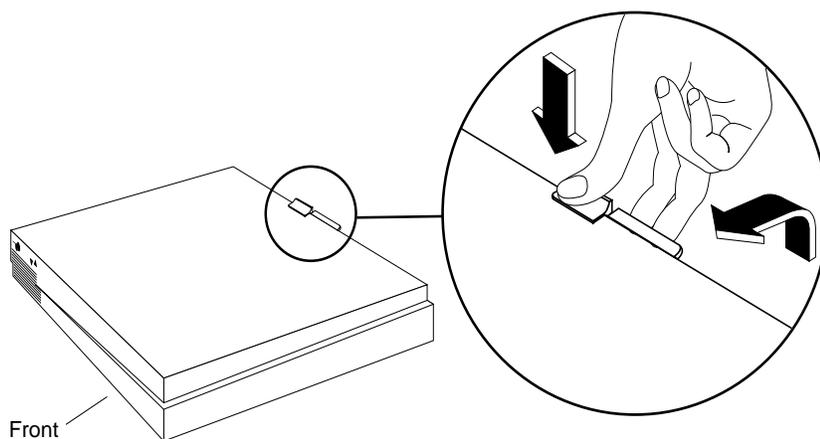
Front

Figure 3-10   Removing the top cover from the Challenge S server

Replacing the Top Cover

To replace the cover of your Challenge S server, follow these steps:

1. Facing the front of the system, lower the cover about one inch from its fully closed position, as shown in Figure 3-11.

2. Tilt the cover and insert the tab through the hole in the rear of the chassis.

3. Slide the cover toward the back of the chassis until it snaps into place.

Rear
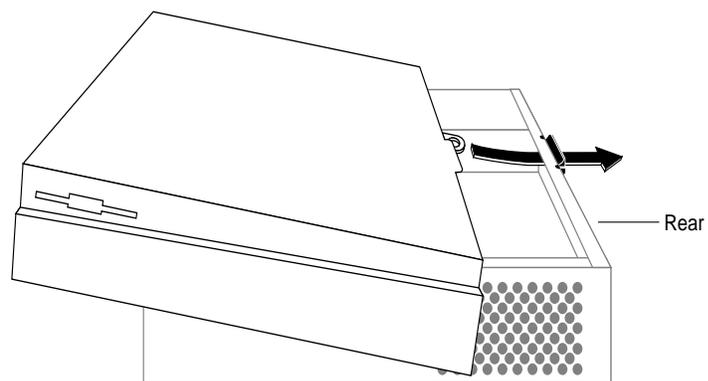
Figure 3-11   Replacing the Top Cover on the Challenge S Server

Locking the Top Cover

To prevent anyone from tampering with the internal parts of the Challenge S server, attach a lock through the hole in the lockbar, as shown in Figure 3-12. To prevent theft of the server, attach a cable lock.
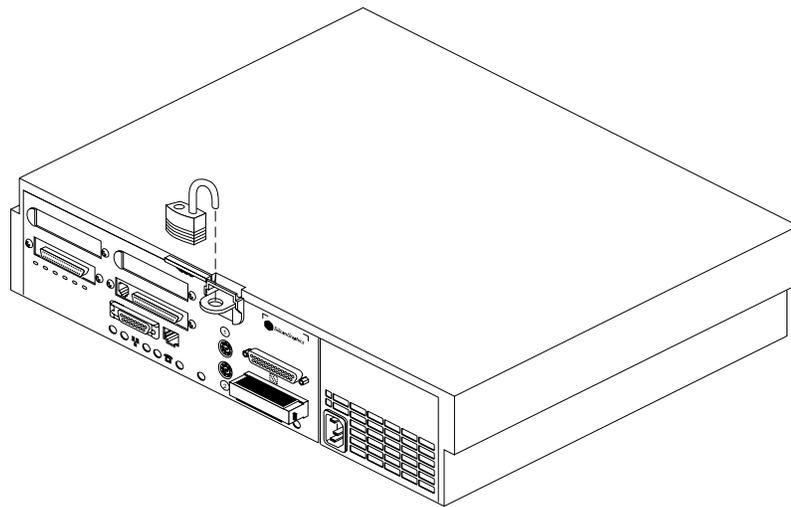
Figure 3-12   Attaching a Lock to the Challenge S Server

Installing Memory

This chapter describes how to install SIMMs (Single Inline Memory Modules) in the Challenge S server.

Installing Memory

This chapter tells you how to install single in-line memory modules (SIMMs). If you are removing and replacing SIMMs, go to "Replacing SIMMs".

Installing SIMMs

Follow these steps to shut down your system, remove the cover, install the SIMMs, replace the cover, and check to make sure the SIMMs are installed and working properly.

1. If the system is powered on, press and release the power button on the front panel to power off the system.

    The system powers off automatically after about a minute.

2. Disconnect the power cable from the back of the Challenge S server.

3. Remove the top cover by releasing the latch on the rear of the cover and sliding it forward. For more details, see "Removing the Top Cover".

4. Ground yourself to a metal part of the chassis.

    ■   Put the wrist strap (included with the server) around your wrist, making sure it's tight against your arm.

    ■   Attach the alligator clip to a metal part of the chassis.

    Caution: The system's internal components are sensitive to static electricity. Handle the parts carefully, and wear the wrist strap to avoid discharging static electricity.

5. Move the system or position yourself so that you are facing the power supply. The SIMM sockets are located as shown in Figure 4-1.
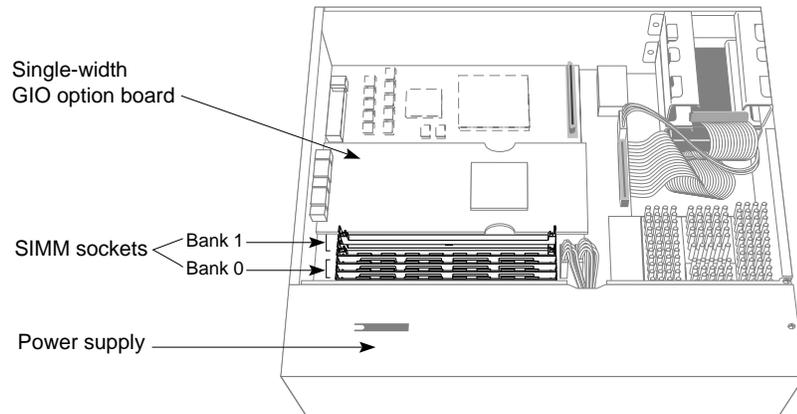
Figure 4-1   Locating the SIMM Sockets

There are eight sockets, split into two banks—0 and 1. Bank 0 is closer to the power supply and contains sockets S1 through S4. Bank 1 is closer to the graphics board and contains sockets S5 through S8. The system ships with four SIMMs installed in Bank 0. See Figure 4-2.
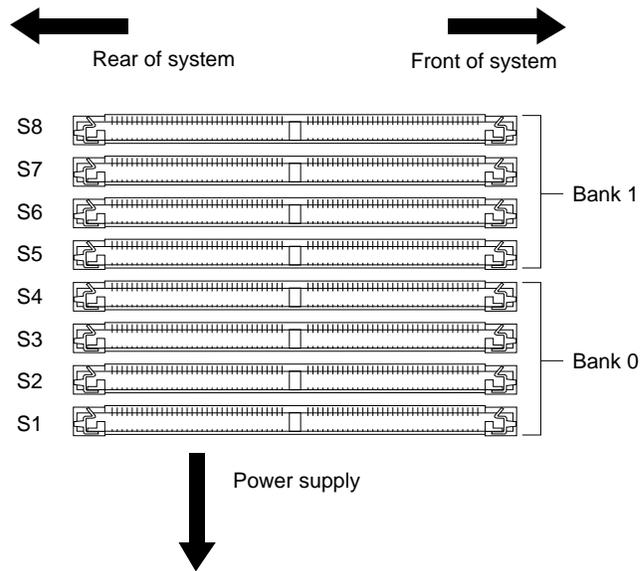
Figure 4-2   SIMM Bank and Socket Numbers

(If you are upgrading memory or replacing faulty memory and need to remove any SIMMs that are already installed, go to "Replacing SIMMs" and then return to this section.)

6. Install the SIMMs consecutively in groups of four, beginning with the open slot closest to the power supply (from bank 0 to 1). Each bank must have four SIMMs of the same capacity installed.

   For example, you may install four 4 MB SIMMs in bank 0, and four 8 MB SIMMs in bank 1, but you may not install 4 MB and 8 MB SIMMs in the same bank.

   ■ Using both hands, grasp the top of the SIMM so the notch in the bottom corner of the SIMM is on your right, as shown in Figure 4-3. (This is the side closest to the CPU module).

This side faces you

Notch
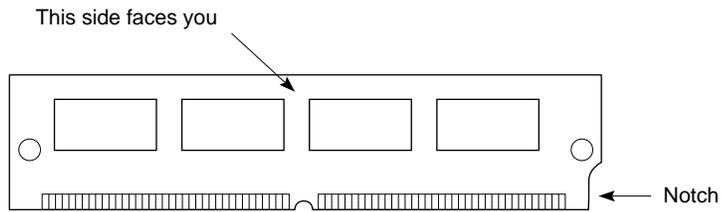
Figure 4-3   Orienting the SIMM

   ■ Start with the socket closest to the power supply. Tip the top of the SIMM away from the power supply, and press the SIMM firmly into the socket at a slight angle (from straight upright).

   ■ Tilt the SIMM up into a vertical position, as shown in Figure 4-4. There should be a slight click when the SIMM reaches the vertical position as the metal latches snap up around the SIMM.The SIMM is positioned correctly when the latches on both sides of the SIMM socket are hugging the edges of the SIMM.
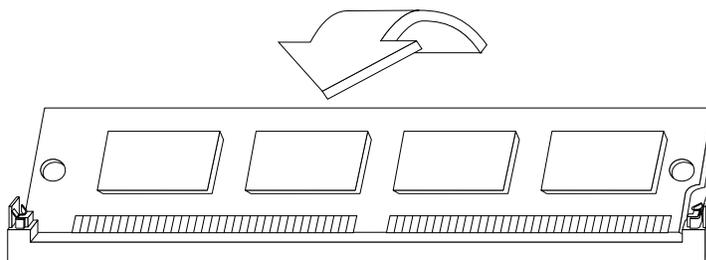
Figure 4-4   Tilting the SIMM Up to a Vertical Position

> **Note:** Some GIO option boards, if installed in slot 0 (on the side of the IOPLUS or GIO extender board close to the SIMMs), may impede your installation of the SIMM in the last socket of bank 1 (closest to the graphics board). If this is the case, you may have to remove the GIO option board to gain access to the SIMM socket. Turn to "Replacing a GIO Option Board" for instructions and then return to this section.

7. Install the rest of the SIMMs the same way.

8. If you removed a GIO board to gain access to the last SIMM socket, reinstall it, referring to "Replacing a GIO Option Board".

Now, go to the next section to check that the SIMMs are installed correctly before closing up the system.

Checking the SIMM Installation

Before replacing the cover, make a final visual check that the SIMMs are installed correctly.

1. Check that each SIMM is vertical and perpendicular to the system board.

    - Look across the tops of the SIMMs to make sure they are even and inserted all the way into the socket.

    - If the SIMM appears to be leaning, push it up into a vertical position.

    - Make sure the latches on the sides of each SIMM fit snugly around it.

2. If you have no other internal parts to install, replace the top cover by inserting the tab through the hole in the rear of the chassis and sliding the cover back until it snaps into place. For more information, see "Replacing the Top Cover".

    It is important to replace the cover before testing the SIMMs. This ensures proper airflow through the system while the system is running the test.

3. Reconnect the power cable to the connector on the back of the system.

You are now ready to power up the system and check if the system recognizes the new memory.

Checking the New Memory

To confirm that you've installed the memory modules correctly, check whether the system recognizes the new memory. Follow these steps:

1. Press and release the power button to turn on the power.

   You see the power-on diagnostics message, as shown in Example 4-1.

   ```
   Running power-on diagnostics...
   ```

   Example 4-1   Power-On Diagnostics Message

   The system boots up and brings you to the System Maintenance menu.

   If nothing appears on the console and the LED on the front panel is blinking red, one or more SIMMs are not installed correctly. Check to make sure the SIMMs are installed correctly by referring to "Checking the SIMM Installation" then try this procedure again.

2. Press **1** to start the system.

3. When you see the login prompt, log in to your own account.

4. At the system prompt, enter the following command:

   hinv

   Look for a line similar to the following

   ```
   Main memory size: 32 Mbytes
   ```

   The amount of memory shown in megabytes should equal the amount of memory that came with the server plus the amount of memory you installed. For example, if you had 32 MB of memory when you started and you installed another 16 MB, you should have a total of 48 MB.

5. If the system does not show the total amount of memory you now have installed, the SIMMs may not be installed correctly. Go to "Installing SIMMs" and try re-installing the SIMMs, following the instructions carefully. Then try this procedure again.

You have finished installing the SIMMs.

Installing GIO Option Boards

This chapter describes how to install GIO option boards such as network, Fast SCSI, and other I/O boards.

Installing GIO Option Boards

This chapter tells you how to install GIO (Graphics Input/Output) option boards. GIO option boards are video or network boards, fast SCSI controller boards, and other I/O boards that are connected to the expansion slots on the graphics board to add functionality to your system.

If a GIO option board is already installed and you wish to replace it, go to "Replacing a GIO Option Board".

GIO Slot Dependencies

Currently, direct memory access (DMA) is supported for GIO slot 0. (See Figure 5-1 to determine which GIO slot is 0.) All Silicon Graphics GIO options use DMA, and should therefore be installed on slot 0. GIO slot 1 only supports option boards that use programmed I/O. The only exceptions to this rule are the GIO32 SCSI and Ethernet E++ boards (any boards that use the HPC1.5 ASIC). Table 5-1 describes these dependencies.

Table 5-1   GIO Slot Dependencies

GIO Slot	DMA Available	Board Restrictions
0	Yes	GIO32 SCSI and Ethernet (E++) boards *may not be installed* (any boards that use the HPC1.5 ASIC).
		Any other option board that requires DMA must be installed in this slot.
1	No	GIO32 SCSI and Ethernet (E++) boards *must be installed* in this slot (any boards that use the HPC1.5 ASIC).
		Note: if the GIO32 SCSI or E++ boards are installed, no other boards requiring DMA may be installed in the system, even in slot 0.

Installing a GIO Option Board

GIO option boards are installed on top of the IOPLUS board. A GIO option board can be either single-width, covering half of the graphics board, or double-width, extending over the entire graphics board.

Note: These instructions are for installing a single-width GIO option board. You can also follow these steps to install a double-width GIO option board. The only difference is that there will be more securing screws on the double-width board.

Refer to the manual included with your GIO option board for any special installation instructions.

Follow these steps to turn off the system, remove the cover, install the GIO option board, and replace the cover.

1. If the system is powered on, press and release the power button on the front panel to power off the system.

    The system powers off automatically after about a minute.

2. Disconnect the power cable from the back of the Challenge server.

3. Remove the top cover by releasing the latch on the rear of the cover and sliding it forward. For more details, see "Removing the Top Cover".

4. Ground yourself to a metal part of the chassis.

    ■   Put the wrist strap (included with the server) around your wrist, making sure it is tight against your arm.

    ■   Attach the alligator clip to a metal part of the chassis.

    Caution: The GIO option board is extremely sensitive to static electricity; you must wear the wrist strap while installing it. The wrist strap prevents the discharge of static electricity, which could damage the board.

5. Move the system or position yourself so that you are facing the rear of the system, as shown in Figure 5-1. You'll connect the GIO option board to the IOPLUS board. You can install the GIO option board in either of the two available slots. However, before installing the board, read "GIO Slot Dependencies".

GIO slot 0

GIO slot 1

SIMM sockets
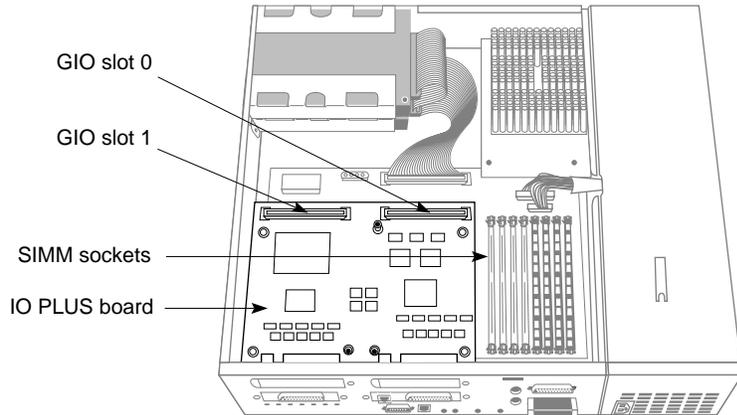
IO PLUS board

Figure 5-1   Locating the GIO Board Connectors (IOPLUS board shown)

6. Using a Phillips screwdriver, remove the screw from the face plate on the rear of the server that covers the GIO option port where you are installing the board, as shown in Figure 5-2. Save the face plate in case you remove and do not replace the board in the future.
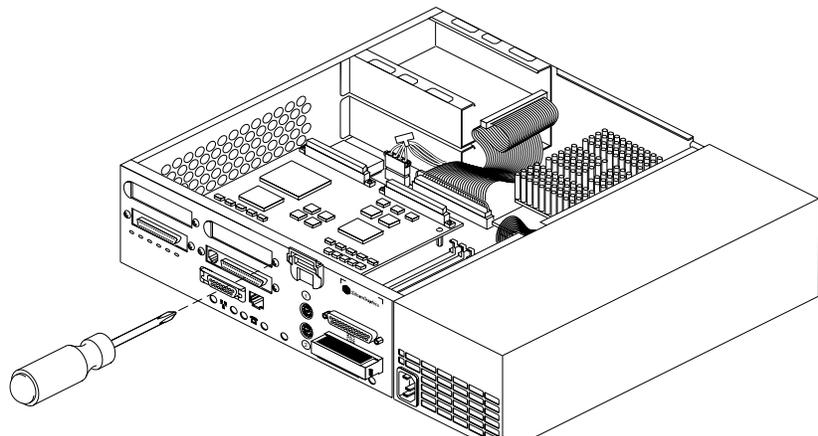
Figure 5-2   Removing the Screw From the GIO I/O Port Face Plate

7. Lower the GIO option board over the IOPLUS board, inserting the GIO board's I/O connector through the open slot on the rear of the server, as shown in Figure 5-3.
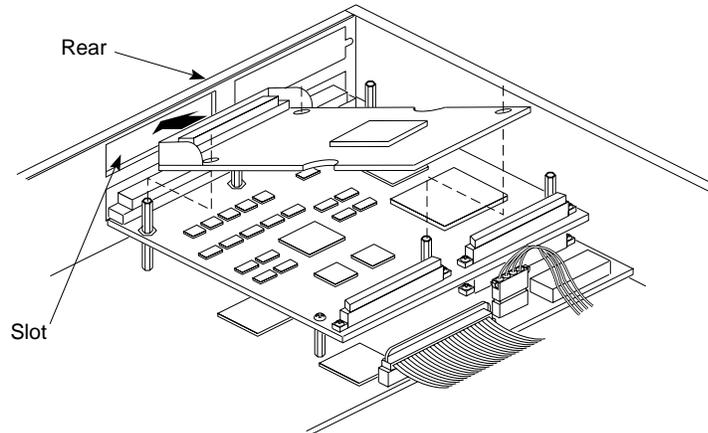
Figure 5-3   Inserting the GIO Board's I/O Connector Through the Backplane

8. Connect the GIO option board to the IOPLUS board.

    ■   Align the screw holes on the GIO option board over the vacant standoffs (tall, hexagonal posts), as shown in Figure 5-4.

    ■   Align the connector on the bottom of the GIO option board with the socket on top of the IOPLUS board. Press down firmly on the corners of the option board over the GIO connector until the connector is securely seated.

    ■   Using a Phillips screwdriver, insert and tighten the three screws (provided with the board) to secure the GIO option board, as shown in Figure 5-4. As you tighten the screws, alternate between them so that the board is connected evenly.

    Note: A double-width GIO option board has more than three screws to insert.

Install screws
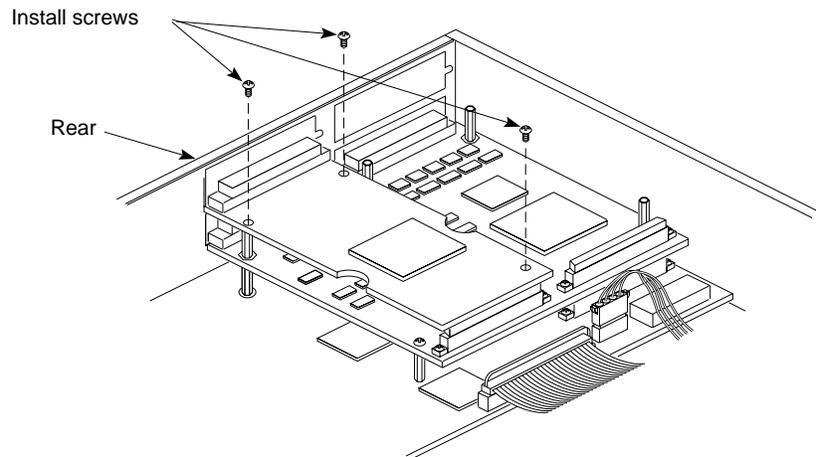
Rear

Figure 5-4   Installing a single-width GIO option board

9. Through the rear of the server, insert and tighten the two screws that come with the GIO board. If the screw holes do not line up, the board may not be seated all the way, or one of the screws may be screwed down too tightly on a standoff.

    ■   Look under the board to make sure the connector or connectors are seated evenly and are inserted all the way into the sockets.

    ■   Press the corners of the board over the GIO connector to make sure the connectors are inserted all the way into the sockets on the graphics board.

10. If you have no more options to install, replace the top cover by inserting the tab through the hole in the rear of the chassis and sliding the cover back until it snaps into place. For more information, see "Replacing the Top Cover".

11. If the GIO option board has one or more external cables, connect them to the board's I/O connector.

12. Reconnect the power cable to the connector on the back of the Challenge S server.

You are now ready to power up the system and check that the system recognizes the new board.

Checking the GIO Option Board Installation

Follow these steps to check if the system recognizes the new board:

1. Press and release the power button to turn on the power.

2. After the power-on diagnostics run, start the system from the System Maintenance menu.

3. Log in to your account.

4. Check that the board you installed is shown correctly.

   ■ At the shell prompt, type:

   hinv

   Then press **<Enter>**.

   You see a listing of your system's hardware devices. There should be a line similar to the following for the GIO option board (in this example, an additional Ethernet board):

   ```
   Integral Ethernet: ec2, version 1
   ```

   If the board you installed is not shown, the board may not be seated correctly. Go to "Installing a GIO Option Board" and re-install the board. Then try the **hinv** command again.

   You are now finished installing the GIO option board.

Note: Individual GIO boards may need additional software configuration in order to work properly. Refer to the documentation (either online or printed) that is supplied by the board manufacturer.

Installing Internal and External Peripherals

This chapter describes how to install an internal drive, such as an option disk, or a floptical drive. It also explains how to connect external SCSI devices and external serial devices.

Installing Internal and External Peripherals

This chapter tells you how to install

- a second internal SCSI drive (floptical or hard disk); see "Installing an Internal Floptical Drive or Second Hard Disk"

- external SCSI devices; see "Installing External SCSI Devices"

- serial devices; see "Installing the System Console and Other Serial Devices"

Note: If you need to install the system disk (the disk with the IRIX operating system installed on it), follow the instructions in "Replacing the System Drive". If you are connecting a system disk that does not yet have the IRIX operating system installed on it, you need to go through a specific software procedure to format the disk, create partitions on the disk, then install the IRIX operating system on the system disk. See the *IRIS Software Installation Guide* for information on installing IRIX on a new system disk.

Installing an Internal Floptical Drive or Second Hard Disk

This section tells you how to install a second internal drive, such as a floptical or second hard disk, in the top drive slot of the Challenge S server.

The system disk drive should always be installed in the bottom slot.

Installing the Drive

Use these instructions to install either a floptical or a second hard disk drive.

Follow these steps to power off the system, remove the top cover, remove the empty drive bracket (or installed drive) from the top drive slot, connect the cables, install the drive, and replace the top cover.

1. If the system is powered on, press and release the power button on the front panel to power off the system.

   The system powers off automatically after about a minute.

2. Disconnect the power cable from the back of the Challenge S server.

3. Remove the top cover by releasing the latch on the rear of the cover and sliding it forward. For more details, see "Removing the Top Cover" .

4. Ground yourself to a metal part of the server chassis.

   ■ All Silicon Graphics peripheral options ship with a wrist strap so that you can safely install the peripheral without damaging it or the system. Put the wrist strap around your wrist, making sure it is tight against your arm.

   ■ Attach the alligator clip to a metal part of the server chassis.

   Caution: Drives can be easily damaged. Handle your drive carefully. Do not drop it or otherwise abuse it.

5. Move the system or position yourself so that the power supply is close to you and the system drive and empty drive bracket are in the upper right hand corner, as shown in Figure 6-1.

   If a drive is already installed in the upper drive slot and you wish to remove it, go to "Replacing the Internal Floptical Drive or Second Hard Disk Drive".
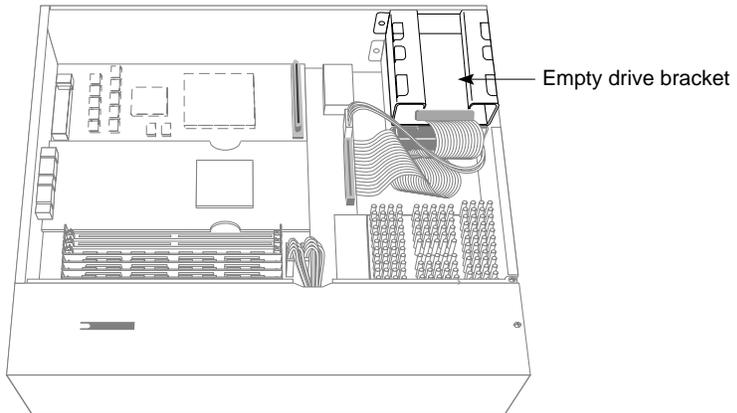
Figure 6-1   Locating the Drive Bracket Above the System Disk

6. Remove the empty drive bracket (with the face plate attached) by pressing the release button that protrudes through the side of the chassis and pulling the bracket toward you, as shown in Figure 6-2.
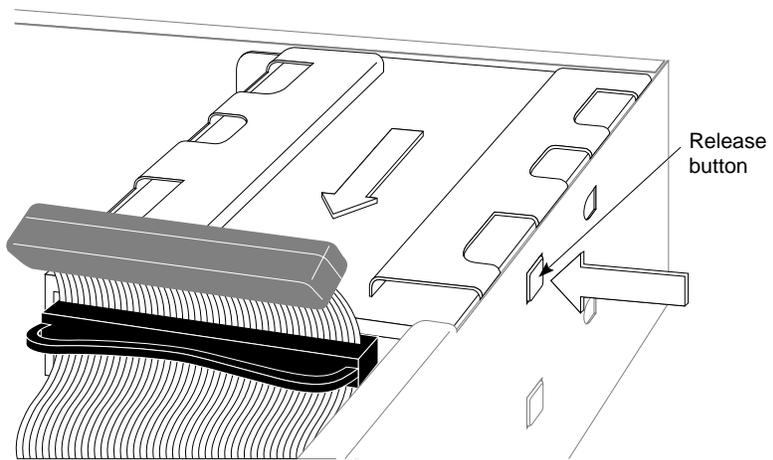
Figure 6-2   Removing An Internal Drive Bracket

Figure 6-2 shows how to remove the upper drive bracket, but the procedures for removing both upper and lower drive brackets are the same. Save the drive bracket and face plate. If you remove the drive and do not replace it, you must reinstall them.

Caution: The empty drive bracket provides support for any monitor or terminal that sits on top of the system. Do not remove it unless you are installing a drive in the top slot.

7. If you are installing a floptical drive, refer to Appendix C to check the drive's jumper settings.

8. Connect an unused power cable to the drive. A floptical drive will have an adapter cable attached to it, as shown in Figure 6-3. For a second disk drive, attach the power cable directly to the receptacle on the drive.
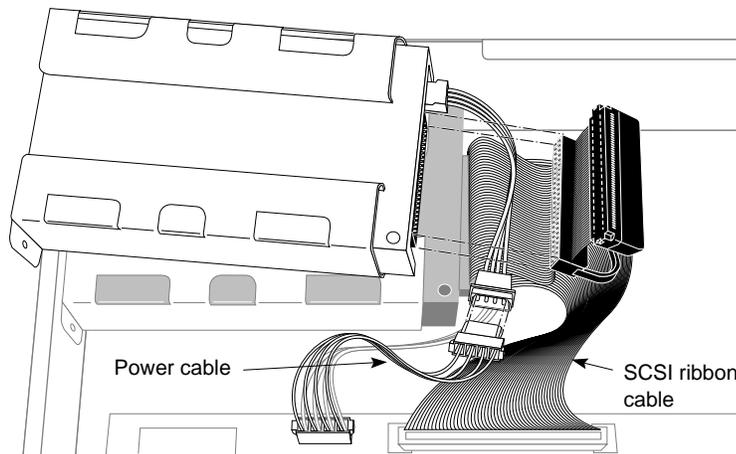
Figure 6-3   Power Cable to a Second Drive (Floptical Shown)

9. Install the drive and attach the SCSI cable.

   ■ Position the drive and bracket over the system disk.

   ■ Slide the metal tabs underneath the bracket into the holes on the top of the system drive's bracket. At the same time, make sure that the button on the right side of the bracket snaps into the hole on the side of the chassis.

■ Attach the SCSI cable to the drive. For both the floptical and a second hard drive, use the connector at the end of the cable. Press it firmly against the connector on the drive and make sure it is seated.
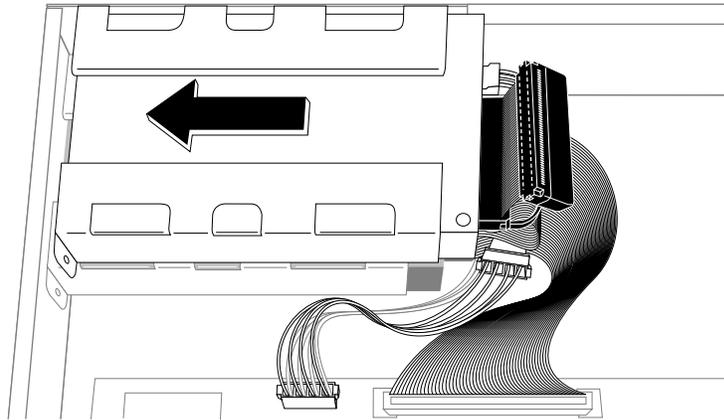
Figure 6-4   Installing a Second Drive Above the System Disk

10. If you have no more internal options to install, replace the top cover by inserting the tab through the hole in the rear of the chassis and sliding the cover back until it snaps into place. For more information, see "Replacing the Top Cover".

11. Reconnect the power cable to the connector on the back of the Challenge S server.

12. Press and release the power button on the front panel to power on the system.

When you see the System Maintenance menu, you are ready to test the drive you installed. Go to the next section, "Testing the Internal Drive".

Testing the Internal Drive

Follow these steps to check that the system recognizes the new drive.

1. At the System Maintenance menu, select option 5 to enter the Command Monitor.

2. At the Command Monitor prompt (>>), enter the following command:

   hinv

   The *hinv* command provides a list that looks similar to the following:

   ```
   1 100 MHZ IP22 Processor
   FPU: MIPS R4010 Floating Point Chip Revision: 0.0
   CPU: MIPS R4000 Processor Chip Revision: 3.0
   On-board serial ports: 2
   On-board bi-directional parallel port
   Data cache size: 8 Kbytes
   Instruction cache size: 8 Kbytes
   Secondary unified instruction/data cache size: 1 Mbyte
   Main memory size: 64 Mbytes
   Integral Ethernet: ec0, version 1
   Disk drive: unit 1 on SCSI controller 0
   Disk drive: /removable media: unit 2 on SCSI controller 0:
   Integral SCSI controller 0: Version WD33C93B, revision D
   ```

   If you have more than one hard disk drive, you'll see multiple disk drive listings, each with a different controller unit number combination. The system disk is always unit 1. Make sure the drive appears in the *hinv* listing. If it doesn't, it may not be properly connected and configured. To check, power down the system and check the power and SCSI connections and ID. Then restart the system and check the drive installation with *hinv* again.

You are finished installing the floptical or second hard disk drive.

Formatting a Floptical Diskette

The floptical drive can read from and write to both optical floppy diskettes and standard, 3.5″ diskettes. Before you can use diskette with IRIX, you must format it. There are two ways to format a diskette, depending upon how you want to use the disk:

• as an IRIX file system

• as an MS-DOS or Macintosh diskette

This applies whether you are going to back up files using *tar*(1) and *cpio*(2), use the diskette as a mounted file system, or use it to store MS-DOS or Macintosh format files. However, if you format a diskette as an IRIX filesystem, you cannot use it with the MS-DOS emulation software SoftPC/AT, or use the diskette on a non-IRIX (non-UNIX) system.

To the floptical diskette as an IRIX file system, follow these steps to format a floppy:

1. At an IRIX shell prompt, enter:

   fx -x "fd(0,*unit_number***)"**

   In this command, unit_number is the SCSI unit number (address) of the device. For example, **2**.

   You see this message:

   ```
   Which floppy type (one of 48, 96, 96hi, 480, 3.5, 3.5hi,
   or 3.5.20m)[96]
   ```

2. Enter the number for the type of disk that you are formatting. For a 3-1/2″ (21MB) diskette, type:

   3.5.20m

   Press <**Enter**>.

3. At the fx> prompt, type:

   format

   Then press <**Enter**>.

4. The system asks you:

    ```
    About to destroy data on fd(0,2)! ok?
    ```

    Type:

    yes

    Then press <**Enter**>.

5. When the prompt returns, type:

    exit

    The disk begins formatting. It can take as long as 20 minutes to format a 20 MB capacity optical diskette.

You are finished formatting the floptical diskette as an IRIX file system. You can mount the floptical diskette as you would mount any other file system. See *mount*(1M) and *fx*(1M) for more information.

To format the floptical as an MS-DOS or Macintosh diskette, follow these steps:

1. Insert the floptical diskette in the floptical drive.

2. Use the *mkfp* command to format the floptical diskette:

    ```
    mkfp -t type -x /dev/rdsk/fds0d1.3.5 volume_label
    ```

    To format a Macintosh floptical with a volume label of "My-disk":

    ```
    mkfp -t mac -x /dev/rdsk/fds0d1.3.5 My-disk
    ```

    To format an MS-DOS floptical with a volume name of "My-DOS-disk":

    ```
    mkfp -t dos -x /dev/rdsk/fds0d1.3.5 My-DOS-disk
    ```

    The volume label is optional. The –*x* option formats the disk.

The instructions above describe how to format a diskette as high-density, 3.5" form-factor. Although you can format a 20 MB optical disk in both MS-DOS and Macintosh formats, not all MS-DOS and Macintosh systems are equipped with floptical drives and this may not be able to use a 20 MB optical disk.

You are finished formatting the floptical disk. For more information, see *mkfp*(1), *fpck*(1), *msdosd*(1M), and *smfd*(7M).

Using the Floptical for Backup

Under IRIX, you can use the floptical in the same way as a tape. For example, you can back up files to the drive using *tar* or *cpio*. To use the floptical instead of the default device, specify the floptical device name in the command. All floptical devices are in */dev/dsk* and */dev/rdsk*.

This example copies all the files in the current directory to a 20 MB floptical diskette loaded in the floptical drive installed as SCSI unit 2 on controller 0:

```
tar cvf /dev/rdsk/fds0d2.3.5.20m *
```

For a complete description of the floptical device files, see *smfd*(7M). For a complete description of the various *tar* and *cpio* options, see the *tar*(1) and *cpio*(1) manual pages. Also, refer to the *IRIX Advanced Site and System Administration Guide* for a discussion of backup commands.

Ejecting a Floptical Diskette

To eject a floptical diskette, use the *eject* command. Always make sure the system is not accessing the floptical when you attempt to eject it.

If the floptical drive is the only removable media device connected to the Challenge S server, you can eject the diskette by typing:

```
eject
```

Since the *eject* command can eject either a floptical, a CD-ROM, or certain tapes, if you have more than just the floptical drive installed, you must specify which device you want to eject. For example, to eject a floptical diskette, enter the following command at the IRIX shell prompt:

```
eject /dev/rdsk/fds0d2.3.5.20m
```

This ejects the floptical diskette that is installed as unit 2 on SCSI controller 0. For more information, see the *eject*(1) reference (man) page.

If the system is shut down, hung, or the floptical simply will not accept the *eject* command, use the manual ejection method.

1. Locate the small manual ejection hole on the right side of the floptical diskette opening (nearest the rear of the server).

2. Insert a straightened paper clip into the hole until the floptical diskette pops out.

Installing External SCSI Devices

You can connect one or more single-ended external SCSI devices to the standard 50-pin high-density SCSI connector on the Challenge S server. Connecting more than one device is called daisy chaining. Each of the devices has a unique SCSI address and is connected to the other devices in a chain, with the first device connected to the standard SCSI port on the back of the server.

Caution: You can connect a maximum of five external, single-ended SCSI devices to the standard 50-pin connector on the back of the Challenge S server if the maximum combined cable length of all external SCSI cables does not exceed **two meters**. Practically, it may not be possible to connect more than three external devices because of this cable limitation. Additionally, the last device in the daisy chain must be terminated with an active terminator. An active terminator ships with the SCSI device.

External, single-ended SCSI devices include a QIC (Quarter-Inch Cartridge) tape drive, a 4-mm DAT (Digital Audio Tape) drive, a Digital Linear Tape (DLT) drive, a CD-ROM drive, SCSI scanners, and other external SCSI devices such as hard disk drives.

You may also wish to connect additional external SCSI devices to the Challenge S server using the differential connectors on the IOPLUS SCSI and Ethernet expansion board. You can connect only differential devices to the IOPLUS connectors. See the section "Connecting SCSI Devices to the IOPLUS".

Use the steps in the following sections to determine what SCSI address to assign, set the SCSI address on the external device, and install the device.

Assigning a SCSI Address to the External Device

You can connect up to five single-ended external SCSI devices on the 50-pin connector on the Challenge S server (up to two meters of cable). Each device needs a unique numeric SCSI address (ID) to distinguish it from other devices.

- If you currently have two internal drives and no external devices connected to your system, you may use any SCSI address from 3 to 7 for external SCSI devices on controller 0. (SCSI address 0 is reserved for the controller; addresses 1 and 2 are reserved for the system disk and second internal disk.)

- If you have at least one external device connected to your system, and you are adding another device, check which address is assigned to the existing external device and then choose another number. Use the hinv command if you are unsure of the device IDs already being used.

To check which SCSI addresses are already assigned on your server, follow these steps:

1. Log in as root.

2. At a shell prompt, enter the hardware inventory command:

   hinv

   You see a listing of your system's hardware devices and their SCSI ID numbers (also called unit numbers). The output looks similar to the following:

   ```
   1 100 MHZ IP22 Processor
   FPU: MIPS R4010 Floating Point Chip Revision: 0.0
   CPU: MIPS R4000 Processor Chip Revision: 3.0
   On-board serial ports: 2
   On-board bi-directional parallel port
   Data cache size: 8 Kbytes
   Instruction cache size: 8 Kbytes
   Secondary unified instruction/data cache size: 1 Mbyte
   Main memory size: 64 Mbytes
   Integral Ethernet: ec0, version 1
   Disk drive: unit 1 on SCSI controller 0
   Disk drive: /removable media: unit 2 on SCSI controller 0:
   Integral SCSI controller 0: Version WD33C93B, revision D
   ```

3. Decide which number to assign to your new external device.

Caution: Do not assign number 0, 1, or 2. These numbers are reserved.

Setting the SCSI Address on an External Device

Now you need to set the address on the external SCSI device you are installing to reflect the SCSI address you chose.

This is done in a number of ways, depending on the device. Most SCSI devices have a switch, dial, or jumpers that you set to determine the SCSI address.

Refer to the documentation included with the device for instructions.

Connecting an External SCSI Device

The following types of SCSI cables listed in Table 6-1 are available from Silicon Graphics. The standard single-ended SCSI connector on the back of the server is a single-ended, 50-pin, high-density connector (controller 0). The two differential SCSI connectors on the rear of the IOPLUS board are 68-pin, Fast (20 megatransfers/sec.), and wide (16 bit) high density connectors (controllers 4 and 5; see Figure 2-4).

Table 6-1   External SCSI Cables Available

1st Connector	2nd Connector	Length	Silicon Graphics Part Number
50-pin high-density	Centronics low-density	1.5 ft. (0.46 m)	
50-pin high-density	Centronics low-density	3 ft. (0.91 m)	018-8128-001
50-pin high-density	68-pin high-density	1.5 ft. (0.46 m)	018-0416-001
50-pin high-density	68-pin high-density	5 ft. (1.5 m)	018-0455-001
50-pin high-density	68-pin high-density	15 ft. (4.57 m)	018-0356-001

Table 6-1 (continued) External SCSI Cables Available

1st Connector	2nd Connector	Length	Silicon Graphics Part Number
50-pin Centronics low-density	68-pin high-density	15 ft. (4.57 m	018-0348-001
50-pin Centronics low-density	68-pin high-density	3 ft. (0.91 m)	018-0347-001
68-pin high-density	68-pin high-density	1.5 ft. (0.46 m)	9290051
68-pin high-density	68-pin high-density	2.0 ft. (0.61 m)	9290055
68-pin high-density	68-pin high-density	12.0 ft. (3.66 m)	9290103

To connect an external device, follow these steps:

1. If you have not already shut down and powered off the system, do so now.

    ■   Press and release the power button on the front of the system to power off the system.

        The system powers off automatically after about a minute.

2. Remove the active SCSI terminator (metal cap) from the connector on the back of the server, or from the last external device connected to the unit.

    ■   If you are connecting the device to the Challenge S server, remove the terminator from the SCSI connector on the rear of the server by squeezing the clips on both sides of the terminator and pulling it off, as shown in Figure 6-5.

        Save the terminator. You need to reconnect it to the system if you remove and do not replace the external device.
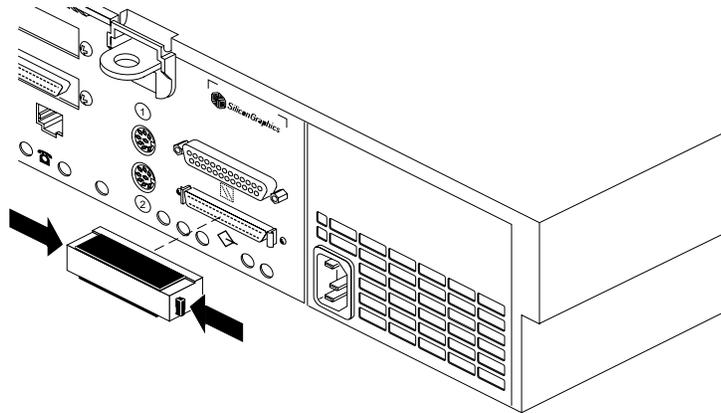
Figure 6-5   Removing the 50-Pin SCSI Terminator From the Challenge S Server

    ■   If you are daisy-chaining the external device to another external device, remove the terminator from the connector on the last device in the chain.

3. Choose the appropriate SCSI cable to connect the external SCSI device.

■ If you are attaching the device directly to the server, use a cable that has a 50-pin, high-density connector for the server and the appropriate connector on the other end.

■ To daisy-chain a device to another device, use the cable that has the correct connectors at each end.

Caution: Single-ended, Fast SCSI devices may not operate reliably if the maximum combined cable length of all external SCSI cables exceeds **two meters**. (The 50-pin connector is a single-ended channel.) Additionally, all Fast SCSI devices require higher quality cables than early SCSI devices. Use the cable shipped with the Fast SCSI device.

4. Connect the SCSI cable.

■ To connect the device to the server, connect the flat, smaller end of the cable to the port above the SCSI icon on the back of the server, as shown in Figure 6-6.

■ Connect the other end of the SCSI cable to one of the SCSI connectors on the back of the device and secure the clips (if applicable) on each side of the connector.
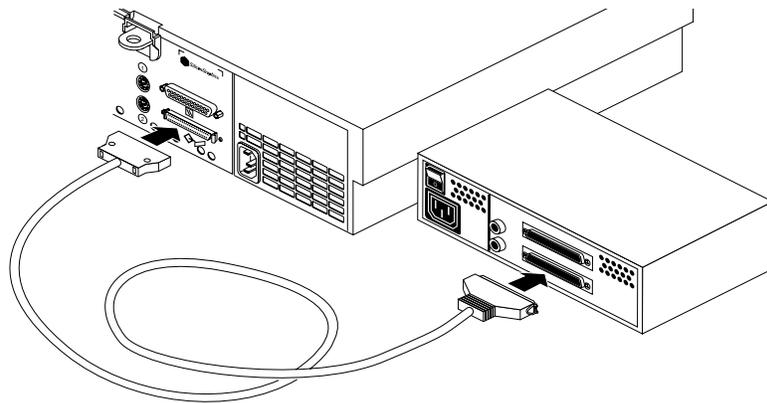
Figure 6-6   Connecting an External 50-Pin SCSI Device to the Challenge S Server

■ To daisy-chain the device to another external SCSI device, connect one end of the cable to the open connector on the first device, as shown in Figure 6-7. Connect the other end to one of the connectors

on the device you are adding. Keep in mind the total cable length limit of two meters for controller 0. Use the shortest possible cable.
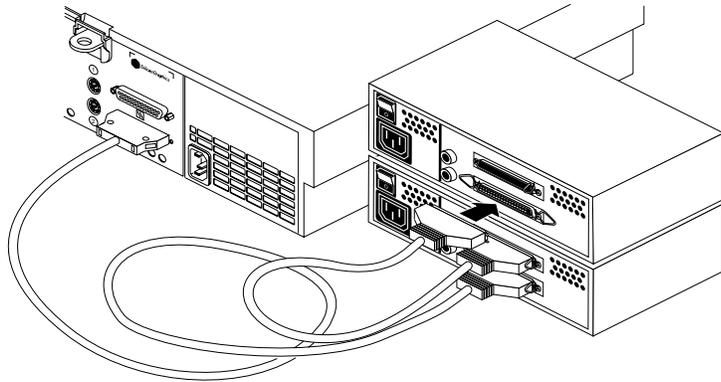
Figure 6-7   Daisy-Chaining an External 50-pin Single-Ended SCSI Device

5. Connect the active terminator that you received with the external SCSI device to the open SCSI connector on the back of the last device on the daisy-chain, as shown in Figure 6-8.

    Note: The terminator must be an active terminator.
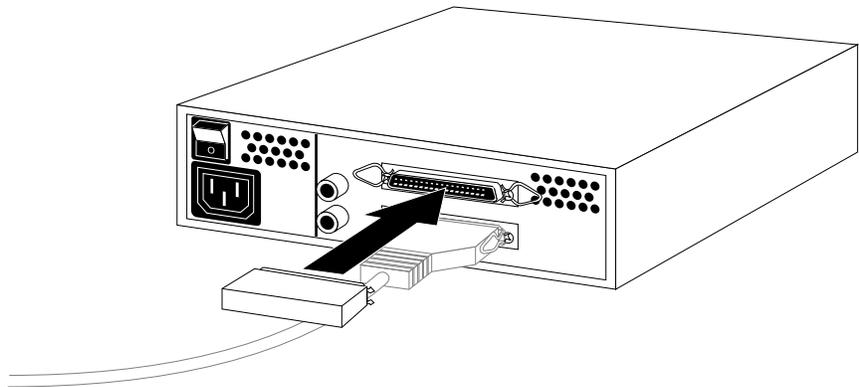
Figure 6-8   Connecting a Terminator to the Last SCSI Device on the Chain

6. Connect one end of the power cable that came with the external device to the power connector on the back of the device, as shown in Figure 6-9. If you are finished connecting external devices, go on to the section "Testing the External SCSI Device".
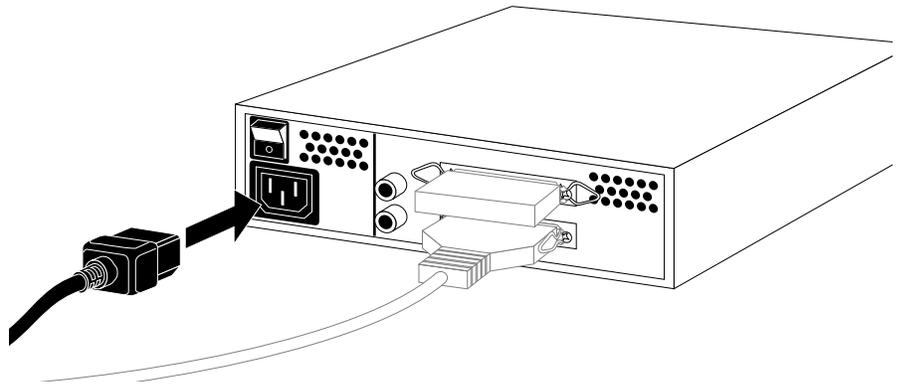
Figure 6-9   Connecting the Power Cable to an External Device

7. Plug the other end of the power cable into a grounded three-pronged (or other approved) electrical outlet.

    Remember to power up the external devices first and then your system to make sure that the devices are recognized.

Connecting SCSI Devices to the IOPLUS

The IOPLUS is a GIO option board that provides two differential SCSI channels and an Ethernet 10 BASE-T port in the Challenge S server. You can identify this board by checking the connectors on the back of the server. The IOPLUS provides two narrow horizontal 68-pin SCSI connectors and one 10-BASE T Ethernet connector on the back (see Figure 2-4).

The SCSI connectors on the IOPLUS are used to attach external differential SCSI devices (such as disk and tape drives) to your server. Differential peripheral systems available from Silicon Graphics include:

•   the differential Digital Linear Tape (DLT) stacker (capable of backing up more than 70 GB of data)

- the differential CHALLENGEvault M™ SCSI expansion box (which holds up to six differential hard disk drives)

Each differential SCSI connector on the IOPLUS can communicate with up to 15 devices. Note that the cables connecting these devices must not exceed a total of 81 feet (25 meters).

Caution: Do not connect single-ended SCSI devices to the IOPLUS. They will not function and will cause SCSI bus errors.

Testing the External SCSI Device

Follow these steps to check that the system recognizes the new device.

1. Turn on the external SCSI device first. If there is more than one external device, you may turn them on in any order, as long you turn them on before the server. The power switch is usually on the back of the device.

2. Press and release the power button on the front of the system to power on the system.

3. At the System Maintenance menu, enter 5 to start the Command Monitor.

4. At the command monitor prompt (>>), enter the *hinv* command to list the devices recognized by the system:

   hinv

5. If the device is not listed in the output from *hinv,* turn off the system and all the external SCSI devices, then repeat steps 1 through 4. If the devices are still not listed, there could be a problem with the cable, a problem with the device, or with the system. See Chapter 8, "Troubleshooting" for tips on diagnosing the problem.

6. If the devices you installed are recognized (shown in the *hinv* listing), enter **auto** to boot the system.

The system should automatically detect and recognize any new SCSI devices.

If You Installed Additional Hard Disks

If you installed an additional hard disk(s), you can now boot the system and configure the drive(s) for use with IRIX. The configuration process varies depending upon how many disks you have and how you want to use them. The basic process can include:

- formatting disks with the *fx*(1) command, if it is not already formatted (drives purchased from Silicon Graphics are pre-formatted)

- partitioning the disk, if you want multiple partitions, also using *fx*

- creating device nodes to access the disk using the *MAKEDEV*(1) command (depending upon how the disk is partitioned)

- create file systems on the disk, create mount points for those file systems, and configure the system to automatically check and mount the file systems (if desired) using the *Add_disk*(1) command

In addition, you may want to grow an existing filesystem onto a new disk, increase swap space, create logical volumes, or stripe disks for increased system performance. For complete information on performing all of these tasks, see the *fx*(1m), *makedev*(1), and *Add_disk*(1) reference (man) pages and the *IRIX Advanced Site and System Administration Guide*.

You should configure additional drives in single-user mode. To enter single-user mode, follow these steps:

1. At the System Maintenance Menu, enter **5** to start the Command Monitor.

2. At the Command Monitor prompt, enter this command:

   >> **single**

   The system boots up to single-user mode. You are automatically logged in as root, and are the only user on the system. All other serial ports are disabled, as are networking and other daemons. You can proceed with configuring the new disk(s).

3. When you have finished configuring the new disk(s), press **<Ctrl-D>** to bring the system up in multi-user mode.

Installing the System Console and Other Serial Devices

This section tells you how to install serial devices. Serial devices include:

- A terminal used as the system console

- A modem

- A serial printer

Serial Device Connection Overview

To install a serial device, follow these steps:

1. Unpack the serial device and cables.

2. Locate the serial ports on the back of the Challenge S server, as shown in Figure 6-10.

   The serial ports are labeled 1 and 2 and are MINIDIN 8 connectors. Port 1 is the console port. (Pinouts are described in Appendix A, "Cable Pinout Assignments.")
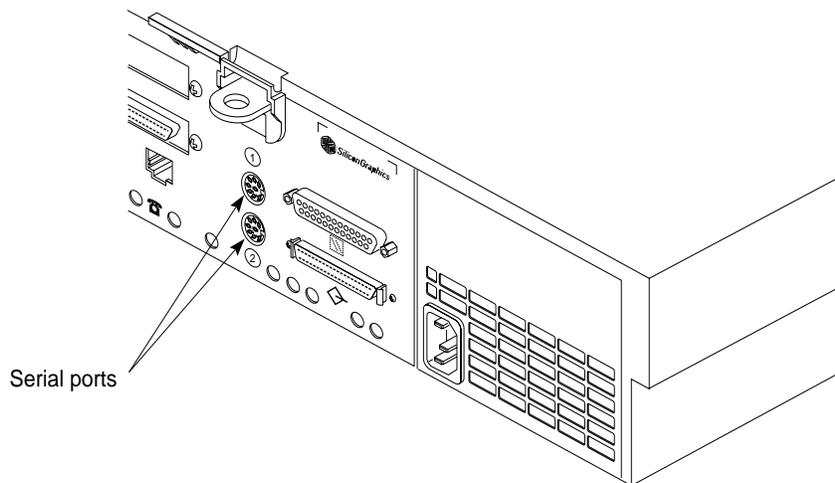
Figure 6-10 Serial Ports on the Rear of the Challenge S Server

3. Connect the serial cable. The Challenge S server ships with a serial
    cable that has a MINIDIN 8 connector at one end and a DB-25
    connector at the other (Silicon Graphics part number 018-8114--001)
    that is appropriate for use with terminals or other data terminal
    equipment (DTE).

    If you are connecting a console terminal, attach it to serial connector **1**
    only. If you are connecting another device, you can attach it to serial
    connector **2**.

    ■   Connect one end of the serial cable into the connector on the back of
        the serial device. See the instructions that came with the serial
        device for detailed instructions on how to connect the cable to
        the device.

    ■   Connect the other end of the cable to the serial connector on the
        back of the Challenge S server, as shown in Figure 6-11.
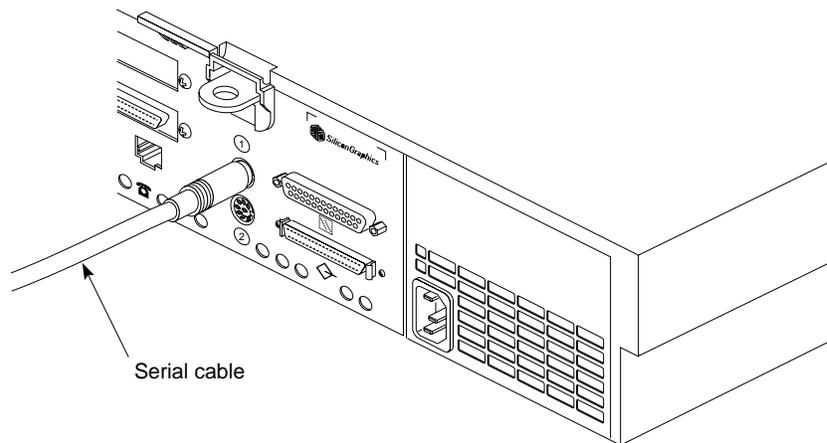
Serial cable

Figure 6-11   Connecting the Serial Cable to the Serial Port

4. Plug in the serial device's power cable.

    ■   Plug the socket end of the power cable into the power connector on
        the back of the serial device.

    ■   Plug the other end into a grounded three-pronged wall outlet or
        power strip. (Do not use a two-pronged adapter.)

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For information on using other serial cables, turn to Appendix B, "Serial Cables." For more information on serial ports, see *serial*(7).

Serial (ASCII) Terminals

You can connect an optional ASCII terminal to your server by using the serial cable shipped with your Challenge S server. It has an 8-pin MINIDIN connector on one end and a 25-pin serial connector on the other (Silicon Graphics part number 018-8114--001).

Be sure to read the documentation that comes with the terminal. Always connect your system console terminal to serial port **1**. You can connect an additional terminal to port **2**. Set the terminal with the following operational characteristics:

- 9600 baud

- 8 bits

- 1 stop bit

- No parity

Use the following steps to properly connect a terminal:

1. Attach the keyboard (if applicable) and power connectors to the terminal.

    Caution: Before plugging the terminal into either a 110 VAC or a 220 VAC outlet, be sure that the electrical rating on the UL-CSA label is in either the 100–120 VAC or the 200–240 VAC range, whichever applies.

2. Attach a serial cable to

3. Power on the terminal.

4. Restart the system or continue with other peripheral connections as needed.

In some cases your console terminal may need special recognition from the system software.

You can check or set up the system software to work under specific parameters by using the following:

1. Log in to the system as root.

2. Edit the file */etc/gettydefs* to choose the proper baud rate, prompt, and line conditioning.

    vi /etc/gettydefs

3. Modify the file */etc/inittab*, if necessary, to enable *getty* on port tty_1. The line will be listed under "on-board ports" and should appear similar to the following:

    vi /etc/inittab

    ```
    t1:23:respawn:/etc/getty ttyd1 co_9600  # alt console
    ```

4. After modifying the */etc/inittab* file, inform *init* of any changes by entering:

    telinit q

5. Look in */etc/ttytype* for the listed console port information. You should see lines similar to this:

    ```
    ?iris-tp console
    iris-tp tport
    ?vt100 ttyd1
    ?vt100 ttym1
    ?vt100 ttyf1
    ?vt100 ttyd2
    ?vt100 ttym2
    ?vt100 ttyf2
    ?vt100 ttyd3
    ?vt100 ttym3
    ?vt100 ttyf3
    ...
    ```

6. The default terminal type for all terminals is vt100 and the system prompts to confirm this. To keep the system from asking you what type of terminal you are using when you log in, remove the question marks from all lines in the file that correspond to the serial port (either 1 or 2). For example, to prevent the system from prompting for a terminal type on port 1, you would change these lines in */etc/ttytype*:

    ```
    ...
    vt100 ttyd1
    vt100 ttym1
    vt100 ttyf1
    ...
    ```

You can also change the terminal type that designated for the particular serial port by changing "vt100" to another shorthand terminal name. See Appendix D, "Supported Terminals" for a list of some terminals and shorthand names.

7. Add the following line to your ~/.*login* file. This sets the terminal type, syntax, and erase/kill parameters automatically when you log in:

    ```
    eval 'tset -s -Q'
    ```

8. Check terminal connection and function using the following commands:

    ```
    cat /etc/group > /dev/ttyd1
    ```

    ```
    ps -def | grep getty
    ```

Connecting a Modem

A modem can be connected to your system by connecting a modem cable to the 8-pin connector labeled as serial port **2**. Silicon Graphics supports Hayes® 2400 and Telebit™ modems. See the */etc/uucp/fix-hayes* or */etc/uucp/fix-telebit* files for information on specific models supported, (see step 5).

The following general procedures are used when connecting a modem:

1. Make sure that the power switch on the modem is turned off.

2. Attach the serial cable to the modem. The serial cable must be appropriate for data communications equipment (DCE): the data transmit and data receive pins are opposite those in a DTE cable. Also, the cable must provide full flow control.

3. Attach the connector on the other end of the cable to the second serial connector on the server's I/O panel (see Figure 6-10).

4. Attach the modem power cord and turn on the modem.

5. Install the *eoe2.sw.uucp* subsystem, if it is not already installed.

    Note: The *eoe2.sw.uucp* subsystem is shipped with each copy of the IRIX operating system, but is not installed by default. Confirm that *eoe2.sw.uucp* is installed by using the *versions*(1M) command. If it is not installed, see the *IRIS Software Installation Guide* for instructions.

6. Read the documentation that comes with your modem to determine model-specific connection and configuration procedures.

Refer to the *IRIX Advanced Site and Server Administration Guide* for additional information about configuring modems. Entries in the */etc/inittab* and */etc/uucp/Devices* files may need to be modified.

Additional useful information on modem operation and configuration, is available on the *cu*(1) reference (man) page.

See the following section for additional helpful serial port information.

Helpful Serial Port Commands

To show the standard settings on a particular serial port, become superuser and enter:

```
stty < /dev/ttydx
```

Where *x* is the number of the tty port on which you want information.

To show the various settings on a particular serial port, enter:

```
stty -a < /dev/ttydx
```

To change the baud rate (the example is 2400) on a particular serial port, enter:

```
stty 2400 < dev/ttydx
```

For additional useful information on serial ports and configuration, see the reference (man) pages for the following:

- *cu*
- *inittab*
- *gettydefs*
- *ttytype*
- *terminfo*
- *stty*
- *termio*

The following files are commonly used to properly configure serial port operation for the Challenge S server:

- */etc/inittab*
- */etc/gettydefs*
- */etc/ttytype*
- */usr/lib/terminfo*
- */etc/uucp/Systems*

Installing and Removing Software

This chapter briefly describes how to install and remove Silicon Graphics, Inc. software products on the Challenge S server. It also suggests software subsystems that you may not need on a server.

Installing and Removing Software

This chapter shows you how to install software products that you received from Silicon Graphics, Inc. To install products from other vendors, please see the software installation instructions that accompany the products.

You can install software from a CD-ROM drive that's connected either to your own system or to another Silicon Graphics. system on your network. Only *root* can install or remove software.

If you need advanced information on software installation or troubleshooting, see the *IRIS Software Installation Guide*. You can view this guide on-line using InSight, or you can order a printed copy.

Available Software Installation Tools

There are several tools available to install and remove software, including:

inst   Text-based utility for installing and removing software.

swmgr   Graphical tool for installing and removing software. (Requires a graphics system, such as a Silicon Graphics Indy.)

versions   Command-line tool for checking what software is installed and for removing software. You can also use the *versions* command to identify site-specific configuration files that may need special handling after software installation.

The following sections provide brief instructions on installing and removing software using *inst* and *versions*. For complete information, see the *IRIS Software Installation Guide* and the *inst*(1M) and *versions*(1M) reference pages.

Installing a New Version of the Operating System Software

Follow these steps to reinstall a new version of the operating system over a previous version:

1. Make a full system backup; see the *IRIX Advanced Site and Server Administrator's Guide*.

2. If hardcopy Release Notes accompanied the operating system you should read through them before continuing with the installation.

3. If you do not have a CD drive connected directly to your system, find a CD drive on your network. You will need to know the hostname of the system to which the CD drive is attached. Also, the CD-ROM must be mounted (for example on */CDROM*) on the remote host.

4. Insert the CD into the drive you are going to use.

5. Shut down the server. See "Turning Off the Challenge S Server".

6. At the System Maintenance menu, select **2**. You see the following screen:

   ```
   Installing System Software...

   Press <Esc> to return to the menu

   1) Remote Tape 2) Remote Directory 3)Local CD-ROM 4)Local
   Tape
   5) Remote CD-ROM

   Enter 1-5 to select source type, <esc> to quit
   or <enter> to start:
   ```

7. Specify the location of the new software to install.

   ■ If you're using a CD-ROM drive that's connected to your own system, press **3**. The "X" in the above screen indicates that the installation program will choose one of these options as the default.

   ■ If you're using a remote drive, press **1**. You are prompted for the location of the remote drive. You will provide the name of the remote host (for example *hostname.wpd.sgi.com*) and the name of the remote directory on the device (for example: */CDROM/dist*.)

8. When the system finds the software, it takes several minutes to copy the software installation tools onto your system. The system is ready to install software when you see the *inst* menu:

```
1. from [source]
2. list [keywords] [names]
3. go
4. install [keywords] [names]
5. remove [keywords] [names]
6. keep [keywords] [names]
7. step [keywords] [names]
8. versions [args]
9. help [topic]
10. admin
11. quit

Inst>
```

9. Install all or some of the subsystems that make up the operating system.

   ■ To install all of the *default subsystems*, type:

      go

   ■ To install all optional and required subsystems, type:

      install all

      go

   If you see an error message that says the system cannot find the software, see "System Cannot Find the New Software". If you see any other messages, see "Cannot Complete an Installation". The installation is complete when you see
   this message:

   ```
   Installation and/or removal succeeded.
   You can insert another tape or CD-ROM now.
   Type "quit" if you are ready to leave the inst tool
   Inst>
   ```

10. Remove the CD. If you have another CD from which you want to install an optional product, insert the CD, and go back to step 7.

11. When all the software is installed, type:

    quit

    You'll see several messages.

12. The software is successfully installed and your system is ready to restart when you see these messages:

    ```
    Please wait...
    Ready to restart the system. Restart? [y, n]
    ```

    Type **y**; then press **<Enter>**.

    If you see a different message or question, see "System Reports Errors After an Installation".

13. The system starts as usual. When the login prompt appears, log in to your own account.

14. See your Release Notes by typing **relnotes** at the system prompt. This displays a list of available release notes and brief instructions for viewing them. Release Notes cover new features and known problems with each product.

Installing Optional Software

Before you install a new product, check its printed Release Notes for this information:

• The version of the operating system (IRIX) that must be running in order for this product to run.

• A list of prerequisite products or *subsystem*s (smaller parts of the products) that must be installed before you install the new product.

• A list that shows which subsystems are optional and which are required for product operation, and shows how much disk space each subsystem will use.

To make sure your system is ready for the new software, follow these steps:

1. Log in as root.

2. Check which version of the operating system your server us running by typing the following at a system prompt:

    uname -a

3. Check whether required subsystems (determined by examining the Release Notes) are already installed by typing the following:

    versions *subsystem.name*

    In this example, *subsystem.name* is the name of the subsystem you are thinking about installing. The *versions* command indicates whether or not the subsystem is already installed, as well as the date on which it was installed.

4. Check whether you have enough disk space by typing the following:

    df -kl

    The *df* command displays free disk space. If you do not have enough space to install the entire product but you do have enough space for the required subsystems, during installation you can choose to install only required subsystems. To free up disk space by removing or archiving old or unneeded files, see the *IRIX Advanced Site and Server Administrator's Guide*.

5. If you do not have a CD drive connected directly to your system, find a CD drive on your network. Determine the name of the host to which it is attached and the device name (for example, */dev/dsk/dks0d4s7*).

6. Make sure the CD-ROM is mounted. Typically, if you insert a distribution CD in a CD-ROM drive attached to a Silicon Graphics workstation or server, the CD is automatically mounted on the directory */CDROM*. However, if you have to do this manually, use this command:

    mount /dev/dsk/dks0d4s7 /CDROM

To install the product, follow these steps:

1. Insert the CD into the drive that's connected to your system, or the network drive that you found earlier.

2. While still logged in as root, enter the following command to start the installation program:

   inst -f guest@*hostname*****:****devicename*

3. For example, to install from a CD-ROM drive that is mounted on */CDROM* on the host *mars*, you would type the following:

   inst -f guest@mars:/CDROM/dist

4. You see the *inst* menu:

   ```
   1. from [source]
   2. list [keywords] [names]
   3. go
   4. install [keywords] [names]
   5. remove [keywords] [names]
   6. keep [keywords] [names]
   7. step [keywords] [names]
   8. versions [args]
   9. help [topic]
   10. admin
   11. quit


   Inst>
   ```

5. Install all or some of the subsystems of this product:

- To install all of the *default subsystems*, type:

  go

- To install all optional and required subsystems, type:

  install all

  go

- To select only required subsystems or to select all required subsystems plus some optional subsystems, use the *step* or *install* commands. See the *inst* on-line help for more information.

If you see an error message that says the system cannot find the software, see "System Cannot Find the New Software".

If you see any other messages, see "Cannot Complete an Installation". The installation is complete when you see this message:

```
Installation and/or removal succeeded.
You can insert another tape or CD-ROM now.
Type "quit" if you are ready to leave the inst tool
Inst>
```

6. Remove the CD. If you have another CD from which you want to install another product, insert the CD, and go back to step 4.

7. When all the software is installed, type:

quit

The installation is complete when the shell prompt returns. If it does not return, and you see an error message, see "System Reports Errors After an Installation".

See your Release Notes by typing **relnotes** at the system prompt. This displays a list of available release notes and brief instructions for viewing them. Release Notes cover new features and known problems with each product.

Troubleshooting Software Installation

This section covers the three most common problems that may arise during software installation. See the section that describes the problem you have encountered.

- "System Cannot Find the New Software"

- "Cannot Complete an Installation"

- "System Reports Errors After an Installation"

For comprehensive troubleshooting information, please order the *IRIS Software Installation Guide*.

System Cannot Find the New Software

The system cannot find the software when:

- There is no CD in a drive that you specified.

- Your system cannot contact the system on the network that has the software. See the *IRIX Advanced Site and Server Administrator's Guide*.

- You entered an incorrect directory name.

  This typically happens when you are installing from a remote CD drive, and the drive is not accessible from (is not mounted at) the */CDROM* directory.

  Also be sure to complete the full pathname with *dist*, which is the name of the directory on the CD in which the software is stored. For example, the full pathname for new software on a CD whose pathname is */CDROM* on a system named *mars* is *mars:/CDROM/dist*

Cannot Complete an Installation

Typically the system cannot complete an installation when:

- There is not enough disk space to install all the products you selected for installation. In this case, you could:

  – Select fewer *subsystem*s to install.

  – Remove subsystems that are already installed (see "Removing Optional Software").

  – Quit the Software Manager (*inst*) and remove or archive files or directories (see "Removing Unnecessary Subsystems" for a list of the subsystems you may not need on the Challenge S server. Then see "Removing Optional Software" for basic information about using the *versions* command to remove software. See also the *IRIX Advanced Site and Server Administrator's Guide* for information about freeing up disk space).

- You need to install companion or prerequisite subsystems. In this case, you see an error message about "Incompatible Subsystem."

  Check the Release Notes for the products, and use the *install* command from within *inst* to choose the correct combination of subsystems.

- During optional product installation, the current version of the operating system cannot support the product. In this case, you need to install a new version of the operating system, then install the optional product. See "Installing a New Version of the Operating System Software".

System Reports Errors After an Installation

If the system reports errors after an installation is complete, read the error message carefully, and follow its instructions. The message will ask you to type **help** *<topic>* for online instructions.

Warning: **If the errors occur after you install new system software, do not turn off the system or press the Reset button. This could seriously damage your system software.**

If you cannot solve the problem using the online help, contact your local support organization.

Removing Optional Software

When your system starts getting low on disk space, you may want to review the software products and the *subsystems* of these products. You may no longer need certain products, or you may discover that some products include large, optional subsystems that you can remove without removing the core product.

The *root* account can remove software by following these steps:

1. Log in as root.

2. At the shell prompt, type:

   versions

   You see a list of all software products that are installed.

3. Check the list for products that you do not need, or for subsystems of products that have *data*, *man*, or *movies* in their names. Then check the Release Notes for these products to find out which subsystems are optional and which are required, and to find out how large the subsystems are.

   To check the Release Notes, type **relnotes** at a shell prompt.

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4. Remove an entire product or a specific subsystem.

- To remove an entire product, such as Space Tour, type:

  `versions remove spacetour`

- To remove a specific subsystem, such as the large, optional movies that accompany Space Tour, type:

  `versions remove spacetour.data.movies`

Table 7-1 lists IRIX subsystems that may be installed on your system but might not be needed. To save disk space, you can remove them. However, you may wish to leave some or all of these subsystems installed as a reference, or to allow graphical system administration of the Challenge S server by a remote workstation.

Note that *motif_dev* and *x_dev* are required to build graphical applications, and *tooltalk_eoe* is required by some CASE applications.

Table 7-1   Possible Subsystems to Remove From the Challenge S Server

Subsystem Name	Description
4Dwm	Desktop Window Manager, 5.3 (based on OSF/Motif™ 1.2.4)
4Dwm.sw	Desktop Window Manager
4Dwm.sw.4Dwm	Desktop Window Manager
ViewKit_eoe	ViewKit Execution Environment, 1.1
ViewKit_eoe.sw	ViewKit Execution Environment, 1.1
ViewKit_eoe.sw.base	ViewKit Execution Environment, 1.1
cadmin	Desktop Administration, 5.3
cadmin.sw	Desktop Administration Software, 5.3
cadmin.sw.dso	Desktop Administration Dynamic Shared Object
cadmin.sw.objectserver	Desktop Administration Object Server
demos	Graphics Demonstration Programs, 5.3

Table 7-1 (continued)   Possible Subsystems to Remove From the Challenge S

Subsystem Name	Description
demos.sw	Demonstration Programs
demos.sw.games	Game Demos
desktop_eoe	Indigo Magic™ Desktop, 5.3
desktop_eoe.books	Indigo Magic Desktop Books, 5.3
desktop_eoe.books.DesktopHelp	Desktop Help
desktop_eoe.books.ErrorMessageHelp	Desktop Help on Error Messages
desktop_eoe.sw	Indigo Magic Desktop, 5.3
desktop_eoe.sw.Confidence	Confidence Tests
desktop_eoe.sw.Desks	Desktop Desks
desktop_eoe.sw.FileTypingRules	Desktop Filetype Rules
desktop_eoe.sw.control_panels	Desktop Control Panels
desktop_eoe.sw.dso	Desktop Shared Libraries
desktop_eoe.sw.envm	Desktop
desktop_eoe.sw.fam	Desktop File Alteration Monitor
desktop_eoe.sw.toolchest	Desktop Toolchest, 5.3
desktop_tools	Desktop Tools, 5.3
desktop_tools.sw	Desktop Tools Software
desktop_tools.sw.tape_backup	Desktop Tape Backup
desktop_tools.sw.tools	Desktop Tools
desktophelp	Desktop Help Environment, Release 1.0
desktophelp.sw	Desktop Help Software, Release 1.0
desktophelp.sw.client	Desktop Help Software, Release 1.0
dmedia_eoe	IRIS® Digital Media Execution Environment, 5.3

Table 7-1 (continued)   Possible Subsystems to Remove From the Challenge S

Subsystem Name	Description
dmedia_eoe.books	Media Control Panels Help/User's Guide
dmedia_eoe.books.MediaCtls_UG	Media Control Panels Help/User's Guide
dmedia_eoe.data	IRIS Digital Media EOE Data Files
dmedia_eoe.data.soundscheme	SoundScheme Data Files
dmedia_eoe.sw	IRIS Digital Media Software
dmedia_eoe.sw.audio	Audio Execution Environment
dmedia_eoe.sw.common	Common Execution Environment Components
dmedia_eoe.sw.soundscheme	SoundScheme Sound Server
dmedia_eoe.sw.video	Video Execution Environment
dmedia_tools	IRIS Digital Media Tools, 5.3
dmedia_tools.books	Media Tools Help/User's Guide
dmedia_tools.books.MediaTls_UG	Media Tools Help/User's Guide
dmedia_tools.data	IRIS Digital Media Data Files
dmedia_tools.data.movies	Sample Movie Files
dmedia_tools.sw	Digital Media Tools
dmedia_tools.sw.cddat	CD/DAT Audio Tools
dmedia_tools.sw.movietools	Movie Playback, Recording, Conversion
dmedia_tools.sw.soundtools	Sound Playback, Recording, Conversion
dps_eoe	Display PostScript®/X, 2.0.3 based on PostScript Level 2
dps_eoe.sw	DPS/X Software
dps_eoe.sw.dps	DPS/X Execution Environment
dps_eoe.sw.dpsfonts	PostScript Type1 Fonts

Table 7-1 (continued)   Possible Subsystems to Remove From the Challenge S

Subsystem Name	Description
eoe2.sw.gltools	Graphics Library™ Tools
eoe2.sw.imagetools	Graphics Library Image Tools
il_eoe	IMAGEVISION™ Library Execution Only Environment, 2.4
il_eoe.sw	IMAGEVISION Executable Software
il_eoe.sw.c++	IMAGEVISION Shared C++ Library
il_eoe.sw.fit	IMAGEVISION FIT Image File Support
il_eoe.sw.gif	IMAGEVISION GIF Image File Support
il_eoe.sw.photocd	IMAGEVISION PhotoCD Image File Support
il_eoe.sw.sgi	IMAGEVISION Silicon Graphics Image File Support
il_eoe.sw.tiff	IMAGEVISION TIFF Image File Support
imgtools	IMAGEVISION Tools, 2.2
imgtools.books	IMAGEVISION Tools User's Guide
imgtools.books.tools	IMAGEVISION Tools User's Guide
imgtools.hlp	IMAGEVISION Tools Help
imgtools.hlp.tools	IMAGEVISION Tools Help Cards
imgtools.sw	IMAGEVISION Tools
imgtools.sw.tools	IMAGEVISION Tools
insight	IRIS InSight Viewer, 2.3
insight.books	IRIS InSight Viewer Help Book, 2.3
insight.books.help	IRIS InSight Help
insight.books.ViewerHelp	SGIHelp (Desktop Help) Help, 1.1
insight.books.help	IRIS InSight Help, 2.3
insight.sw	IRIS InSight Viewer, 2.3

Table 7-1 (continued)   Possible Subsystems to Remove From the Challenge S

Subsystem Name	Description
insight.sw.client	IRIS InSight Viewer, 2.3
insight.sw.data	IRIS InSight Data, 2.3
inventor_eoe	Inventor™ Execution Only Environment, 2.0.1
inventor_eoe.sw	Inventor User Software
inventor_eoe.sw.1_1	Inventor 1.1.2 Run-time
motif_dev	IRIX IM Development Software, 1.2.4 (based on OSF/Motif 1.2.4)
motif_dev.sw	Software Developer Software
motif_dev.sw.dev	IRIX IM Libraries and Header Files (based on OSF/Motif 1.2.4)
motif_eoe	IRIX IM Execution Only Environment, 1.2.3 (based on OSF/Motif 1.2.4)
motif_eoe.sw	Execution Only Environment Software
motif_eoe.sw.eoe	IRIX IM Run-time Software (based on OSF/Motif 1.2.4)
netls_eoe.books	IRIS InSight Books, Release 2.2
netls_eoe.books.NetLS_AG	Network License System Administration Guide
print	Printing Tools, Release 1.3
print.sw	Printing Tools Software 1.3
print.sw.desktop	Desktop Graphical Printing Tools 1.3
sgihelp	SGIHelp (Desktop Help) Server, 1.0.1
sgihelp.books	SGIHelp (Desktop Help) Data, 1.0.1
sgihelp.books.ViewerHelp	SGIHelp (Desktop Help) Data, 1.0.1
sgihelp.sw	SGIHelp (Desktop Help) Server, 1.0.1

Table 7-1 (continued)   Possible Subsystems to Remove From the Challenge S

Subsystem Name	Description
sgihelp.sw.eoe	SGIHelp (Desktop Help) Server, 1.0.1
showcase	IRIS Showcase™ 3.3
showcase.books	IRIS Showcase 3.3 User's Guide
showcase.books.showcase	Showcase User's Guide
showcase.sw	IRIS Showcase 3.3 Software
showcase.sw.data	Necessary Data Files
showcase.sw.fonts	Additional Fonts
showcase.sw.models	Sample 3D Models
showcase.sw.onlinehelp	Online Help
showcase.sw.showcase	IRIS Showcase 3.3 Software
showcase.sw.templates	Sample Templates
sysadmdesktop	Desktop Administration, 5.3
sysadmdesktop.sw	Desktop Administration Software, 5.3
sysadmdesktop.sw.clients	Desktop Administration Client Software
tooltalk_eoe	ToolTalk™ 1.2.2 Execution Only Environment
tooltalk_eoe.sw	ToolTalk runtime executables and library
tooltalk_eoe.sw.links	ToolTalk sw links
tooltalk_eoe.sw.runtime	ToolTalk runtime
x_dev	X11 Development Environment, 3.3 based on X11R6
x_dev.sw	X11 Development Environment
x_dev.sw.binaries	X11 Development Binaries
x_dev.sw.dev	X11 Development Hdrs/Libs

Table 7-1 (continued) Possible Subsystems to Remove From the Challenge S

Subsystem Name	Description
x_eoe	X11 Execution Environment, 3.3 based on X11R6
x_eoe.sw	X11 Execution Environment
x_eoe.sw.Server	X11 Window Server and Font Server
x_eoe.sw.Xapps	X11 Applications
x_eoe.sw.Xfonts	X11 Standard Fonts
x_eoe.sw.Xgifts	X11 Unsupported Demos & Gifts
x_eoe.sw.Xoptfonts	X11 Optional Fonts
x_eoe.sw.eoe	X11 Execution Environment
x_eoe.sw.xdps	DPS/X X11 Server Extension

Troubleshooting

This chapter describes how to diagnose hardware problems. It also explains how to run diagnostic tests.

Troubleshooting

This chapter includes information on:

- diagnosing some of the more common hardware problems

- using the system tests (power-on, interactive diagnostic environment, and confidence) to diagnose hardware problems

- recovering from a system crash

- disabling the system password

- service and support

Diagnosing Hardware Problems

In the section "Common Problems", you'll find a list of some of the more common problems that you may have with your system. If the problem you have is not listed there, you can use the system tests, as described below, to further diagnose hardware problems before calling your service provider.

Note: If your system is under warranty, or if you have a full service maintenance contract, call your service provider before removing any parts.

- Power-on tests run automatically on the major hardware parts of the system each time it is turned on. If the tests find a faulty part, the power indicator light (LED) on the front of the system will turn red and there will probably be an error message displayed on the system console. For a description of the LED colors, and of hardware diagnostic error messages and how to interpret them, go to "Power-On Tests".

- Interactive Diagnostic Environment (IDE) tests check your system's hardware when you suspect a problem. These tests are more comprehensive than the power-on tests. If these tests find a fault, you

are informed with an error message. To run the IDE tests, go to "Interactive Diagnostic Environment (IDE) Tests".

Common Problems

Here are a few of the more common hardware problems and the actions you can take.

No Power to the System

1. Check that the power cable is firmly connected to the rear of the system and to a working wall outlet.

2. If you're using a power outlet strip, make sure it is turned on.

Printer Problems

Troubleshooting problems with printers can be found in the *IRIX Advanced Site and Server Administration Guide*.

Internal Floptical Drive or Second Hard Disk Drive Not Working

1. If no external SCSI devices are connected to the system, make sure there is an active terminator connected to the SCSI port on the rear of the system. The Challenge S server ships with an active terminator connected to the SCSI port(s).

2. Try reinstalling the drive, making sure that the SCSI ribbon and power cables are connected properly. Refer to "Installing an Internal Floptical Drive or Second Hard Disk".

3. Verify that the system recognizes the drive. Turn on the system, log in, and type the following at a shell prompt:

   hinv

   This lists the hardware that is installed on the system and that the system recognizes.

4. Check that the SCSI address of the drive is set to 2. Go to Appendix C, "Floptical Drive Jumper Settings" for more information on how to do this. (For drives not supplied by Silicon Graphics, refer to the documentation included with the drive.)

5. If the problem persists, call your service provider.

External SCSI Device Not Working

1. Make sure you've turned on all external devices before turning on the system.

2. Follow these steps to ensure that the device has been installed correctly. (Refer to "Installing External SCSI Devices".)

   ■ Check that the SCSI and power cables are connected properly.

   ■ If the device is the last one on the daisy-chain, check that it has an active terminator connected to it. (The active terminator comes with the SCSI device.)

   ■ Check that the SCSI address of each external device does not conflict with other SCSI devices. Do not use SCSI address 1 or 2 for external devices; they are reserved.

3. If more than one external SCSI devices is connected to the system, make sure that the combined length of all external SCSI cables does not exceed two meters.

4. Check that no more than five external SCSI devices attached to the main SCSI channel (0) and no more than fifteen devices to each of channels 4 and 5.

5. If the device is a tape drive, make sure you're using tapes of the correct density. To find out which densities are supported, see *tps*(7M).

6. Verify that the system recognizes the device. At a shell prompt, enter this command:

hinv

You should see something similar to this:

```
Tape drive: unit 3 on SCSI controller 0: DAT
```

7. If the problem persists, call your service provider.

Power-On Tests

When you turn on the power button, your system goes through these steps:

• The power indicator light (called an LED) on the front of the machine is amber first and then changes to green with the boot "tune." The system initiates power-on diagnostics.

• The LED light is amber while the system runs power-on diagnostics for about five seconds; then the disk spins up. This takes about 15 seconds.

• When the system passes all power-on tests, the LED turns green.

• The system boots the IRIX operating system or brings up a menu if you configured your system to do so.

If the LED light doesn't turn green after the power-on tests, the tests found a faulty part, and the LED light will be either solid red or blinking red. Table 8-1 summarizes the symptoms and possible causes, which are described in detail in the following sections.

Table 8-1   Troubleshooting Symptoms and Probable Causes

Indicator	Symptom	Cause
No power indicator light (LED)	No power to system	Power supply failure. Check rear of system for fan operation or power cable not connected.
No sound	No sound	This is normal for Challenge S. There is no audio processor in the system.

Table 8-1 (continued)   Troubleshooting Symptoms and Probable Causes

Indicator	Symptom	Cause
Blinking red power indicator light (LED)	Memory diagnostic failure	SIMM failure. Check error messages for faulty SIMM.
Solid red power indicator light (LED)	One of the parts of the workstation is faulty	Graphics board, system board, or CPU module failure.

No Visible Light From the LED With No Error Message

If during power-on, the power indicator light (LED) on the front of the system doesn't light up and no error message appears on the screen, follow these steps:

1. Make sure that the power cables are plugged in to a working wall outlet. (The power supply is autoranging, so there is no possibility of switching it to the wrong setting.)

2. If you're using a power outlet strip, check that it is turned on.

3. Press the power button again.

4. If you hear the system drive spin up, check for airflow out the rear of the system (near the power connector) and listen for the sound of the fan. If the system disk spins up and the fan is blowing air, then the LED may be burned out or disconnected.

5. If you have recently disassembled the system, verify that you reconnected the internal power harness properly.

6. If there is no airflow and no sound of the fan, and if the power harness is connected properly inside the chassis, the power supply is probably faulty.

7. Contact your service provider for further instructions.

Blinking Red LED with No Error Message

If the power indicator light (LED) is blinking red and no error message appears on the screen, one or more SIMMs (memory modules) may be faulty.

1. Press the power button on the front of the workstation to power off the system.

2. After the system shuts down, press the power button to power it on again.

3. If you still see the message, check that the memory modules are seated all the way into the sockets. Go to "Checking the SIMM Installation" and follow the instructions there.

Blinking Red LED With an Error Message

If the power indicator light (LED) on the front of the system is blinking and a message appears on the screen, look for one of the messages below and follow the instructions.

If you see this message:

No usable memory found. Make sure you have a full bank (4SIMMs)

1. Press the power button on the front of the server to power off the system.

2. After the system shuts down, press the power button to power it on again.

3. If you still see the message, check that the memory modules are seated all the way into the sockets. Go to "Checking the SIMM Installation" and follow the instructions there.

If you see this message:

`Check or replace: SIMM#`

1. Press the power button on the front of the workstation to power off the system.

2. After the system shuts down, press the power button to power it on again.

3. If you still see the message, check that the memory modules are seated all the way into the sockets. # represents the SIMM number that failed the test (for example, SIMM S1, SIMM S2).

Go to "Checking the SIMM Installation" and follow the instructions there.

Solid Red LED With No Error Message

If the power indicator light (LED) on the front of the system is solid red and does not turn green, one of the parts in the workstation is faulty.

Press the power button to power off the system. Wait a few seconds and then press it again to power on again. If the LED is still solid red, contact your service provider for further instructions.

Solid Red LED With an Error Message

If the power indicator light (LED) on the front of the system is solid red and a message appears on the screen, look for one of the messages below and follow the instructions.

If you see this message:

```
Check or replace: Graphics board
```

1. Press the power button on the front of the workstation to power off the system.

2. After the system shuts down, press the power button to power it on again. If you get the same error message, try running the Interactive Diagnostics Environment (IDE) tests. Go to "Interactive Diagnostic Environment (IDE) Tests".

3. Contact your service provider for further instructions.

If you see this message:

```
Check or replace: CPU module
```

1. Press the power button on the front of the workstation to power off the system.

2. After the system shuts down, press the power button to power it on again. If you get the same error message, try running the Interactive Diagnostics Environment (IDE) tests. Go to "Interactive Diagnostic Environment (IDE) Tests".

3. Contact your service provider for further instructions.

Green LED But the System Has a Problem

If the power indicator light (LED) on the front of the system is green, the system has passed the power-on tests. However, if you suspect a problem with the system, you can use the following diagnostics tests to help isolate the problem before calling your service provider.

- "Interactive Diagnostic Environment (IDE) Tests"
- "Recovering from a System Crash"

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Interactive Diagnostic Environment (IDE) Tests

When you power on the system, power-on tests check the system's essential hardware parts. Interactive Diagnostic Tests give you a greater depth of testing capabilities. Diagnostic tests take at least 30 minutes to run. If you have a large amount of memory or more than one hard disk, they take longer. The system stops the testing if it finds errors, and reports failures on the screen.

Follow these steps to run the tests:

1. Press and release the power button on the front of the workstation to power off the system.

   After a few seconds you see the notifier shown in Example 8-1, and the system shuts down automatically.

   ```
   INIT: New run level: 0
   The system is shutting down.
   Please wait.
   ```

Example 8-1 System Shutdown Message

2. Press and release the power button to turn on the system.

3. After the system performs its power-on diagnosis, you should see the System Maintenance menu, shown in Example 8-2.

   ```
   System Maintenace Menu

   1) Start System
   2) Install Software
   3) Run Diagnostics
   4) Recover System
   5) Enter Command Monitor

   Option?
   ```

Example 8-2 System Maintenance Menu

If you cannot reach this menu, your system is faulty. Contact your service provider.

4. To start the diagnostics, type:

   3

5. You see a screen similar to this:

```
                Starting Diagnostic Program

          Press <Esc> to return to the menu.

SGI Version 5.2 IP22 IDE field Feb 11, 1994

                   System: IP22
                Processor: 150 Mhz R4400, with FPU
Primary I-cache size: 8 Kbytes
Primary D-cache size: 8 Kbytes
Secondary cache size: 1024 Kbytes
                SCSI Disk: scsi(0)disk(1)
                SCSI Disk: Controller 0, ID 2, removeable media

/
```

Example 8-3   Interactive Diagnostic Environment (IDE) Start-up Screen

Note: If you do not see this screen, you cannot run the diagnostics. You may have a faulty disk drive. Contact your service provider.

The character on the last line is a "spinning" combination of pipes (vertical bars), slashes, and dashes while the tests are running. Also, the LED on the front of the system blinks slowly throughout the testing process.

Watch for messages.

If the system's hardware is completely healthy, after 10 to 30 minutes (or more, if you have more than one hard disk or a lot of memory) you see this message:

```
Diagnostic tests completed with no failures detected.
```

```
Press <Enter> to continue.
```

Press **<Enter>** to return to the System Maintenance menu, where you can restart the system by clicking on the *Start System* icon. If problems persist, or if you still cannot restart the system, you may have a software problem. See "Recovering from a System Crash".

If the diagnostics find a problem, you see a message similar to the following:

```
ERROR: Failure detected on the <name>
```

where *<name>* is the internal part or circuit, peripheral, or subsystem that is faulty.

Record this information and call your service provider for further instructions.

Recovering from a System Crash
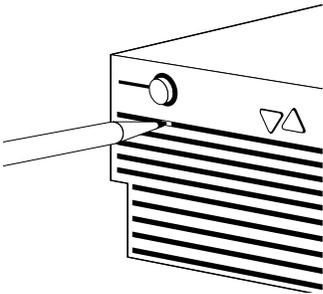
Figure 8-1
Pressing the Reset Button

If your system crashes because of a software malfunction, first try powering off the system by pressing the power button on the front panel. Wait until the system shuts off and then power it on again. If this doesn't solve the problem you can use the CD-ROM that came with your system and your most recent full backup to recover your system.

To recover from a system crash, follow these steps:

1. If you cannot communicate with the system using the console, or over the network, or if the power button on the front of the system doesn't respond, use a pencil or an unwound paper clip to press the recessed reset button located on the front panel, as shown in Figure 8-1.

2. When the System Maintenance menu appears, select:

    4

    The System Recovery menu appears, as shown in Example 8-4.

    ```
                      System Recovery

              Press <Esc> to return to the menu.

    1) Remote Tape 2) Remote Directory X) Local CD-ROM X)
    Local tape

    Enter 1-4 to select source type, <esc> to quit,
    or <enter> to start:
    ```

Example 8-4   System Recovery Menu

3. Choose the appropriate source by typing its number.

4. Insert the CD included with your system, then press **<Enter>**.

   The CD-ROM drive begins accessing information from the CD. The system takes approximately five minutes to copy the information from the CD that it needs.

   You may see a warning message, after which the system pauses; this is normal.

5. After everything is copied from the CD to the system disk, you can restore your data from a recent full backup tape. You see series of messages and prompts. Note that at most question prompts, you may type:

   sh

   to get a shell prompt.

   The first message is the following:

   ```
   *********************************************

   SYSTEM RECOVERY

   *********************************************
   ```

   ■ If you have a local tape device, you see this message:

   ```
   Restore will be from <tapename> OK? ([Y]es, [N]o): [Y]
   ```

   where *<tapename>* is the name of the local tape device. Enter **y** to use a local tape drive.

   ■ If you have a remote (network) tape device, when no tape device is found, or when you answered "**N**" to the question in the previous bullet, you see this message:

   ```
   Remote or local restore ([r]emote, [l]ocal):
   ```

   If you answer "remote," you have chosen to restore from the network and you see this message:

   ```
   Enter the name of the remote machine:
   ```

   ```
   Enter the name of the tape device on <remote>
   ```

   where *<remote>* is the name of the network host you identified in the previous question.

If you answer "local," you have chosen a tape device that must be connected to your system and you see this message:

```
Enter the name of the tape device:
```

Enter the name of the tape device and press <**Enter**>. Then you see this message:

```
Insert the first backup tape in the drive, then press
<Enter>, [q]uit (from recovery), [r]estart:
```

■ Remove the CD-ROM, insert your most recent full backup tape, then press <**Enter**>. If you are recovering using a tape drive on another workstation, the system asks for its name.

Then you see this message:

```
Erase /x filesystems and make new ones (y,n)? [n]
```

where x is a filesystem. It prompts you for every filesystem.

6. Answer by typing either **y** or **n**.

If you answer no to this question, the system tries to salvage as many files as possible, then it uses your backup tape to replace the files it could not salvage. Usually you should answer **n** for no, especially if your backup tape is not very recent.

If you answer **y** for yes, the system erases the filesystem and copies everything from your backup tape to the disk. The system loses any information you created between now and when you made your backup tape.

You see this message:

```
Starting recovery from tape.
```

After two or three minutes, the names of the files that the system is copying to the disk start scrolling. When the recovery is complete, you see this message:

```
Recovery complete, restarting system.
```

Then the system restarts. When you see the System Maintenance Menu, the system is ready to boot.

Disabling the System Maintenance Password

The system maintenance password keeps unauthorized people from using the Command Monitor to gain superuser access to the system, or otherwise altering the system configuration. You can set the system maintenance password from the Command Monitor.

Once the system maintenance password is set, whenever you are in the System Maintenance Menu and you choose the "Install System Software," "Run Diagnostics," "Recover System," or "Enter Command Monitor" menu items, you are prompted for a password, as shown in Example 8-5.

```
Enter password:
```

Example 8-5   System Maintenance Password Prompt

If you do not know the system maintenance password, you can disable it by removing a jumper from the system board inside the sever, as shown in Figure 8-2.

Note: To prevent unauthorized access to the jumper on the system board, you can lock the cover of the Challenge S server. For more information, go to "Locking the Top Cover".

To remove the jumper and disable the password, follow these steps:

1. Shut down the system.

    ■   Press and release the power button to power off the system.

    ■   Disconnect the power cable from the rear of the system.

2. Remove the cover by releasing the latch on the rear of the cover and sliding the cover forward. For more details, see "Removing the Top Cover".

3. Locate the jumper beside the power supply cable connectors on the system board, as shown in Figure 8-2.
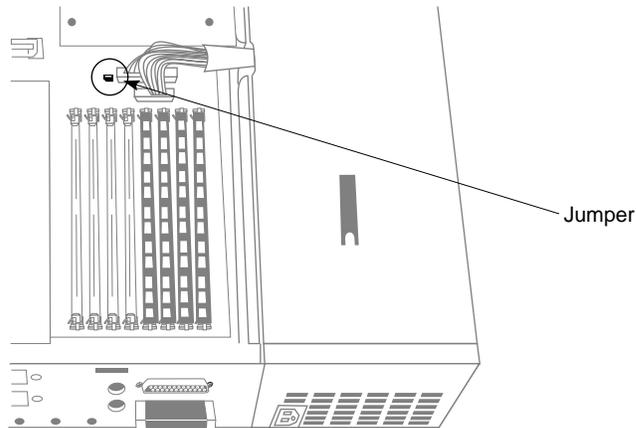
Figure 8-2   Locating the Password Jumper

4. Remove the jumper and save it. You must reinstall it if you choose to reset the password.

5. Replace the cover by inserting the tab through the hole in the rear of the chassis and sliding the cover back until it snaps into place.

6. Reconnect the power cable to the rear of the system.

7. Press and release the power button on the front of the system to power on the system.

When you return to the System Maintenance Menu and choose one of the four menu options mentioned before, you see the notifier shown in Example 8-6.

```
Warning: Password jumper has been removed. Not enforcing
PROM password
```

Example 8-6   Disabled PROM Password Message

If you want to reenable the password, you can do so by entering the Command Monitor and giving the command *resetpw* to clear the password.

Then power the system down, remove the top cover, and replace the jumper. Replace the top cover and power on the system.

Service and Support Information

When you purchased your system, you may have purchased a support program from either Silicon Graphics or a vendor who supplies software. Whenever you encounter any problems that you cannot solve using the methods in this chapter, contact the organization from which you purchased the support program.

If your products are supported by Silicon Graphics and you need help, contact your service provider.

Ordering, Removing, and Installing Replacement Parts

This chapter describes how to remove and replace various parts of the Challenge S server. It also explains how to return parts or the entire system to your service provider, and provides a list of the basic tools you need to work on the Challenge S server.

Ordering, Removing, and Installing Replacement Parts

This system is designed to be user maintainable. If diagnostic tests identify a faulty part, contact your service organization before removing it. In some cases you may be instructed to return the system.

This chapter tells you how to:

- order a replacement part and package the faulty part for return
- replace the system
- replace the following internal parts
    - GIO option board (optional video, network, or Fast SCSI-2 boards)
    - IOPLUS board
    - GIO extender board
    - CPU module
    - SIMMs (Single Inline Memory Modules)
    - internal drives (floptical, second hard disk, and system disk)
    - power supply
    - external SCSI (Small Computer Systems Interface) devices

It also describes the tools you need to replace components and lists the sizes of some of the screws and standoffs used in the Challenge S server.

Ordering a Replacement Part

If diagnostics have identified a faulty part, call your service provider. You will be instructed either to order a replacement part, or to ship the system back. If instructed to return the system, go to "Replacing the System". If asked to return the part, Figure 9-1 and Figure 9-2 will help you locate the part number of the faulty part.
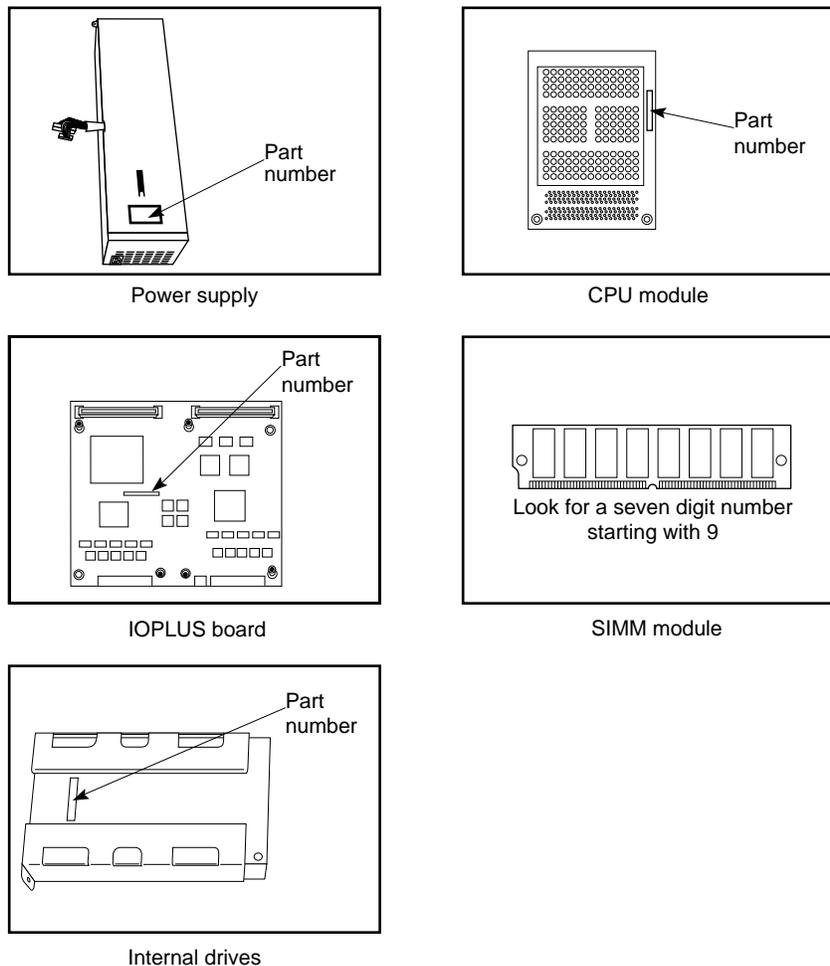
Figure 9-1   Part Number Locations for Standard System Components
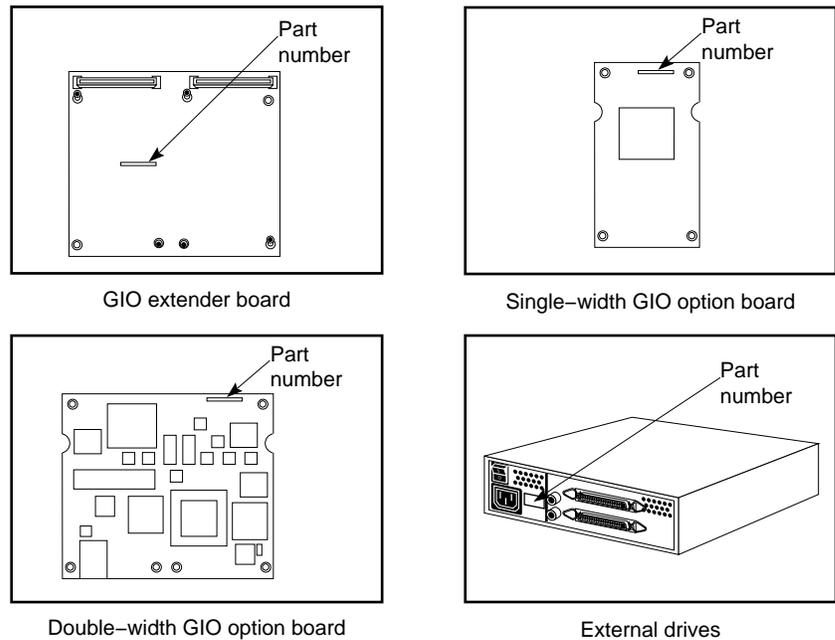
Figure 9-2   Part Number Locations for Optional Components

Follow these steps to order a replacement part:

1. Contact your service provider.

    You will be asked for the system serial number, configuration
    information, the faulty part's part number, and a description of the
    problem. You may be instructed to remove the faulty part, or you may
    be asked to return the entire system.

2. Make a photocopy of the "Part Request Form" at the back of this guide.

3. Note the name of the faulty part on the copy of the form.

4. Note the serial number of your system. It is on a label on the back of the
    system.

5. Remove the faulty part if instructed to do so. Go to the appropriate
    instructions on replacing parts in this chapter.

6. Look the part number of the faulty part; it's shown on the part. (Refer to Figure 9-1 and Figure 9-2.)

7. Pack and ship the faulty part to your service provider:

   ■ If possible, package the part in an antistatic bag. GIO option boards, CPU modules, and SIMM modules are extremely sensitive to static electricity.

   ■ For maximum protection to the part, use two sturdy boxes for shipping.

   Place the faulty part and "Part Request Form" into one of the two boxes. Pack them in plenty of packing material so the part won't sustain further damage. Tape the box securely.

   Place the box containing the faulty part into a larger box and fill the empty space with packing materials. Tape the box securely and affix a mailing label. Ship the box to your service provider.

Replacing the System

If diagnostics have identified a problem with the system, call your service provider. If instructed to return the system, follow these instructions to prepare it for shipping and complete the necessary paperwork.

1. To preserve your data, remove all disk drives from the system:

   ■ Remove the floptical disk drive or second hard disk drive in the top drive slot (if installed). Go to "Replacing the Internal Floptical Drive or Second Hard Disk Drive" .

   ■ Remove the system disk drive. Go to "Replacing the System Drive".

2. Remove any components (such as memory modules or option boards) that are were not provided by Silicon Graphics. Refer to the appropriate section in this chapter to remove the parts.

3. Remove any external SCSI devices or external parts such as expansion chassis and cables. Do not ship these external parts unless told to do so by your service provider.

4. Make a photocopy of the "Part Request Form" on the last page of this guide.

5. Complete the "Part Request Form." You need to know the serial number of your system; it is on a label on the back of the system. The serial number allows your service provider to identify the correct replacement system for you.

6. Pack the server in the original packing materials that came with it. The server should include all the internal parts that it shipped with (except for the system drive): power supply, system board, CPU module, IOPLUS or GIO Slot Extender board, and memory modules.

   Note: It is important that you use the original packing materials to prevent further damage to the server and its internal parts. If you don't have the original packing materials, contact your service provider.

7. Ship the system to your service provider.

Tools Required to Remove and Replace Components

Table 9-1 lists the tools that are required to remove and replace components of the Challenge S server:

Table 9-1   Tools Required to Remove and Replace Components

Tool	Description	Use
Screwdriver	#1 Phillips screwdriver	Removing most screws.
Screwdriver	Flat-bladed, small	Removing screws that connect the Ethernet AUI connector to the chassis backplane.
Hex wrench (see Figure 9-3)	4.5 mm and 3/16"double-sided hex wrench, provided with system	Removing standoffs (4.5 mm) on system board. Removing cable-fasteners (3/16") on external SCSI connectors
Wrist strap	Grounding strap (provided with Silicon Graphics option products and memory upgrades)	Preventing damage to system components from Electrostatic Discharge (ESD)

Warning: **If you do not have a grounding strap, we strongly recommend you obtain one. Always follow proper electrostatic discharge (ESD) procedures when handling internal system components.**

The Challenge S server ships with a double-sided hex wrench that is used to remove and install standoffs and cable-fasteners on the external SCSI connectors. See Figure 9-3:
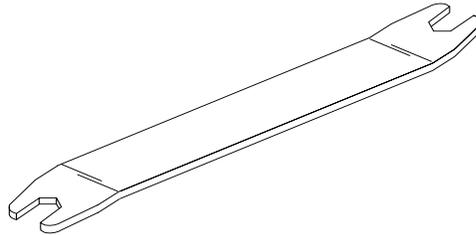
Figure 9-3   Double-Sided Hex Wrench (4.5 mm and 3/16″)

Miscellaneous Parts (Screws and Standoffs)

Table 9-2 lists some of the screws and standoffs used in the Challenge S server:

Table 9-2   Standoffs and Screws Used in Challenge S Server

Part	Size/Description
Standoff	4.5 mm x 9/16″
Screw	2-56 x 5/16″, self-tapping
Screw	M3 x 6 mm, machine thread (DIN)
Screw	4-40, slotted

Replacing Internal Parts

Internal replacement parts include the IOPLUS board, GIO option board, CPU module, SIMM modules, internal drives, and power supply (and optional GIO extender board).

Note: Before replacing an internal part, call your service provider for instructions. If the system is under warranty, you may be instructed to ship the system back.

Follow the steps below to shut down the system, remove the cover, attach a wrist (grounding) strap, replace the part, replace the cover, and start up the system.

Replacing a GIO Option Board

For GIO option boards that are not provided by Silicon Graphics, contact the supplier for maintenance instructions.

To replace a single-width GIO option board, follow these steps:

Note: You can also follow these steps to replace a double-width GIO option board. The only difference is that there will be more screws to remove on the double-width board.

1. If the system is powered on, press and release the power button on the front of the system to shut down the software and power off the system.

    The system powers off automatically after about a minute.

2. Disconnect the power cable from the back of the Challenge S server.

3. Remove the top cover by releasing the latch on the rear of the cover and sliding it forward.

4. Ground yourself to a metal part of the Challenge S chassis.

    ■   Put the wrist strap (included with the option board) around your wrist, making sure it is tight against your arm.

    ■   Attach the alligator clip to a metal part of the Challenge S chassis.

    Caution: The GIO option board is extremely sensitive to static electricity. Wearing the wrist strap prevents the discharge of static electricity, which could damage the board.

5. Move the system or position yourself so that you are facing the rear of the system, as shown in Figure 9-4.

    GIO option boards are installed on top of either the IOPLUS or GIO Slot Extender boards (depending upon your system model). A single-width GIO option board covers half of the lower board (IOPLUS or GIO extender); a double-width covers the entire lower board. Figure 9-4 shows a single-width board.
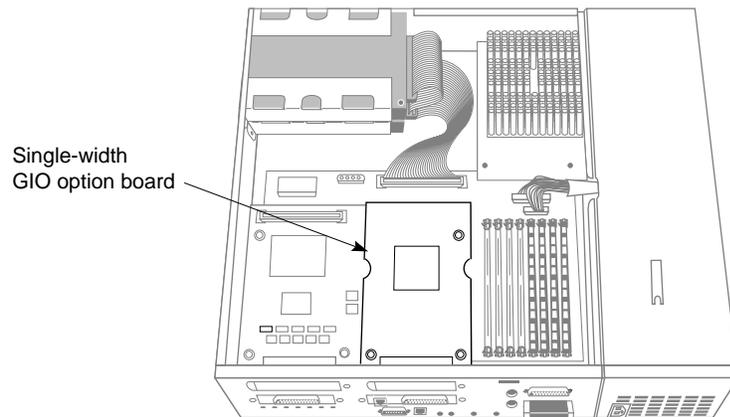
Figure 9-4   Locating the GIO Option Board

6. If there are external cables connected to the GIO board connector on the rear of the server, disconnect them.

7. Using a Phillips screwdriver, remove the screws from the GIO board connector on the rear of the server, as shown in Figure 9-5.
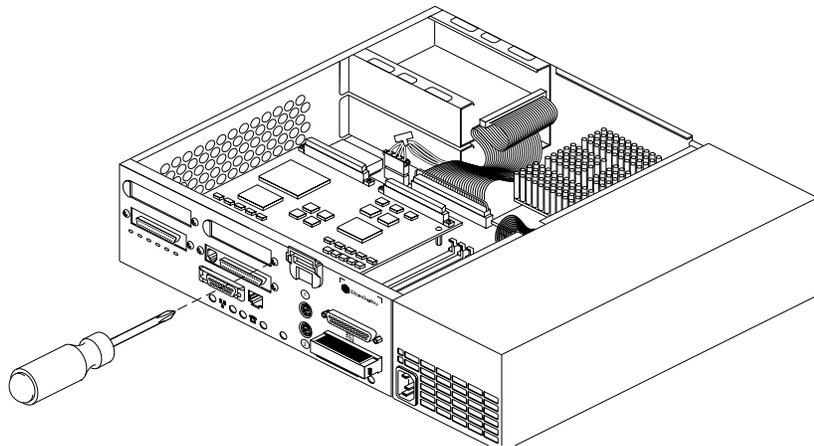
Figure 9-5　Removing the Screw From the Connector on the Rear of the Server

8. Using a Phillips screwdriver, remove the screws that connect the GIO option board to the lower board, as shown in Figure 9-6.

   Note: A double-width GIO option board has more than two screws to remove.
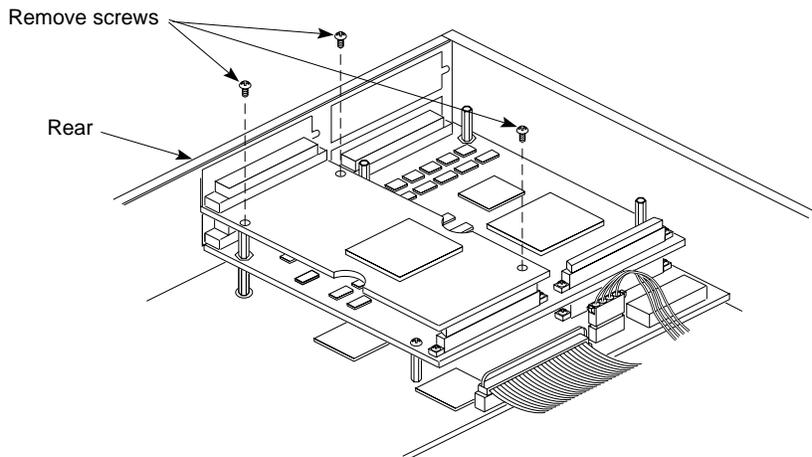
Figure 9-6   Removing the Screws From the GIO Option Board

9. Disconnect the GIO board from the lower board by grasping the GIO board firmly and pulling it up.

10. Install the replacement GIO option board.

    To install the new board, follow the instructions in "Installing a GIO Option Board" .

Replacing the IOPLUS or GIO Extender Board

To replace either the IOPLUS or GIO extender board, you first need to remove any GIO option boards installed on it. Follow these steps :

1. If the system is powered on, press and release the power button on the front of the system to shut down the software and power off the system.

    The system powers off automatically after about a minute.

2. Disconnect the power cable from the back of the Challenge S server.

3. Remove the top cover by releasing the latch on the rear of the cover and sliding it forward. For more details, see "Removing the Top Cover".

4. Ground yourself to a metal part of the Challenge S chassis.

   ■ Put the wrist strap (included with the Silicon Graphics option boards and memory upgrades) around your wrist, making sure it is tight against your arm. If you do not have a wrist strap, it is strongly recommend you obtain one.

   ■ Attach the alligator clip to a metal part of the Challenge S chassis.

   Caution: The IOPLUS board is extremely sensitive to static electricity. Be sure wear a wrist strap to prevent the discharge of static electricity, which could damage the board.

5. Move the system or position yourself so that you are facing the rear of the system, as shown in Figure 9-7.
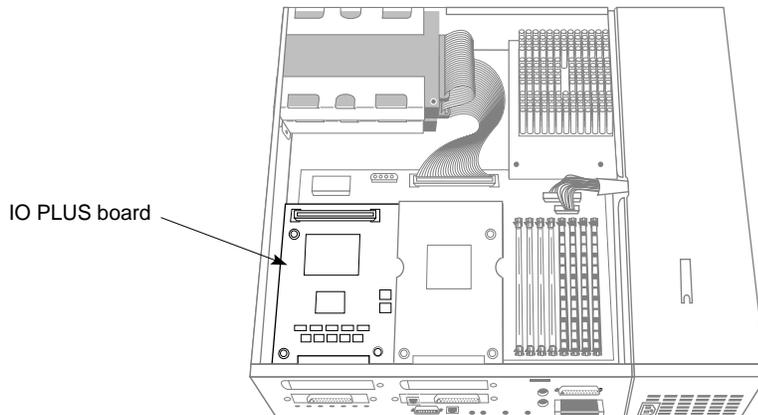
Figure 9-7   Locating the IOPLUS Board With a GIO Option Board Installed

6. To gain access to the IOPLUS or GIO extender board, remove any GIO option boards, if installed.

   There might be one double-width GIO option board, or one single-width board, or two single-width boards installed on the IOPLUS or GIO extender board. Figure 9-7 shows one single-width GIO option board installed.

   Refer to "Replacing a GIO Option Board" for instructions, and then continue with the next step.

7. Use a Phillips screwdriver to remove the four screws from the IOPLUS or GIO extender board's I/O connector on the rear of the server, as shown in Figure 9-8.
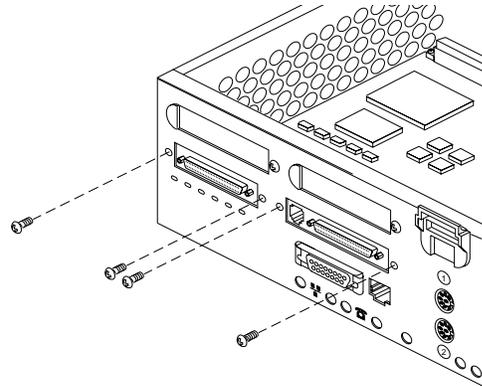
Figure 9-8   Removing the Screws From the IOPLUS Board's I/O Connector

8. Use the hex-wrench tool to unscrew the two standoff screws (tall, hexagonal posts) from the IOPLUS or GIO extender board, as shown in Figure 9-9.

9. Use a Phillips screwdriver to remove one screw from the IOPLUS or GIO extender board.
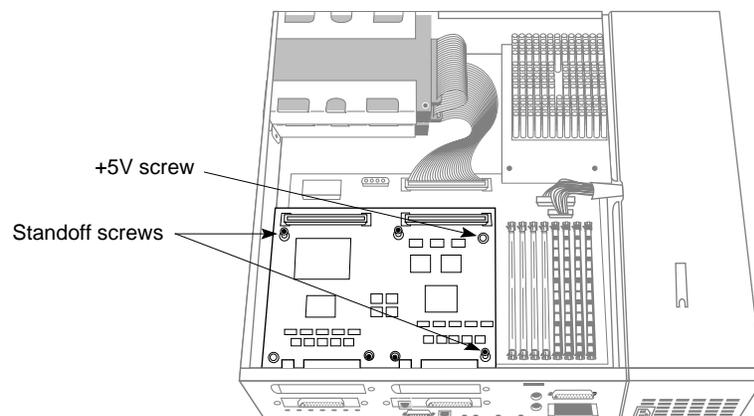
Figure 9-9   Removing the Screws From an IOPLUS

Warning: **As indicated in Figure 9-10, the standoff between the main system board and the IOPLUS that is closest to the CPU module carries +5 VDC. Do not use this as a grounding attachment.**

10. Disconnect the IOPLUS or GIO extender board from the system board, as shown in Figure 9-10. The IOPLUS is shown, but the standoff and screw pattern is identical for the GIO extender.

   ■ Grasp the board firmly with two hands on the side close to the system disk drive and pull up. This will disconnect the two connectors under the IOPLUS/GIO extender board from the sockets on the system board.

   ■ Lift the board up and remove it.
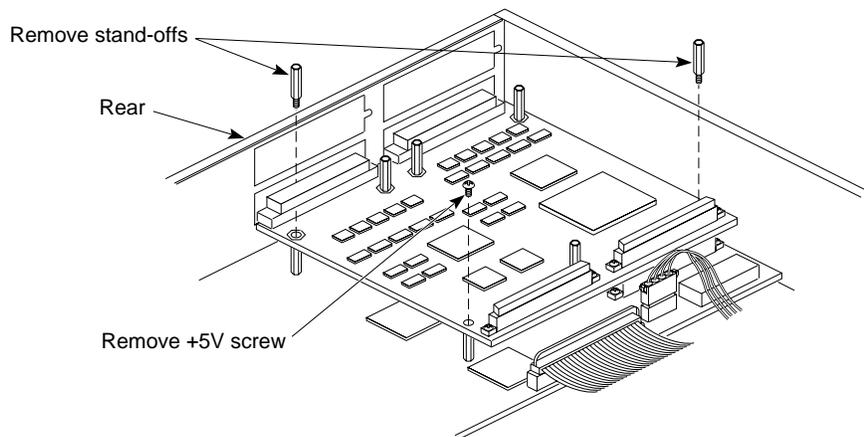
Figure 9-10 Disconnecting the IOPLUS Board From the System Board

11. Lower the replacement board over the system board, tilting it as necessary to insert the IOPLUS board's I/O connectors through the open I/O slot on the rear of the chassis.

12. Align the screw holes on the new board over the vacant standoff screws (tall, hexagonal posts) on the system board.

13. Connect the new board to the system board.

   ■ Seat the connectors under the new IOPLUS/GIO extender board over the sockets on the system board. Make sure they are positioned correctly before going on to the next step.

   ■ Press down firmly on all four corners of the new board until it is securely seated in the two sockets on the system board. If the board is not seated all the way, the screws will not tighten correctly.

14. Reinsert the two standoff screws that you removed earlier on the IOPLUS or GIO extender board, as shown in Figure 9-9. Use the double-sided hex wrench to tighten them. As you tighten the screws, alternate between them so that the board is connected evenly.

15. Insert and tighten the +5 VDC screw (IOPLUS only). See Figure 9-9.

16. Reattach the screws that secure the board to the backplane. See Figure 9-8.

17. If you removed any GIO option boards, re-install them. Refer to "Replacing a GIO Option Board".

18. Replace the top cover by inserting the tab through the hole in the rear of the chassis and sliding it back until it snaps into place. For more information, see "Replacing the Top Cover".

19. Reconnect the power cable to the connector on the back of the Challenge S server.

You are finished replacing the IOPLUS or GIO board and you are ready to power on the system.

Replacing the CPU module

Follow the steps below to remove the CPU module and install a new one.

1. If the system is powered on, press and release the power button on the front of the system to shut down the software and power off the system.

   The system powers off automatically after about a minute.

2. Disconnect the power cable from the back of the Challenge S server.

3. Remove the top cover by releasing the latch on the rear of the cover and sliding it forward. For more details, see "Removing the Top Cover".

4. Ground yourself to a metal part of the Challenge S chassis.

   ■ Put the wrist strap (included with the server) around your wrist, making sure it is tight against your arm.

   ■ Attach the alligator clip to a metal part of the Challenge S chassis.

   Caution: The CPU module is extremely sensitive to static electricity. Wearing the wrist strap prevents the discharge of static electricity, which could damage the board.

5. Locate the CPU module, as shown in Figure 9-11.

    The CPU module is elevated on the system board and is located at the front of the system between the power supply and the system disk drive. It is protected by a textured heat sink. *Do not remove the heat sink.*

    Note: Two types of CPU modules are supported on the Challenge S server. Your system may have a smaller CPU module than the one shown below.
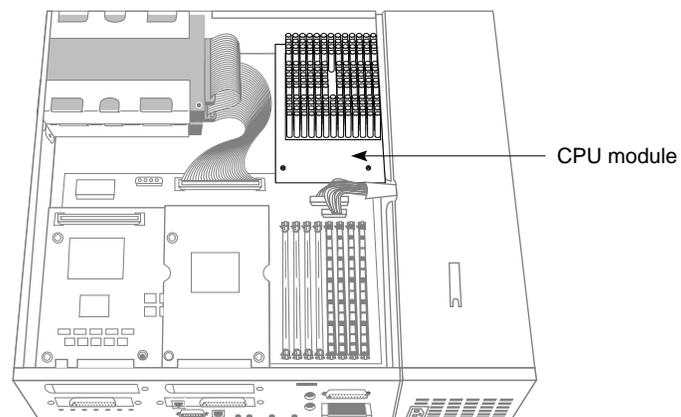
CPU module

Figure 9-11   Locating the CPU Module

6. Remove the two screws that connect the CPU module to the system board, as shown in Figure 9-12.
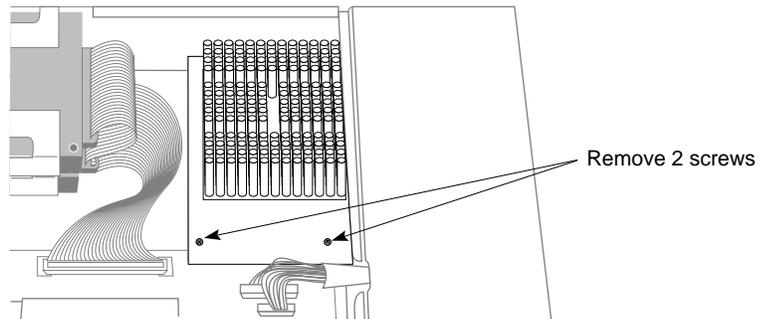
Figure 9-12 Removing the Two Screws From the CPU Module

7. Lift the board by bracing your hands against the power supply and the chassis and pushing the board up with your thumbs, as shown in Figure 9-13.

    Note: When the board disconnects, it pops up quite quickly and may startle you.
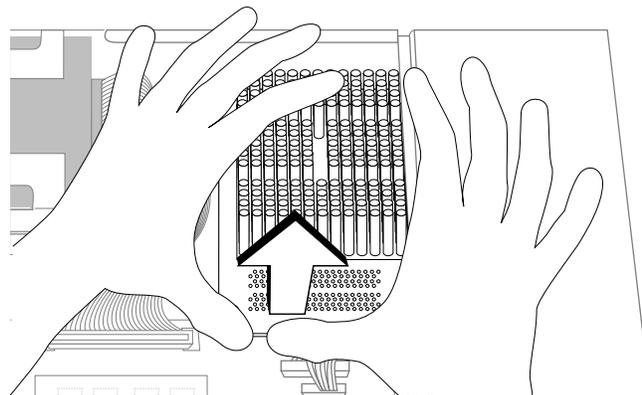
Figure 9-13 Disconnecting the CPU Module

8. Install the replacement CPU module, as shown in Figure 9-14.

    ■   Slide the feet on the bottom of the CPU module into the slippers on the base of the chassis.

    ■   Align the two screw holes on the CPU module over the screw holes on the system board.

    ■   Seat the connector under the CPU module over the connector on the system board. Make sure it is positioned correctly before going on to the next step.

    ■   Press down firmly on the CPU module until it is securely seated in the socket on the system board.

        If the connector does not seem to fit into the socket, do not force it. Lift the end of the CPU module slightly and lower it again, making sure it's seated correctly over the connector before pressing it all the way down.
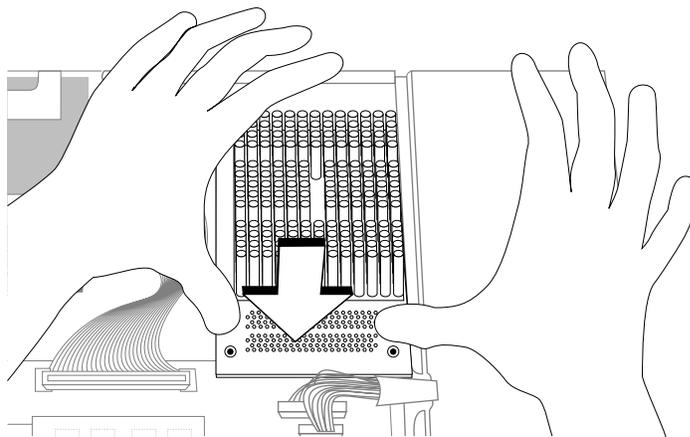
Figure 9-14   Installing the CPU module

9. To connect the CPU module to the system board, insert and tighten the two screws you removed earlier. As you tighten the screws, alternate from one to the other so that the board is connected evenly.

10. Replace the top cover by inserting the tab through the hole in the rear of the chassis and sliding it back until it snaps into place. For more information, see "Replacing the Top Cover".

11. Reconnect the power cable to the connector on the back of the Challenge S server.

You are finished replacing the CPU module and you are ready to power on the system.

Replacing SIMMs

You may need to remove and replace SIMMs (single in-line memory modules) if one fails or if you want to upgrade the memory in your system.

Follow these steps to shut down the system, remove the cover, remove the SIMMs, and replace the cover.

1. If the system is powered on, press and release the power button on the front of the system to shut down the software and power off the system.

   The system powers off automatically after about one minute.

2. Disconnect the power cable from the back of the Challenge S chassis.

3. Remove the top cover by releasing the latch on the rear of the cover and sliding it forward. For more details, see "Removing the Top Cover".

4. Ground yourself to a metal part of the chassis.

   ■ Put the wrist strap (included with the server) around your wrist, making sure it's tight against your arm.

   ■ Attach the alligator clip to a metal part of the chassis.

   Caution: SIMMs and the system's internal components are sensitive to static electricity. Handle the SIMMs carefully, and wear the wrist strap to avoid discharging static electricity.

5. Move the system or position yourself so that you are facing the power supply, as shown in Figure 9-15.
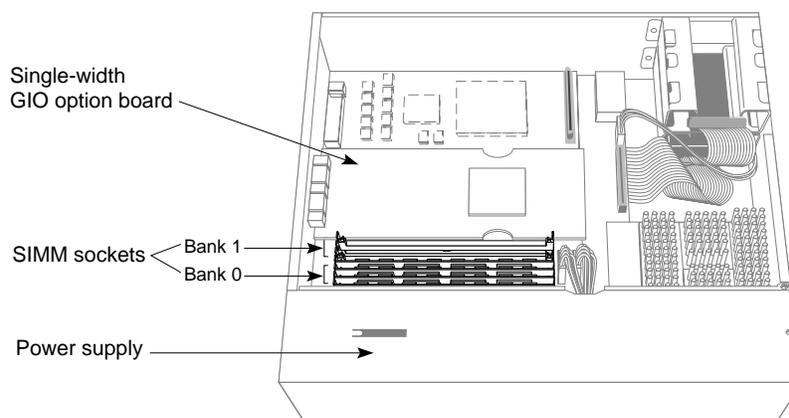
Figure 9-15   Locating the SIMMs

6. Locate the SIMMS next to the power supply. There are eight SIMM sockets, split into two banks—0 and 1. Figure 9-16 shows the bank and socket arrangement:

Rear of system   Front of system

S8
S7   Bank 1
S6
S5

S4
S3   Bank 0
S2
S1

Power supply
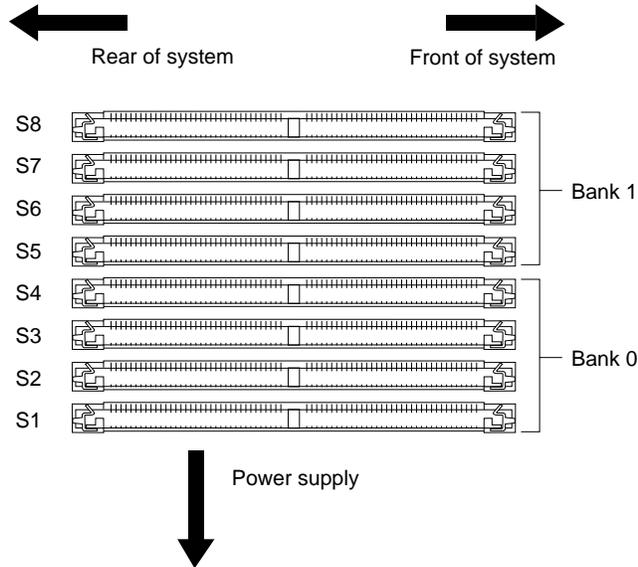
Figure 9-16   SIMM Socket and Bank Numbers

7. Locate the SIMMs you want to remove. In order to replace a faulty SIMM, you need to remove the SIMM farthest from you first, then remove the other SIMMs until you reach the SIMM you want to replace.

8. With your thumbs, pull the latches away from the SIMM, as shown in Figure 9-17.

   The SIMM releases and tips away from you.
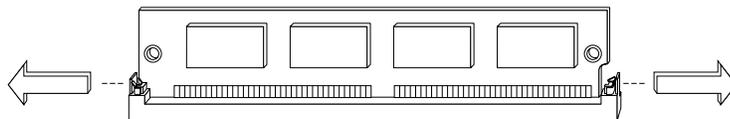
Figure 9-17   Releasing the Latches on the SIMM

Note: Some GIO option boards, if installed in GIO slot 0, close to the SIMMs (as shown in Figure 9-18), may impede your installation of the SIMM in the last socket of bank 1 (socket S8). If this is the case, you may have to remove the GIO option board to gain access to the SIMM socket. Turn to"Replacing a GIO Option Board" for instructions and then return to this section.

Single-width
GIO option board
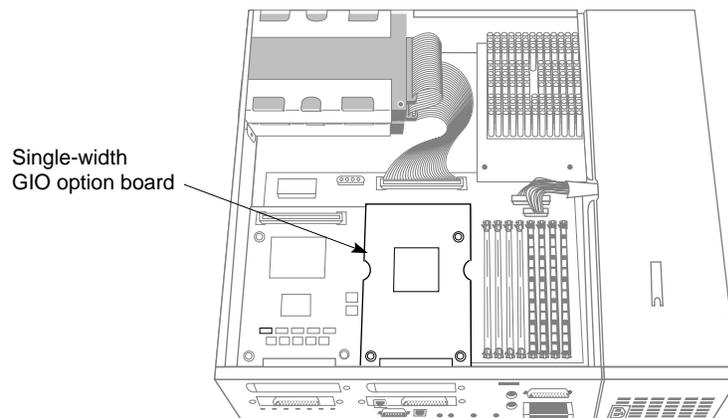
Figure 9-18   GIO Board Installed in Slot 0

9. Remove the other SIMMs the same way.

10. Install the replacement SIMMs. To install the SIMMs, turn to "Installing SIMMs".

Replacing the Internal Floptical Drive or Second Hard Disk Drive

To remove the internal floptical or second hard disk drive from the top drive slot, follow these steps:

1. If the system is powered on, press and release the power button on the front of the system to shut down the software and power off the system.

   The system powers off automatically after about a minute.

2. Disconnect the power cable from the back of the Challenge S server.

3. Remove the top cover by releasing the latch on the rear of the cover and sliding it forward. For more details, see "Removing the Top Cover".

4. Ground yourself to a metal part of the Challenge S chassis.

   ■ Put the wrist strap (included with the server) around your wrist, making sure it is tight against your arm.

   ■ Attach the alligator clip to a metal part of the Challenge S chassis.

5. Locate the floptical or second hard drive, as shown in Figure 9-19.
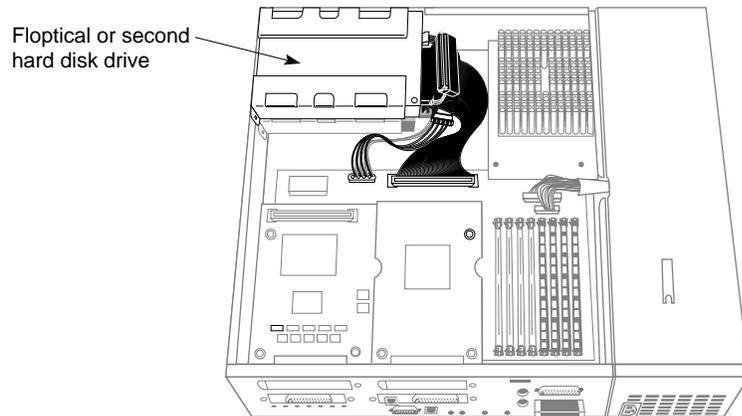
Figure 9-19   Locating the Floptical or Second Hard Disk Drive

6. Remove the drive and bracket by pressing the release button that
    protrudes through the hole on the side of the chassis and pulling the
    unit toward you, as shown in Figure 9-20.

Release
button
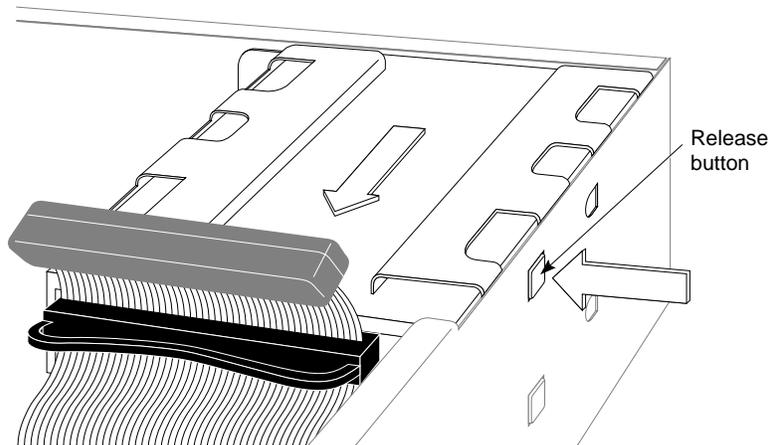
Figure 9-20   Removing the Floptical Drive

7. Disconnect the following cables:

  ■ Disconnect the power cable connector from the drive, as shown in Figure 9-21.

  ■ Disconnect the SCSI ribbon cable connector from the drive. Pull the plastic loop behind the connector to disconnect the cable.
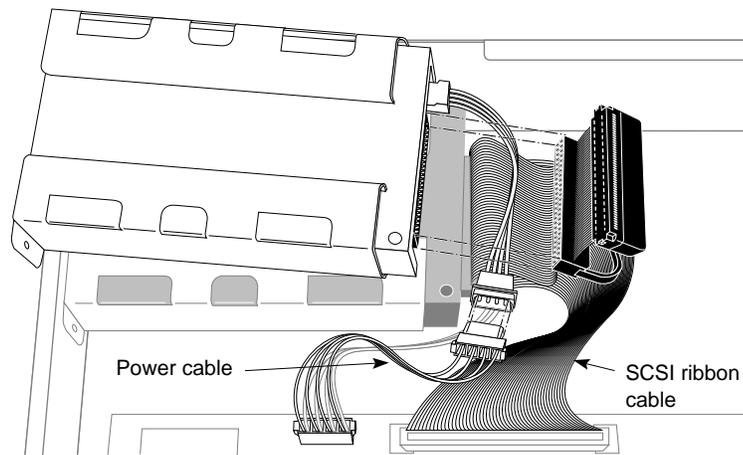
Figure 9-21   Disconnecting the Power and SCSI Cables From the Floptical Drive

8. Install the replacement drive.

   To configure a new hard disk, follow the instructions in "Configuring Additional Hard Disks".

Replacing the System Drive

To replace the system drive, you must first remove the drive and bracket, or the empty bracket if no drive is installed, from the upper drive slot. The drive could be a floptical drive or second hard disk drive.

1. If the system is powered on, press and release the power button on the front of the system to shut down the software and power off the system.

   The system powers off automatically after about a minute.

2. Disconnect the power cable from the back of the Challenge S chassis.

3. Remove the top cover by releasing the latch on the rear of the cover and sliding it forward. For more details, see "Removing the Top Cover".

4. Ground yourself to a metal part of the Challenge S chassis.

   ■ Put a wrist strap (included with Silicon Graphics option products)) around your wrist, making sure it is tight against your arm.

   ■ Attach the alligator clip to a metal part of the Challenge S chassis.

5. Locate the floptical drive or second disk drive (if installed) in the top drive slot, as shown in Figure 9-19. (This might also be a second hard disk drive.)

    If no drive is installed, there will be an empty bracket.

Floptical or second
hard disk drive
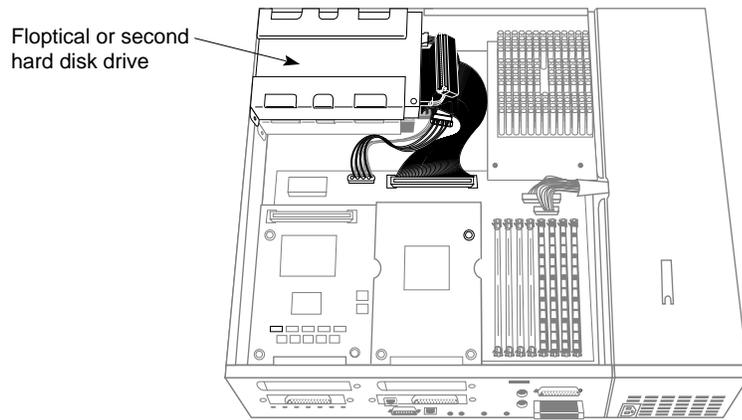
Figure 9-22   Locating a Floptical or Second Disk Drive Installed in the Top Slot

6. Remove the drive and bracket, or the empty bracket if no drive is installed, by pressing the release button that protrudes through the hole in the side of the chassis and pulling the unit toward you.

    Save the empty bracket; you must re-install it after replacing the system disk drive.

    Caution: The empty drive bracket provides structural support for the chassis. You must replace it if you're not installing a drive in the top slot.

7. Disconnect the following cables.

    ■   Disconnect the power cable connector from the drive, as shown in Figure 9-21.

    ■   Disconnect the SCSI ribbon cable connector from the drive. Pull on the plastic loop on the back of the connector to help you disconnect the cable.
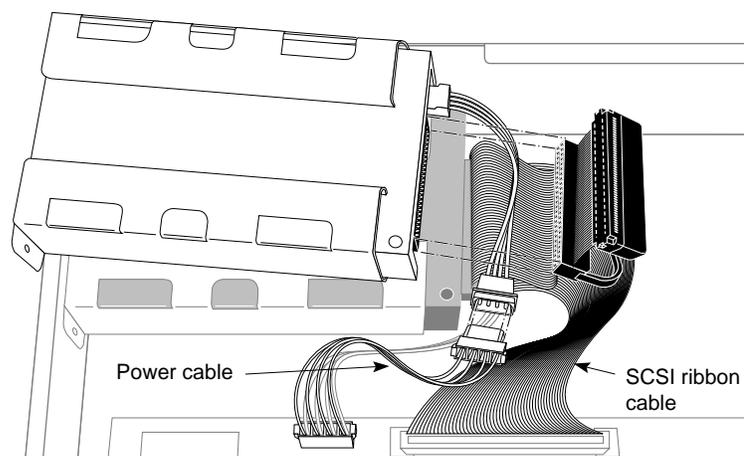
Figure 9-23   Disconnecting the Cables from the Floptical Disk Drive

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8. Remove the system drive and bracket from the lower drive slot by pressing the release button that protrudes through the hole on the side of the chassis and pulling the unit toward you, as shown in Figure 9-24.
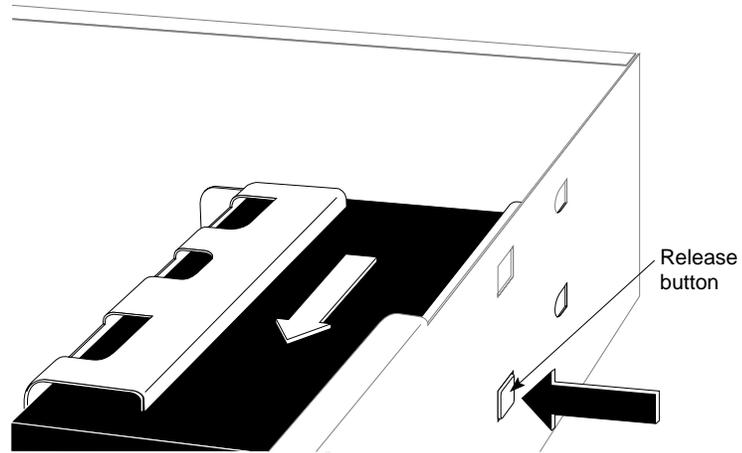
Figure 9-24   Removing the System Disk Drive

9. Disconnect the following cables:

   ■ Disconnect the power cable connector from the system drive, as shown in Figure 9-25.

   ■ Disconnect the SCSI ribbon cable connector from the drive. Pull on the plastic loop behind the connector to disconnect it.
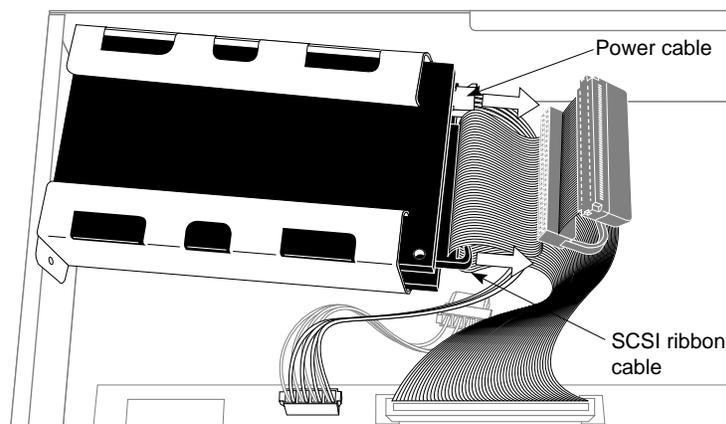
Figure 9-25   Disconnecting the Power and SCSI Cables From the System Disk Drive

10. Pick up the replacement system drive, and reconnect the SCSI cable and the power cable to the replacement system drive.

11. Install the replacement system drive, as shown in Figure 9-26.

   ■ Lower the drive and bracket onto the chassis, making sure it engages in the metal tab on the floor of the chassis. At the same time, the button on the right side of the bracket snaps into the hole on the side of the chassis.

   ■ If you don't hear it snap, push the bracket forward until you hear the snap and can see the button protruding through the hole.
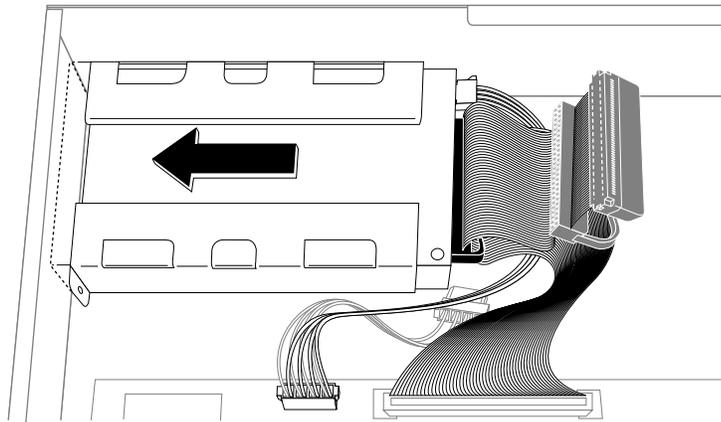
Figure 9-26   Installing the Replacement System Disk Drive

12. Reconnect the SCSI ribbon cable connector and the power cable connector to the floptical drive.

13. Reinstall the floptical drive in the upper drive slot, as shown in Figure 9-27.

    ■   Position the drive and bracket over the system drive.

    ■   Slide the metal tabs underneath the bracket into the holes on the top of the system drive's bracket. At the same time, make sure that the button release on the right side of the bracket snaps into the chassis.
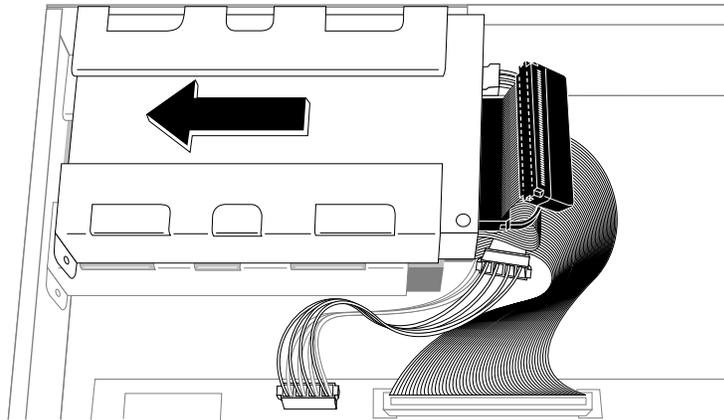
Figure 9-27   Re-installing the Floptical Drive

14. Replace the top cover by inserting the tab through the hole in the rear of the chassis and sliding it back until it snaps into place. For more information, see "Replacing the Top Cover".

15. Reconnect the power cable to the connector on the back of the Challenge S chassis.

You are finished replacing the system disk drive and ready to power on the system.

Replacing the Power Supply

To replace the power supply, follow these steps:

1. If the system is powered on, press and release the power button on the front of the system to shut down the software and power off the system.

   The system powers off automatically after about a minute.

2. Disconnect the power cable from the back of the Challenge S chassis.

3. Remove the top cover by releasing the latch on the rear of the cover and sliding it forward. For more details, see "Removing the Top Cover" .

4. Ground yourself to a metal part of the Challenge S chassis.

   ■ Put the wrist strap (included Silicon Graphics option products) around your wrist, making sure it is tight against your arm.

   ■ Attach the alligator clip to a metal part of the Challenge S chassis.

5. Move the system or position yourself so that you are facing the rear of the system. Locate the power supply, as shown in Figure 9-28.
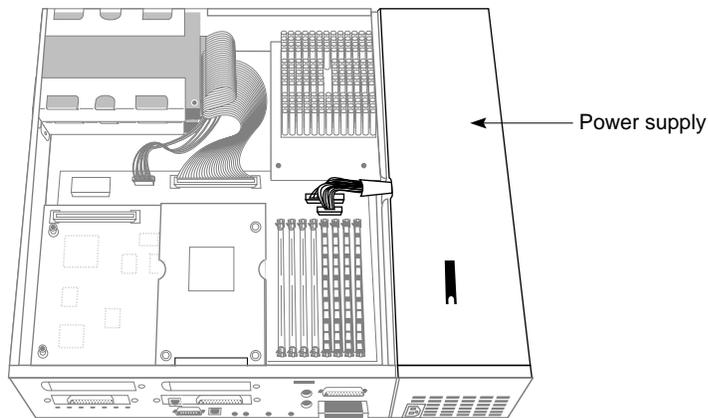
Figure 9-28   Locating the Power Supply

6. Disconnect the two power cables that connect the power supply to the system board. (Refer to Figure 9-29.)

   ■ Disconnect the smaller of the two cables by grasping the connector (not the cables) and pulling it upward.

   ■ Disconnect the larger cable by grasping the connector, pressing in the lever on its side, and pulling it upward. Do not pull the connector up by the cables.

7. Use a Phillips screwdriver to remove the screw that connects the power supply to the chassis.

8. Remove the power supply.

   ■ Place your right hand on the power supply and your left hand on the chassis a few inches from the power supply, as shown in Figure 9-29.

   ■ Slide the power supply forward about one quarter-inch to disengage it from the chassis. You may have to exert some pressure.

   ■ Remove the power supply by pulling it away from the chassis.
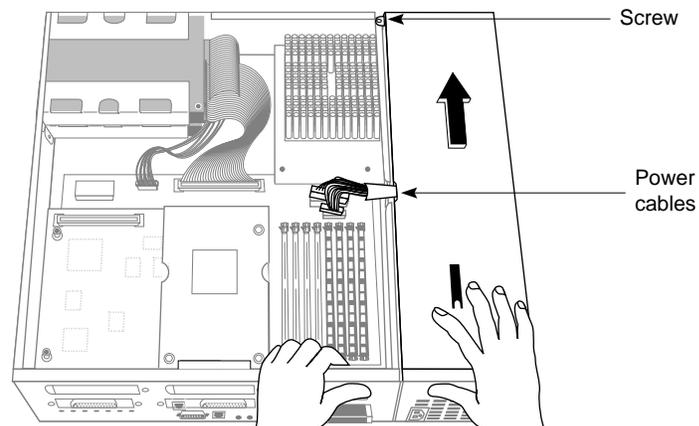
Figure 9-29   Removing the Power Supply

9. Install the replacement power supply.

- Grasp the replacement power supply with your right hand and place your left hand on the front of the chassis as shown in Figure 9-30.

- Place the power supply against the chassis and slide it toward you, making sure that the two metal tabs on its side engage in the two holes on the chassis.
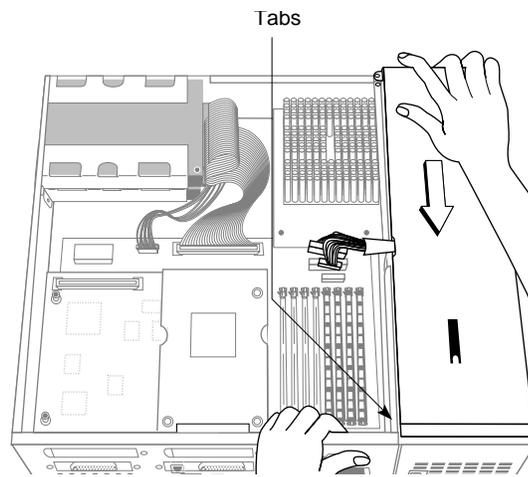
Figure 9-30   Installing the Power Supply

10. Insert and tighten the screw that you removed on the power supply.

11. Connect the two power cables to the system board.

- Insert the larger of the two power connectors into the socket on the system board, pressing it firmly until seated.

- Insert the smaller power connector into the socket on the system board, pressing it firmly until seated.

12. Replace the top cover by inserting the tab through the hole in the rear of the chassis and sliding it back until it snaps into place. For more information, see "Replacing the Top Cover".

Reconnect the power cable to the connector on the back of the Challenge S chassis. You are finished replacing the power supply and ready to power on the system.

Replacing External SCSI Devices

To replace an external SCSI device, follow these steps:

1. If the system is powered on, press and release the power button on the front of the system to shut down the software and power off the system.

   The system powers off automatically after about a minute.

2. Disconnect the power cable from back of the Challenge S chassis.

3. Disconnect the power cable from the SCSI device.

4. Disconnect the SCSI cable from the back of the Challenge S chassis.

   ■ Squeeze the clips on both sides of the connector.

   ■ Pull off the connector.

5. If you are not going to install another external device, replace the terminator that came with your Challenge S server.

   Note: The terminator that shipped with your Challenge S server is a high-density active terminator. The terminator on an external drive may be a low-density terminator. Use only an active high-density terminator to terminate the Challenge S system.

   ■ Put the terminator on the SCSI connector on the back of the Challenge S chassis.

      The SCSI connector is designed so that you can put the terminator on only one way.

   ■ Secure the clips on each side of the terminator.

6. Reconnect the power cable to the back of the system.

7. Press and release the power button on the front of the system to power up the system.

To install a replacement external SCSI device, follow the instructions in "Installing External SCSI Devices".

Safety, Maintenance, and Regulatory Information

This chapter provides guidelines for adjusting your work surface and environment to increase your comfort and safety. It also contains regulatory statements.

Safety, Maintenance, and Regulatory Information

This chapter gives you information on safety and comfort when using workstations and some helpful hints on maintaining the Challenge S server. It also gives you important regulatory information.

Maintaining Your Hardware and Software

This section gives you some basic guidelines to follow to keep your hardware and the software that runs on it in good working order.

Hardware Do's and Don'ts

To keep the server in good running order, follow these guidelines:

Do not

- place the Challenge S server on a soft surface such as a carpet; this alters the airflow through the bottom of the chassis.

- enclose the chassis in a small, poorly ventilated area (such as a closet), crowd other large objects around it, or drape anything (such as a jacket or blanket) over it.

- use the system as a shelf or a table (except for the monitor).

- run the server with the top cover off; this alters the air flow and can greatly reduce product life.

- connect cables or add other hardware components while the server is turned on.

- move the server while it is running, or within 1 minute of powering it down. You may damage the hard disk drive.

- use an adapter to plug the server into a two-pronged (ungrounded) outlet.

- lay the server on its side.

- place liquids or food on the server or console keyboard.

Do

- plug in all cables completely.

- plug the server into a power surge protection strip (if possible).

- wear a wrist strap (grounding strap) to avoid the discharge of static electricity when installing or replacing SIMM modules, the CPU, and GIO option boards.

Software Do's and Don'ts

When your system is up and running, follow these guidelines:

Do not

- use the root account unless you are performing administrative tasks.

Do:

- make regular backups (weekly for the whole system, nightly for individual users) of all information.

- protect the root account with a password.

- protect all open accounts (such as lp, guest, etc.) with a password if your system is connected to the Internet.

Human Factors Guidelines for Setting Up a Workstation

You can increase the comfort and safety of your work environment, and decrease your chances of repetitive strain injuries, by following the guidelines given below. These guidelines help you create a healthy and productive work environment by:

- using a workstation correctly
- properly choosing a site for your system and its components
- setting up your desk and chair correctly

ANSI Standard for Visual Display Terminal Workstations

Table 10-1 shows recommended guidelines for furniture and system adjustment, as developed by the American National Standards Institute (ANSI).[1]

Local Visual Display Terminal (VDT) guidelines issued by country, state, or municipality may apply and supercede the guidelines in Table 10-1.

Table 10-1 ANSI/HFS 100-1988 Guidelines for VDT Workplace Adjustment

Adjustment	Small Female cm (in.)	Midpoint cm (in.)	Large Male cm (in.)
Seat pan height	40.6 (16.0)	46.3 (18.2)	52.0 (20.5)
Work surface height (keyboard and mouse)	58.5 (23.0)	64.75 (25.5)	71.0 (28.0)
Screen viewing height	103.1 (40.6)	118.1 (46.5)	133.1 (52.4)

_____

[1] American National Standard for Human Factors Engineering of Visual Display Terminal Workstations. ANSI/HFS 100-1988. Available through the Human Factors Society, Inc. P.O. Box 1369, Santa Monica CA 90406, USA.

Table 10-1 (continued)   ANSI/HFS 100-1988 Guidelines for VDT Workplace

Adjustment	Small Female cm (in.)	Midpoint cm (in.)	Large Male cm (in.)
Screen viewing distance	>30.5 (>12)	>30.5 (>12)	>30.5 (>12)
Screen viewing angle	0-60 degrees	0-60 degrees	0-60 degrees

Adjustment parameters are defined in Figure 10-1. Guidelines are shown for small females (standing height of 150 cm, or 59 in.) and large males (standing height of 185 cm, or 73 in.). Midpoints are also interpolated for persons of more average height.
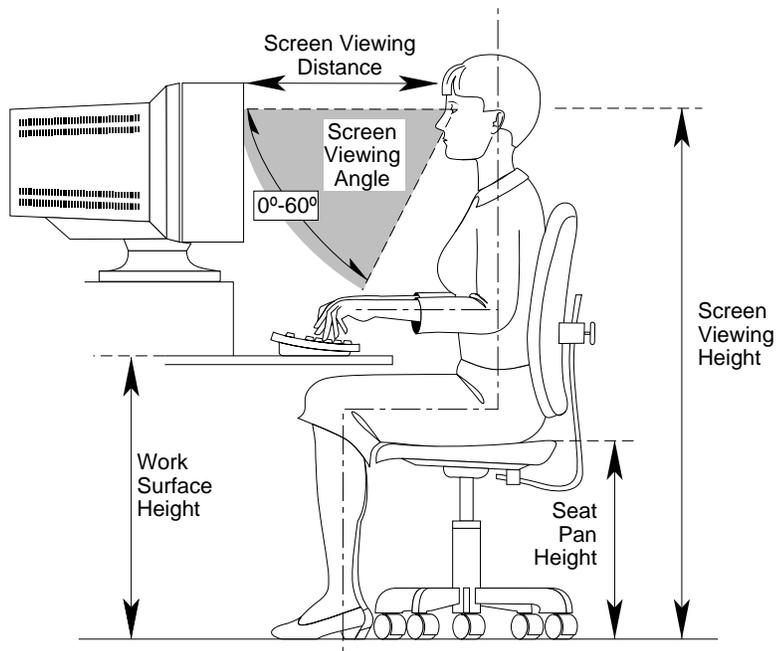
Figure 10-1   Basic Parameters of Visual Display Terminal Workstation Adjustment (Adapted From ANSI/HFS 100-1988)

CAD Operator Preferences

If you work on a CAD system, you may feel more comfortable using the ranges of adjustment shown in Table 10-2.

Table 10-2   Workstation Adjustments Preferred by CAD users

Adjustment[a] cm (in.)	Mean cm (in.)	Range cm (in.)
Seat pan height	54 (21.3)	50-57 (19.7-22.4)
Work surface height	73 (28.7)	70-80 (27.6 -31.5)
Monitor center above floor	113 (44.5)	107-115 (42.1-45.3)
Screen viewing distance	70 (27.6)	59-78 (23.2-30.7)
Work surface tilt	8.6 degrees	2-13 degrees
Monitor tilt[b]	-7.7 degrees	-15 - +1 degrees

a. Derived from Grandjean, Etienne. Ergonomics in Computerized Offices. London: Taylor & Francis Ltd., 1987, p. 148.

b. Negative tilt = a forward monitor inclination (top of the screen toward the operator)

Tips for Setting Up and Using a Workstation

The following tips may be useful for setting up an ergonomic work environment that will be safe, comfortable, and productive. Although you may be able to perform this procedure yourself, it is useful to work with a friend to achieve the best fit.

Facilities Selection

1. A good work chair should swivel, and you should be able to adjust the seat height while sitting. The seat should have a rounded front edge. The chair should have a large enough base to remain stable when adjusted to its maximum height. It should have casters or glides. Many chairs rock, which may partially relieve the muscle tension from sitting in a fixed position. Some chairs can also be adjusted for seat tilt and

depth, armrest height, backrest angle, and lower back support. Check the instructions that came with your chair to take advantage of its adjustability features.

2. Select a work surface that provides enough space to do your work without excessive turning, twisting, or stretching. The height of the work surface should be adjustable and, if possible, it should be wide enough to use the mouse and keyboard at the same height. This helps your neck, shoulders, and upper arms to stay relaxed while you work.

3. Indirect lighting should be used, whenever possible, to prevent glare on the display screen. If you prefer lower levels of lighting (for example, 200-250 lx) than are usually found in offices, separate task lighting may be needed for reading documents. Wearing darker-colored clothing helps minimize glare reflections on the screen.

Adjusting Your Chair, Work Surface, and Workstation

Adjust your chair first, from a seated position if possible. Your lower leg and thigh should form approximately a 90 degree angle at the knee, and your feet should rest flat on the floor. If you are short, you may want to use a footrest for better comfort.

1. Once your chair is adjusted, raise or lower your work surface to a height that allows you to keep your wrists flat and straight while using the keyboard and mouse. The angle between your lower and upper arm should be 70-90 degrees at the elbow. If necessary, use a padded wrist rest under the keyboard to support your wrists.

2. To minimize screen glare, position your monitor screen perpendicular to overhead lighting sources and windows. Do not set the monitor in front of or behind a window, or parallel to other sources of light. Tilting the screen forward slightly helps avoid glare. Adjusting the monitor controls to minimize brightness and maximize contrast may also reduce the effects of glare.

3. Adjust your monitor height so that your line of sight in your regular seated position is at or near the top the screen. You should be able to see the whole screen without tilting your head forward or backward, within a 60-degree viewing angle of the normal line of sight. With

smaller monitors, this may require using a display stand under the monitor base. With larger monitors, it may require a longer viewing distance (see Table 10-2).

4. These adjustment steps should be done each time a different person uses the workstation.

Workstation Use

1. When using the keyboard, mouse, or other input devices, keep the wrists flat as much as possible, and do not rotate the hands inward toward the thumbs or outward toward the fingers.

2. Electronic keyboards and input devices do not require as much force to operate as manual typewriters. Type or click lightly on the keyboard or mouse.

3. Document stands can be mounted on the work surface or swing out on an arm to position documents next to the display. These can be helpful in maintaining a healthy posture for using the workstation (head in approximately a straight line with the body).

4. You may find it helpful to take rest breaks of several minutes every one to two hours. During breaks, focus your eyes on objects or scenery at least 30 feet away, stretch, and move around.

Manufacturer's Regulatory Declarations

The following sections provide regulatory information for the Challenge S server.

Electromagnetic Emissions device may not cause harmful interference

This device complies with the Class A limits of 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.

This equipment does not exceed the Class A limits of Canada's Department of Communications Radio Interference Regulations for radio noise emissions.

This device complies with Class A electromagnetic emissions limits of C.I.S.P.R. Publication 22, Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment, Germany's BZT Class A limits for Information Technology Equipment, and with Japan's VCCI Class 1 limits.

この装置は、第一種情報装置（商工業地域において
使用されるべき情報装置）で商工業地域での電波障害
防止を目的とした情報処理装置等電波障害自主規制協
議会（VCCI）基準に適合しております。
　従って、住宅地域またはその隣接した地域で使用す
ると、ラジオ、テレビジョン受信機等に受信障害を与
えることがあります。
　取扱説明書に従って正しい取り扱いをして下さい。
VCCI-1、CISPR-22 Class A

Bescheinigung des Herstellers/Importeurs

Hiermit wird bescheinigt, daß der/die/das
(Gerät, Typ, Bezeichnung) CHALLENGE S CMN B006

in Übereinstimmung mit den Bestimmungen der
(Amtsblattverfügung) Vfg. 1046/1984

funk-entstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes
angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung
der Bestimmungen eingeräumt.eingeräumt.

(Name des Herstellers/Importeurs) Silicon Graphics, Inc.

Caution: Do not modify this product in any way that is not expressly
approved by Silicon Graphics. If you do, you may lose your FCC or other
government agency authority to operate this device.

Manufacturer's Declaration of Conformity

Manufacturer's name and address:	*Silicon Graphics, Inc.* Visual Systems Group 2011 North Shoreline Boulevard Mountain View, California, 94039 U.S.A.
Manufacturer's name and address:	*Silicon Graphics Manufacturing S.A.* Chemin des Rochettes 2 CH-2016 Cortaillod Switzerland
Manufacturer's name and address:	*Nihon Silicon Graphics K.K.* Nissei Shin Mizonoguchi Building 5F 87-1 Hisamoto, Takatsu-ku J-Kawasaki-shi, Kanagawa-ken 213 Japan

declares that the product

Product name:	CHALLENGE S Server
Model number:	CH-S100, R4600 50 MHz processor CH-S150, R4400, 75 MHz processor

conforms to the following specifications:

Safety:	IEC 950, First Edition AM 1: 1990, AM 2: 1991 EN 60950: 1988 AM 1: 1990, AM 2: 1991 UL 1950, First Edition CSA C22.2 No. 950-M89 *Class 1, SELV*	**Type Approvals:**	CSA "Certified" ``NRTL/C'' TÜV "GS License"
EMC:	CISPR 22, Class A FCC Part 15, Class A, Canada DOC, Class A VCCI, Class 1 Germany Vfg 241/1991, Vfg 46/1992, Class A		
Other:	Germany ZH 1/618/10.80		

Supplementary Information:

Silicon Graphics, Inc.

Visual Systems Group

Mountain View, CA
15 April 1994

David Hanttula, Product Compliance Engineering Manager
Visual Systems Group

Radio and Television Interference

The equipment described in this guide generates and uses radio frequency energy. If it is not installed and used in accordance with the instructions in this guide, it can cause radio and television interference.

This equipment has been tested and complies with the limits for a Class A computing device in accordance with the specifications in Part 15 of FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential or office installation. However, there is no guarantee that the interference will not occur in a particular installation.

You can determine whether your system is causing interference by turning it off. If the interference stops, it was probably caused by the server or one of the peripherals. To tell if the interference is caused by one of the peripherals, try disconnecting one peripheral at a time to see if the interference stops. If it does, that peripheral is the cause of the interference.

If your system does cause interference to radio or television reception, try to correct the interference by using one or more of the following suggestions:

Turn the television or radio antenna until the interference stops.

- Move the system to one side or the other of the radio or television.

- Move the system farther away from the radio or television.

- Plug the system into an outlet that is on a different circuit from the radio or television. (That is, make certain the server and the radio or television are on circuits controlled by different circuit breakers or fuses.)

Product Safety

This product has been tested and is listed, certified, or approved to the following product safety standards:

- UL 1950

- CAN/CSA C22.2, No. 950-M89

- IEC 950

- EN 60 950

- Standard for Safety of Information Technology Equipment, including Electrical Business Equipment, Class1, SELV

Ergonomics

This product meets the applicable requirements of ISO 9241, and the European Community Directive 90/270/EEC (Workstation Safety Law) specifications. This product also meets Germany's ZH1/618 requirements for deskside and bookshelf products.

Electrostatic Discharge

Silicon Graphics designs and tests its products to be immune to 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 while you are operating the Challenge S server you keep the top cover in place. The shielded cables that came with the system and its peripherals should be installed correctly, with all screws/thumbscrews fastened securely.

An ESD wrist strap is included with Silicon Graphics option products, such as memory and graphics upgrades. The wrist strap is used when installing these upgrades to prevent the discharge of static electricity, and it should protect your system from ESD damage.

If you do not have a wrist strap, we strongly recommend you obtain one in the event you remove or replace any components in the system.

Shielded Cables

The Challenge S server is FCC-compliant under test conditions that include the use of shielded cables between the server and its peripherals. The server and any peripherals you purchase from Silicon Graphics 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 Silicon Graphics, make sure they are shielded. Telephone cables do not need to be shielded.

The serial-terminal cable supplied with your system uses additional filtering molded into the cable jacket to reduce radio frequency interference. Always use the cable supplied with your system. If your terminal cable becomes damaged, a replacement cable should be obtained from Silicon Graphics.

Limited User Warranty

Silicon Graphics, Inc. warrants this hardware product, option, or accessory against defects in material and workmanship for a period of twelve (12) months after the date of its original retail purchase (the "Warranty Period"). If you discover a defect in the Product during the Warranty Period, Silicon Graphics will, at its sole option, repair or replace the Product at no charge to you, provided that you (i) return the product (transportation charges prepaid) during the Warranty Period to the authorized Silicon Graphics dealer (or Silicon Graphics service center, if purchased directly from Silicon Graphics) from whom it was purchased, or return it to another authorized Silicon Graphics dealer in the country of its original purchase; and (ii) include a copy of a bill of sale bearing the appropriate Silicon Graphics serial number as proof of the original date and location of the Product's purchase. This warranty applies only to hardware products manufactured by or for Silicon Graphics and distributed under Silicon Graphics' trademarks, and does not apply to any (i) Silicon Graphics software accompanying the Product, which is licensed under a separate statement included with the software; (ii) Product that has been damaged by abuse, accident, misuse, misapplication or improper installation; and (iii) any Product that has been modified or has had its serial number removed or defaced.

The warranties and remedies specified above are exclusive, and are in lieu of, and Silicon Graphics disclaims, all others, express, implied, oral or otherwise, including, without limitation, any warranty of merchantability or fitness for a particular purpose. No oral or written information or advice given by Silicon Graphics, or its dealers or distributors, will create a warranty or increase the scope of this warranty, and you may not rely on such information or advice. Some states do not allow the exclusion of implied warranties, so the exclusion above may not apply to you. Any applicable implied warranties are limited in duration to the period of time specified above. This warranty gives you specific legal rights, and you may have other rights that vary from state to state. Silicon Graphics is not liable for any special, consequential, incidental or indirect damages of any kind (including without limitation loss of profits, data or goodwill, or property damage), whether or not Silicon Graphics has been advised of the possibility of such loss, however caused and on any theory of liability, arising out of the use of the product, or resulting from a breach of this warranty. These limitations shall apply notwithstanding the failure of the essential purpose of any limited remedy. Silicon Graphics' liability for actual damages for any cause whatsoever, regardless of the form of action, will be limited to the net

amount paid by you for the purchase of the Product that caused the damages or is directly related to the cause of action. Some states do not allow the limitation or exclusion of liability for incidental or consequential damages, so this limitation may not apply to you.

Silicon Graphics, Inc.
2011 N. Shoreline Blvd.
Mountain View, CA 94039-7311

For Product and Technical Support, call your dealer, or call Silicon Graphics at (800) 800-4744 in the USA.

Cable Pinout Assignments

This appendix provides cable pinout assignments for the external ports on the Challenge S server.

Cable Pinout Assignments

This appendix contains cable pinout information for the following ports located on the back of the Indy workstation:

- serial port

- parallel port

- Ethernet 10-BASE T port

- ISDN (Integrated Services Digital Network) port

- Ethernet AUI (Access Unit Interface) port

- keyboard port

- mouse port

- SCSI port (Small Computer System Interface) port

Note: The figures in this chapter show the connector pin assignments, not the cable pin assignments.

Serial Ports
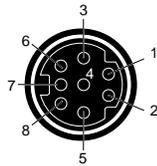
Figure A-1   MINIDIN8 Serial Port (RS-232) Pinout Numbering

Table A-1 shows cable pinout assignments for the two serial ports.

Table A-1   4D-Compatible Pin Assignments (RS-232)

Pin	Assignment	Description
1	DTR	Data Terminal Ready
2	CTS	Clear To Send
3	TD	Transmit Data
4	SG	Signal Ground
5	RD	Receive Data
6	RTS	Request To Send
7	DCD	Data Carrier Detect
8	SG	Signal Ground

Parallel Port
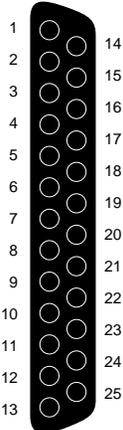
Figure A-2   Parallel Port Pinout Numbering

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

Table A-2   Parallel Port (25-Pin DSUB Connector) Pin Assignments

Pin	Assignment
1	STROBE
2	DATA(0)
3	DATA(1)
4	DATA(2)
5	DATA(3)
6	DATA(4)
7	DATA(5)
8	DATA(6)
9	DATA(7)
10	ACK

Table A-2 (continued)   Parallel Port (25-Pin DSUB Connector) Pin Assignments

Pin	Assignment
11	BUSY
12	PE (Paper End)
13	SELECT
14	AUTOFEED
15	ERROR/FAULT
16	INIT/RESET
17	SELECT-IN (Direction)
18	GROUND
19	GROUND
20	GROUND
21	GROUND
22	GROUND
23	GROUND
24	GROUND
25	GROUND

Ethernet 10-BASE T Port
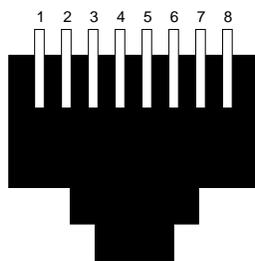
Figure A-3   Ethernet 10-BASE T Pinout Numbering

Table A-3 shows the cable pinout assignments for the Ethernet 10-BASE T port.

Table A-3   Ethernet 10-BASE T Port Pin Assignments

Pin	Assignment
1	TRANSMIT+
2	TRANSMIT–
3	RECEIVE+
4	(Reserved)
5	(Reserved)
6	RECEIVE–
7	(Reserved)
8	(Reserved)

ISDN Port
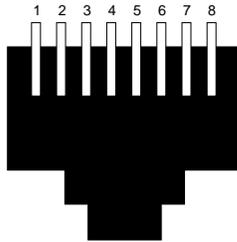
Figure A-4   ISDN Pinout Numbering

Table A-4 shows the cable pinout assignments for the ISDN port.

Table A-4   ISDN Port Pin Assignments

Pin	Assignment
1	(Reserved)
2	(Reserved)
3	TRANSMIT+
4	RECEIVE+
5	RECEIVE-
6	TRANSMIT-
7	(Reserved)
8	(Reserved)

Ethernet AUI Port
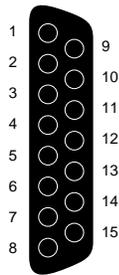
Figure A-5   Ethernet AUI Pinout Numbering

Table A-5 shows the cable pinout assignments for the Ethernet AUI port.

Table A-5   Ethernet AUI Port (Thicknet) Pin Assignments

Pin	Assignment
1	GROUND
2	COLLISION+
3	TRANSMIT+
4	GROUND
5	RECEIVE+
6	GROUND
7	(Reserved)
8	GROUND
9	COLLISION-
10	TRANSMIT-
11	GROUND
12	RECEIVE-
13	+12V
14	GROUND
15	(Reserved)

50-pin SCSI Port
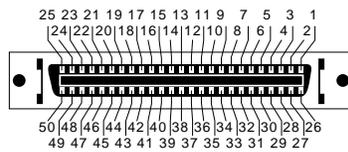
Figure A-6   50-Pin SCSI (High-Density) Pinout Numbering

Table A-6 shows the cable pinout assignments for the 50-pin, high-density, single-ended SCSI port.

Note: A plus sign (+) preceding a signal name means the signal is active high. A minus sign means the signal is active low.

Table A-6   50-Pin, High-density, Single-Ended SCSI Port Pin Assignments

Pin	Assignment
1	GROUND
2	GROUND
3	GROUND
4	GROUND
5	GROUND
6	GROUND
7	GROUND
8	GROUND
9	GROUND
10	GROUND
11	GROUND
12	(Reserved)
13	Open
14	(Reserved)
15	GROUND
16	GROUND
17	GROUND
18	GROUND
19	GROUND

Table A-6 (continued)   50-Pin, High-density, Single-Ended SCSI Port Pin

Pin	Assignment
20	GROUND
21	GROUND
22	GROUND
23	GROUND
24	GROUND
25	GROUND
26	—DB(0)
27	—DB(1)
28	—DB(2)
29	—DB(3)
30	—DB(4)
31	—DB(5)
32	—DB(6)
33	—DB(7)
34	—DB(P)
35	GROUND
36	GROUND
37	(Reserved)
38	TERMPWR
39	(Reserved)
40	GROUND
41	—ATN
42	GROUND
43	—BSY

Table A-6 (continued)   50-Pin, High-density, Single-Ended SCSI Port Pin

Pin	Assignment
44	—ACK
45	—RST
46	—MSG
47	—SEL
48	—C/D
49	—REQ
50	—I/O

68-pin SCSI Port
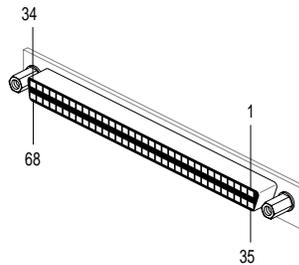
Figure A-7   68-Pin SCSI (High-Density) Pinout Numbering

Table A-7 shows the port pin assignments for the 68-pin, high-density SCSI connector.

Note: A plus sign (+) preceding a signal name means the signal is active high. A minus sign means the signal is active low.

Table A-7   68-Pin, High-density, Differential SCSI Port Pin Assignments

Pin	Assignment
1	+DB(12)
2	+DB(13)
3	+DB(14)
4	+DB(15)
5	+DB(P1)
6	GROUND
7	+DB(0)
8	+DB(1)
9	+DB(2)
10	+DB(3)

Table A-7 (continued)   68-Pin, High-density, Differential SCSI Port Pin

Pin	Assignment
11	+DB(4)
12	+DB(5)
13	+DB(6)
14	+DB(7)
15	+DB(P)
16	DIFFSENS
17	TERMPWR
18	TERMPWR
19	(Reserved)
20	+ATN
21	GROUND
22	+BSY
23	+ACK
24	+RST
25	+MSG
26	+SEL
27	+C/D
28	+REQ
29	+I/O
30	GROUND
31	+DB(8)
32	+DB(9)
33	+DB(10)
34	+DB(11)

Table A-7 (continued)   68-Pin, High-density, Differential SCSI Port Pin

Pin	Assignment
35	—DB(12)
36	—DB(13)
37	—DB(14)
38	—DB(15)
39	—DB(P1)
40	GROUND
41	—DB(0)
42	—DB(1)
43	—DB(2)
44	—DB(3)
45	—DB(4)
46	—DB(5)
47	—DB(6)
48	—DB(7)
49	—DB(P)
50	GROUND
51	TERMPWR
52	TERMPWR
53	(Reserved)
54	—ATN
55	GROUND
56	—BSY
57	—ACK
58	—RST

Table A-7 (continued)   68-Pin, High-density, Differential SCSI Port Pin

Pin	Assignment
59	−MSG
60	−SEL
61	−C/D
62	−REQ
63	−I/O
64	GND
65	−DB(8)
66	−DB(9)
67	−DB(10)
68	−DB(11)

Serial Cables

This appendix provides information on which serial cables you can use with the serial ports on the Challenge S server.

Serial Cables

This appendix contains information on using serial cables with the Challenge S server.

Printer/Character (ASCII) Terminal Serial Cable

The serial cable shipped with the Challenge S server can be used to connect a printer or character (ASCII) terminal. You can also use a 3-wired standard Macintosh® (Plus, SE, or II computer) to Imagewriter™ I cable. (Note that the Imagewriter II cable does not work). The cable connector pin assignments for this cable are shown in Table B-1.

Table B-1   Cable Connector Pin Assignments For Printer/Character (ASCII) Terminal Serial Cable

Signal Description	Pin Number DIN-8 Connector (Male)	Pin Number DB-25 Connector (Male)
	1	N/C
	2	N/C
TXD	3	3
GND	4	7
RXD	5	2
	6	N/C
	7	N/C
GND	8	7

Modem Cable

Use a full-handshake serial cable, which includes request-to-send (RTS) and clear-to-send (CTS) connections, for a modem with RTS/CTS flow control. You can use this cable for all serial devices except terminals and serial printers (any application that doesn't need RTS flow control). For example, you can use this cable for a 3-wire application. This cable can be used with a null modem adapter for serial printers and dumb terminals. You can purchase the full-handshake serial cable from Silicon Graphics or your local service provider.

Note: You cannot use a standard Macintosh serial cable. The Macintosh cable does not have the correct pinout for full flow control.

The cable connector pin assignments for this cable are shown in Table B-2.

Table B-2   Cable Connector Pin Assignments For A Modem Cable

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

Serial Devices Using a Silicon Graphics Adapter Cable

To use the devices below, you'll need a serial adapter cable supplied by Silicon Graphics.

- dial and button box
- dials box
- digitizer tablet
- Spaceball™
- optical mouse

The Silicon Graphics adapter cable is used to convert the serial cable that came with the device to a Silicon Graphics DIN-8 serial cable connector. This cable then connects to the serial connector on the back of the Indy chassis. The cable connector pinout assignments are shown in Table B-3.

Table B-3   Pinout Assignments for the Silicon Graphics Adapter Cable

Signal Description	Pin Number DIN-8 Connector (Male)	Pin Number DB-9 Connector (Female)
DTR	1	9
CTS	2	5
TXD	3	2
GND	4	7
RXD	5	3
RTS	6	4
DCD	7	8
GND	8	7
	N/C	6
	N/C	1

Serial Devices Using a PC Adapter Cable

To use a serial device designed for personal computers using a DB-9 connector, you'll need a PC adapter cable. To obtain the cable, contact your local service provider. This adapter cable is used to convert from the PC's DB-9 pinout to the Indy workstation's DIN-8 pinout.

The cable connector pinout assignments for the PC adapter cable are shown in Table B-4.

Table B-4   Cable Connector Pin Assignments for the PC Adapter Cable

Signal description	Pin Number DIN-8 (Male)	Pin Number DB-9 (Male)
DTR	1	4
CTS	2	8
TXD	3	3
GND	4	5
RXD	5	2
RTS	6	7
DCD	7	1
DSR	8	6
	N/C	9

Floptical Drive Jumper Settings

This appenidix provides information on jumper settings for the floptical drive supplied by Silicon Graphics, Inc. for use in the Challenge S server.

Floptical Drive Jumper Settings

There are seven sets of pins, E1 through E7, on the jumper block, as shown in Figure C-1. Pins E1, E2, and E3 define the SCSI address.

The floptical drive supplied by Silicon Graphics is preconfigured to SCSI address 2. There should be a pin on jumper 2, and none on jumpers 1 and 3.

Note: There is a jumper installed on E4; *do not remove it.*

If the jumpers on the floptical drive do not match Figure C-1, use a pair of needle-nose pliers to remove and install them correctly. To remove the drive, go to "Replacing the Internal Floptical Drive or Second Hard Disk Drive".
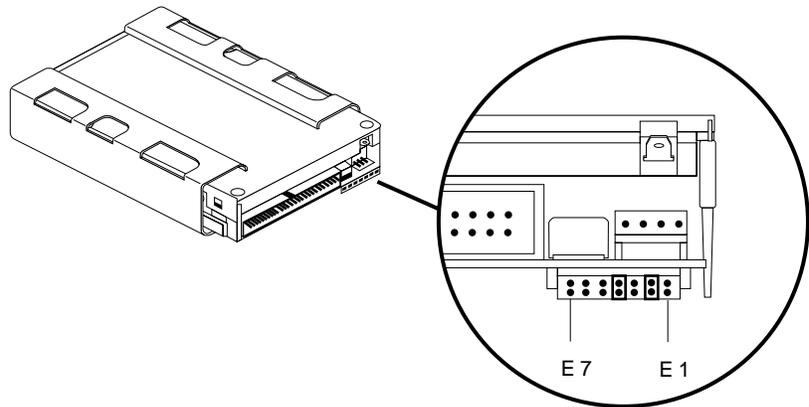
Figure C-1   Floptical Drive Set to SCSI Address 2

Supported Terminals

This appendix provides a list of some common serial (character-based) terminals that are supported for use with the Challenge S..

Supported Terminals

The *terminfo* terminal description database provides support for over 1600 variations of character-based terminals from a wide-variety of manufacturers. This appendix lists a few of the terminals supported under IRIX version 5.3. For a complete list of supported terminals, examine the subdirectories of */usr/lib/terminfo*. Also, see the *terminfo*(4) reference page for more information on the *terminfo* database.

Table D-1 shows some supported terminals, plus the shorthand names of the terminals. When prompted for a terminal type at a TERM= prompt, enter the shorthand name in the far right column.

Note: This list does not constitute an endorsement of any particular terminal or manufacturer.

Table D-1   Brief List of Supported Terminals

Terminal Name	Vendor	Shorthand Name
Adds Viewpoint	Adds	viewpoint
Adm3a	Lear-Siegler	adm3a
AT&T 4410/5410	AT&T	4410
HP 2621	Hewlett-Packard	hp2621
IBM 3101-10	IBM	ibm
Qume Sprint 11	Qume	qume

Table D-1 (continued)   Brief List of Supported Terminals

Terminal Name	Vendor	Shorthand Name
TVI 912	Televideo	tvi912
Visual 50	Visual	vi50
VT-100	DEC	vt100
Wyse 60	Wyse Corporation	wy60

Glossary

account

See login account.

address dial

See SCSI address dial.

administrator

The person who can use the most privileged account, root. This person must have a personal login account for daily use, but when there are serious system problems to correct, the person logs in to the root account to change system information.

The administrator has all the capabilities of a privileged user, plus the capability to change information in the root account (such as the password) and to log in to an IRIX shell as root. Because there is only one root account, there is only one administrator per system. The *root* entry in */etc/passwd* on a particular system includes the name of the system's administrator so other users know who to contact for help.

See also network administrator.

back up

To copy a certain set of files and directories from your hard disk to a tape or other media.

backup tape

A tape that contains a copy of a set of files and directories that are on your hard disk. A full backup tape contains a copy of all files and directories, including IRIX operating system, that are on your hard disk.

baud rate

A term used for the speed (calculated as bits per second) at which the computer sends information to a serial device, such as a modem or terminal.

boot

To start up the system by turning on the workstation and monitor; the system is fully booted when you see the console login prompt.

CD-ROM (CD)

A flat metallic disk that contains information that you can view and copy onto your own hard disk; you cannot change or add to the information on the CD-ROM. CD-ROM is short for "compact disc: read-only memory".

centralized network

A network where a central server controls services and information; the server is maintained by one or more individuals called network administrators. On a centralized network that uses NIS, this server is called the NIS master, and all other systems on the network are called NIS clients. *See also* network administrator, NIS, NIS client, NIS domain, and NIS master.

configuration file

A system file that you change to customize the way your system behaves. Such files are sometimes referred to as customization files.

connector

Hardware at the end of a cable that lets you fasten the cable to an outlet, port, or other connector.

console

The port (Port **1**, or */dev/ttyd1*) on which system messages are displayed.

CPU module

The printed circuit board within the system chassis on which the central processing unit (CPU) is mounted. The CPU module is detachable from the motherboard. See Chapter 9 for information on locating, removing, and replacing the CPU module.

current working directory

The directory within the file system in which you are currently located when you are working in a shell window.

cursor

A special character that indicates where on the screen input appears when entered from the keyboard. On character-based (serial) terminals, the cursor is usually either a rectangular block or an underscore.

DAT (Digital Audio Tape)

A magnetic tape from which you can read and to which you can copy audio and digital information.

default printer

The printer to which the system directs a print request if you do not specify a printer when you make the request. You set the default printer using the *lpadmin*(1M) command.

default subsystems

Portions of a product that are installed automatically if you do not customize a product installation.

defaults

A set of behaviors that Silicon Graphics specifies on every system. You can later change these specifications, which range from the list of user accounts on the system to what type of drive you want to use to install new software.

diagnostics

A series of tests that check all hardware components of your system.

directory

A special file in the file system that contains other files and directories.

disk resource

Any disk (hard, CD-ROM, floppy, or floptical) that you can access either because it is physically attached to the server with a cable, or it is available over the network using NFS. *See also* NFS.

disk use

The percentage of space on a disk that contains information.

drive

A hardware device that lets you access information on various forms of media, such as hard, floppy, and CD-ROM disks, and magnetic tapes.

drive address

See SCSI address.

external device

Any piece of hardware that is attached to the system with a cable.

export

To use NFS software to make all or part of your file system available to other users and systems on the network.

female connector

A connector that has indentations or holes into which you plug a male connector. An example of a female connector is an electrical wall outlet that accepts an electrical plug.

field

An area on the screen in which you can type text.

file

A container in which you store information such as text, programs, or images you create using an application.

file system

A hierarchy of directories and files. Directories contain other directories and files; files cannot contain directories. The root (/) directory is at the top of the hierarchy.

floptical disk drive

A disk drive that combines magnetic recording methods with an optical servo-mechanism that allows large amounts of information to be stored in a small amount of space.

GIO64 bus

The main system bus that connects the CPU, memory, I/O, and GIO expansion slots.

GIO option boards

GIO standards for *graphics I/O*, but the GIO bus supports a variety of option boards such as network and fast SCSI-2. GIO option boards connect to the GIO32-bis expansion slots on the IOPLUS or GIO Slot Extender boards in the Challenge S server.

gracefully halt

Also referred to as "graceful shutdown." The process of stopping the operating system (IRIX), including closing open files and halting processes, before system power is turned off. This can be done through software or by turning off the system using the power button on the front panel. See the *IRIX Advanced Site and Server Administration Guide* for complete information about halting the system.

grounded electrical outlet

An electrical wall outlet that accepts a plug that has a grounding prong. In the USA, all three-pronged outlets are grounded.

group ID

A number that uniquely identifies a group of users on the system. Using group IDs allows specific groups of users to share files among themselves, but maintain privacy from other users on the system and on the network.

handshake

The protocol that controls the flow of information between a workstation and a printer or any other peripheral. A hardware handshake uses only cable wires and pins to control the flow. A software handshake (also called xon-xoff flow control) uses a combination of pins, wires, and software.

home directory

The directory into which IRIX places you each time you log in. It is specified in your login account; you own this directory and, typically, all its contents.

host

Any system connected to the network.

hostname

The name that uniquely identifies each host (system) on the network.

human factors guidelines

A set of standards and suggestions for making your working environment more comfortable and healthy.

icon

A small picture used to label a part of the system, such as a connector on the back of the system.

internal drive

A drive that fits inside the system chassis and connects to an internal port; it is never connected with a cable to a visible external port.

IP address

The Internet Protocol number that uniquely identifies each host (system) on the network.

IRIS

A workstation manufactured by Silicon Graphics, Inc.

IRIX

The Silicon Graphics version of the UNIX operating system. *See also* system software.

ISDN (Integrated Services Digital Network) port

The Challenge S server has a single ISDN basic rate interface that supports Point-to-Point Protocol (PPP). PPP enables TCP/IP networking across ISDN B-channels.

Kb (Kilobit)

A standard unit for measuring data transfer rates. One kilobit is 1024 bits. *See also* KB (Kilobyte)

KB (Kilobyte)

A standard unit for measuring the information storage capacity of disks and memory (RAM and ROM); 1024 bytes make one kilobyte.

LED (Light Emitting Diode)

A light on a piece of hardware that indicates status or error conditions.

log in

To give the system your login name so you can start a session on the server or another host.

log out

To end a session on the server or another host.

login account

A database of information about each user that, at the minimum, consists of login name, user ID, and a home directory.

login name

A name that uniquely identifies a user to the system.

login screen

The screen that you see after powering on the system, before you can access files and directories. The default login screen usually displays the name of the system and prompts for a login account name.

MB (Megabyte)

A standard unit for measuring the information storage capacity of disks and memory (RAM and ROM); 1024 kilobytes make one megabyte.

megatransfers

The number of million operations per bus cycle. An operation is either 8- or 16-bit in size. Megatransfers are based on a bus's burst data rate.

male connector

A connector that has raised edges, pins, or other protruding parts that you plug into a female connector. An example of a male connector is an electrical plug that you plug into a wall outlet.

man page

An online document that describes how to use a particular IRIX command. Also known as a reference page.

monitor

A hardware device that displays the images, windows, and text with which you interact to use a system. It is also called a video display terminal (VDT).

mount point

The directory on your workstation from which you access information that is stored on a local or remote disk resource.

mount

To make a file system that is stored on a local or remote disk resource accessible from a specific directory on your workstation.

network

A group of computers and other devices (such as printers) that can communicate with each other electronically to transfer and share information.

network administrator

The individual(s) responsible for setting up, maintaining, and troubleshooting the network, and for supplying setup information to system administrators of each system.

NFS (Network File System)

A networking software option that lets you access files and directories that reside on the disks of other workstations as if they resided on a local disk in your own workstation.

option drive

Any internal drive other than the system disk. Option drives include floppy disk drives, floptical disk drives, secondary hard disk drives, or DAT drives.

PROM monitor

The interface that you use to communicate with the system after it is powered up, but before it is booted up and running IRIX.

parallel device

Any hardware device that requires a parallel cable connection to communicate with the workstation. A parallel interface transfers bits of information down a number of wires simultaneously.

parallel port

An connector on the workstation to which you attach external parallel devices. A parallel interface transfers bits of information down a number of wires simultaneously. Compare with serial port.

password

A combination of letters and/or numbers that only you know; it is an optional element of your login account. If you specify a password for your account, you must type it after your login name before the system will allow you to access files and directories.

pathname

The list of directories that leads you from the root (/) directory to a specific file or directory in the file system.

peripheral

A hardware device, such as a tape drive, that adds more functionality to the basic workstation. *See also* external devices and internal drives.

port

A connector on the workstation to which you attach cable connectors.

power-on diagnostics

A series of tests that automatically check hardware components of your system each time you turn it on.

power cable

The cable that connects the workstation to a grounded electrical outlet.

power down

To turn off the power switches on the system chassis.

power supply

The piece of hardware within the chassis that transforms wall current to the appropriate levels for the system hardware. It also contains the power switch, reset button, and fan.

power up

To turn on the power switch on the system chassis and the monitor.

prompt

A character or word that the system displays in an IRIX shell that indicates the system is ready to accept commands. The default prompt for regular user accounts is %; the default prompt for the root account is #.

quit

To stop running an application.

remote drive, disk, file system, or printer

A hardware device or the information or media it contains that you can access across the network. It is not physically connected to your workstation. The opposite of local workstation or server.

reset button

A physical button on the server that you press to immediately halt all system processes, flush memory, and reboot the system. You should never press this button while IRIX is running, unless all attempts to shut down the system using software have failed. *See also* shut down.

restore (files)

To copy files that once resided on your hard disk from another disk or a tape back onto your hard disk.

root account

The standard IRIX login account reserved for use by the system administrator. This account's home directory is the root (/) directory of the filesystem; the user of the root account has full access to the entire filesystem (that is, can change and delete any file or directory). The user of this account is sometimes referred to as the superuser.

root (/) directory

The directory at the top of the file system hierarchy.

SCSI (Small Computer System Interface)

Pronounced "scuzzy." SCSI is a high speed input/output specification originally developed for small computers, but now used on a variety of systems.

SCSI address

A number from one to fifteen that uniquely identifies a SCSI device to a system. No two SCSI devices that are physically connected to the same SCSI channel can have the same SCSI address.

SCSI address dial

A small plastic dial connected to every external SCSI device supplied by Silicon Graphics, Inc. You click on its small buttons to select a SCSI address for a new SCSI device.

SCSI bus line

The combined length of all internal and external SCSI cables in a system.

SCSI channel

Part of the addressing scheme used to access SCSI devices. The Challenge S server contains three SCSI channels: 0, 4, and 5. Each SCSI device on a SCSI channel is assigned a unique address (sometimes called a unit number). *See also* SCSI address.

SCSI cable

A cable that connects a SCSI device to a SCSI port on a workstation.

SCSI device

A hardware device that uses the Small Computer System Interface (SCSI) protocol to communicate with the system. Hard disk, floppy disk, floptical disk, CD-ROM, and tape drives are all SCSI devices.

SCSI terminator

A cap that you plug into any open SCSI port on a SCSI bus line. SCSI devices on a SCSI bus line will not work properly unless all SCSI ports on that bus line are occupied by either a cable or terminator.

screen

The portion of a monitor or terminal that displays information.

serial device

Any hardware device that requires a serial cable connection to communicate with the workstation.

serial port

An outlet on the workstation to which you connect external serial devices. Serial ports send information one bit at a time. Compare with parallel port.

server

A system that other systems on the network access to use its disk space, software, or services.

shell

A process that controls other processes on the IRIX system. You type commands to the Challenge S server at a shell prompt, either on a character-based terminal or in a shell window on a remote graphics workstation.

shielded cable

A cable with a protective covering that reduces the possibility of interference with radio, television, and other devices.

shut down

To properly close all files, log out, and bring the workstation to a state where you can safely power it down.

SIMM (Single Inline Memory Module)

A small printed circuit board with several chips that contain random-access memory (RAM).

SIMM socket

A long, thin, female connector located on the system motherboard into which you insert a SIMM.

software option

Any software product that you buy from Silicon Graphics other than the standard system software that comes on your system disk.

stand-alone system

A system that is not connected to a network.

static electricity

Whenever your body comes in physical contact with metal parts (including printed circuit boards) of computer equipment there is the potential for you to feel an electrical shock (electro-static discharge or ESD) which could damage the equipment. To prevent this you must always wear a wrist strap when working with internal parts of a workstation.

subsystem

A portion of a software product. Each product consists of several subsystems; some are required and some are optional.

superuser

An alternate name for the user of the root login account. *See also* system administrator.

system

All the hardware and software that make up the workstation.

system administration

The tasks associated with setting up, maintaining, and troubleshooting a networked or stand-alone system.

system crash

When the IRIX operating system fails and the system will not accept any input (other than pressing the reset button or the power button).

system disk

The physical disk that contains the standard IRIX operating system software.

system software

The standard IRIX operating system software and Silicon Graphics tools. They are provided on the system disk and on the tape or CD-ROM that you use in the event of a system crash.

TCP/IP

Stands for Transmission Control Protocol/Internet Protocol. A set of networking protocols for Local Area Networks (LANs) and Wide Area Networks (WANs).

thumbscrew

The ridged knob attached to a screw in a cable connector. You turn it to secure the connector to an outlet.

upgrade (hardware)

Hardware that you add to the system to increase performance or capabilities.

unmount

To make a file system that is accessible from a specific directory on the server temporarily unaccessible.

user ID

A number that uniquely identifies a user to the system. *See also* group ID.

workstation

A system that contains a CPU, keyboard, mouse, and graphics hardware. A workstation may have a system disk and option disks, or it may be diskless (relying entirely on a server for data storage).

wrist strap

A coiled cable with a loop for your wrist at one end and an alligator clip at the other, used for grounding the user. Whenever you work on the internal components of the system you should fasten the clip to a metal part of the chassis and place the loop around your wrist. This helps avoid electrical shocks to yourself and the components. *See also* static electricity.

Index

Part Request Form

Company Name
Street Address
City/State/Zip Code
Contact
Phone
Fax
Purchase Order Number

Call ID #	Model Type	Warranty	System Serial # (as found on back panel)
		Y	N	

System Configuration Information:

System S/W Version	Type of failure:	Peripherals:	Voltage:	Disk (MB/GB)	Memory (MB):
_____	☐ Solid ☐ Intermittent	☐ DAT ☐ CD-ROM ☐ Floptical ☐ Other_____	☐ 110 ☐ 220	_____	_____

Problem description (please describe symptoms, error messages and actions taken):

_____
_____
_____
_____
_____
_____ Date _____

Failed part information:

Part Number: Revision: Date:

☐☐☐–☐☐☐☐–☐☐☐   ☐   ___/___/___

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☐☐☐☐☐☐   ☐   ___/___/___   For fast service, please complete this form in its entirety!

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- Technical errors

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