

# SGI™ 1400 Server Family User's Guide

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## About This Guide

This guide provides you with information on using and administering your SGI 1400 server.

**Note:** Qualified and trained service personnel should use the *SGI 1400 Server Family Maintenance and Upgrades Guide* to perform procedures that require opening the system and adding, removing, or replacing internal components.

The following topics are covered in this manual:

- Chapter 1, “Chassis Description,” describes the server chassis and its key components.
- Chapter 2, “System Processor Board Description,” lists the major features of the server system’s processor board (also called the baseboard).
- Chapter 3, “Configuration Software and Utilities,” describes the Power-on Self Test (POST) and system configuration utilities.
- Chapter 4, “Solving Problems,” helps you identify and solve problems that might occur while you are using the server system.
- Chapter 5, “Installing or Replacing Drives and Power Supplies,” describes the server’s drive options and removal or replacement procedures, plus information on system power supplies and how to replace them.
- Appendix A lists environmental and regulatory information for the server.
- Appendix B describes the procedures for mounting the server in a 19-inch equipment rack.

See the *SGI 1400 Server Family Quick Start Guide* for overview information on setting up your server and getting started.





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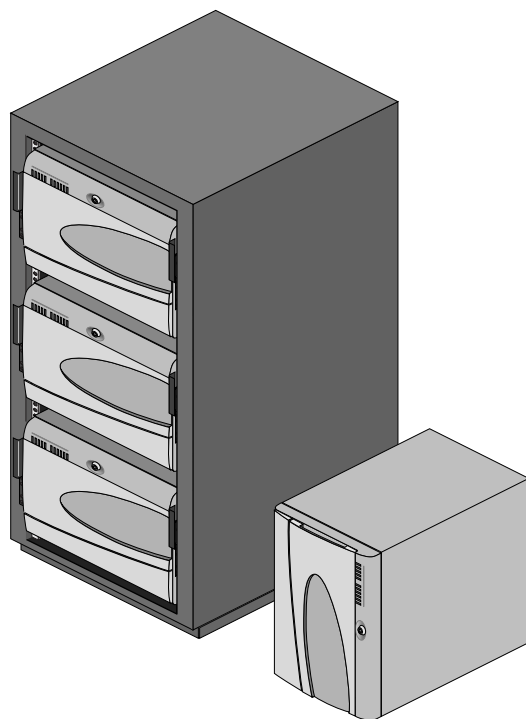
# Chassis Description

The SGI 1400 server is shipped as either an upright (pedestal mode) unit, or it may be ready for rack mounting (rack mode). Figure 1-1 shows examples of these configurations. Table 1-1 provides the basic physical requirements for the server. Instructions for mounting the server in a rack, are included in Appendix B. Note that the rack installation should be performed by a technically trained or certified installer.

The SGI 1400 family of servers includes products such as the SGI 1400M (which uses a Microsoft Windows operating system), and the SGI 1400L which uses a Linux operating system. While its operating system (OS) gives the server a particular functional interface, the basic hardware functions, diagnostics, and configuration are the same within the SGI 1400 server family. The generic terms “server” and “SGI 1400 server” are used throughout this document, and apply to all systems in the SGI 1400 family of servers.

**Table 1-1** SGI 1400 Server Physical Specifications

Specification	Pedestal Mode	Rack Mode
Height	48.26 cm (19 inches)	7u
Width	31.12 cm (12.25 inches)	19-inch rack
Depth	63.5 cm (25 inches)	25 inches
Weight	38.25 kg (85 lbs) minimum configuration 45 kg (100 lbs) maximum configuration	38.25 kg (85 lbs) minimum 45 kg (100 lbs) maximum
Required front clearance	25.4 cm (10 inches) (inlet airflow <35 °C / 95 °F)	25.4 cm (10 inches) (inlet airflow <35 °C / 95 °F)
Required rear clearance	20.3 cm (8 inches) (no airflow restriction)	20.3 cm (8 inches) (no airflow restriction)
Required side clearance	0.0 cm/inches (additional side clearance required for service)	N/A (must be removed for side access)



**Figure 1-1** Example Rack with Three Servers and Pedestal Server

## Chassis Feature Summary

The system's galvanized metal chassis minimizes EMI and radio frequency interference (RFI). The removable access cover is attached to the chassis with three screws. A front subchassis and an electronics bay (at the rear of the main chassis) both rotate outward and can be removed entirely to provide access to internal components. Only trained maintenance personnel should work on the system's internal components.

The removable front panel provides access to the 3.5- and 5.25-inch peripheral bays in the front of the chassis. Table 1-2 lists the main features of the server chassis.

**Table 1-2** Chassis Features Summary

<b>Feature</b>	<b>Description</b>
Front accessible drives	Installed: 1.44 MB, 3.5-inch diskette drive, accessible from front subchassis. CDROM drive. Expansion capacity: Two 5.25-inch-wide bays that are externally accessible, designed to hold half-height standard removable media devices. The externally accessible hard-drive bay holds up to six 1-inch drives.
Expansion slots and covers	Up to eight slot covers can be used; every slot opening that does not have an optional PCI (add-in) board installed must have a slot cover installed.
Baseboard	Form-factor, 16 × 13 inches, ATX I/O.
Power supplies	Three 400-watt power supplies with integrated cooling fans and detachable AC power cords.
Cooling	A total of 11 internal fans provide cooling and airflow: six system fans inside the chassis, one fan on each of the three power supplies, and two fans for cooling hard drives.

## Chassis Front Controls and Indicators

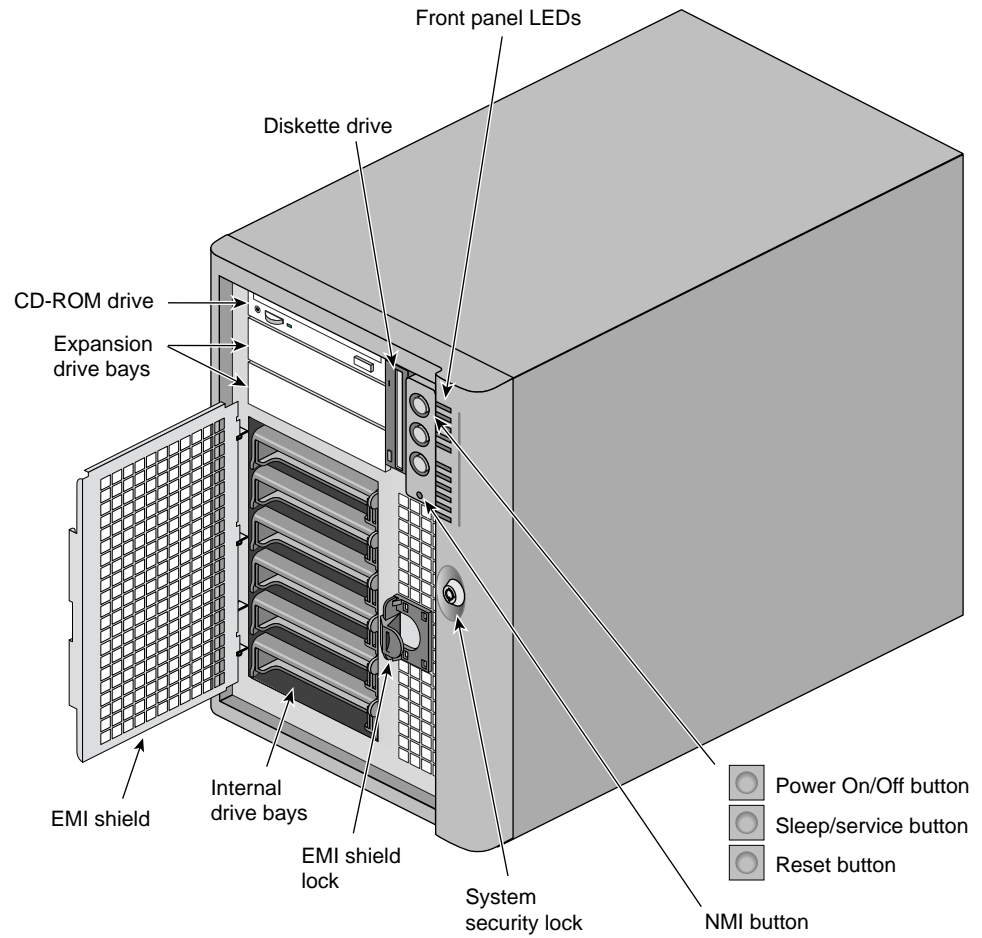
Figure 1-2 shows the server's front controls, option bays, and drives.

Standard front controls include the following:

- Power On/Off button (holding down this button for more than four seconds causes a power-button override to the PIIX4E when you release the button)
- Sleep/Service button (holding down this button for *less than* four seconds enters sleep mode, which requires an ACPI-compliant operating system; holding it down for *more than* four seconds enters service mode, which powers down the electronics bay but leaves hot-swap and peripheral bays running)
- Reset button
- Front panel LEDs (Top to bottom: top five are power on, disk bay power on, hard-drive activity, fan failure, power supply failure; bottom six are hard-drive failure LEDs, labeled 0-5)
- NMI button

Additional front component features include:

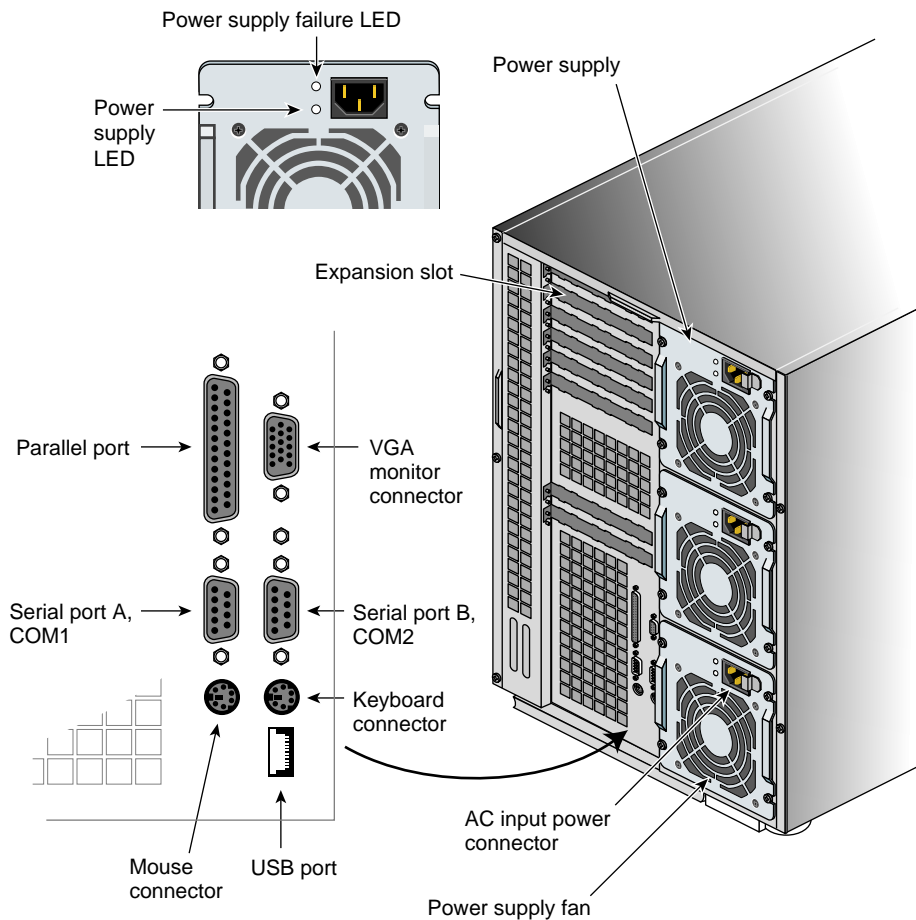
- A standard Diskette drive
- A standard CD-ROM drive
- System security latch
- EMI shield lock
- Six internal hard drive bays
- Two removable media drive bays



**Figure 1-2** Front Controls and Indicators

## Chassis Back Controls and Features

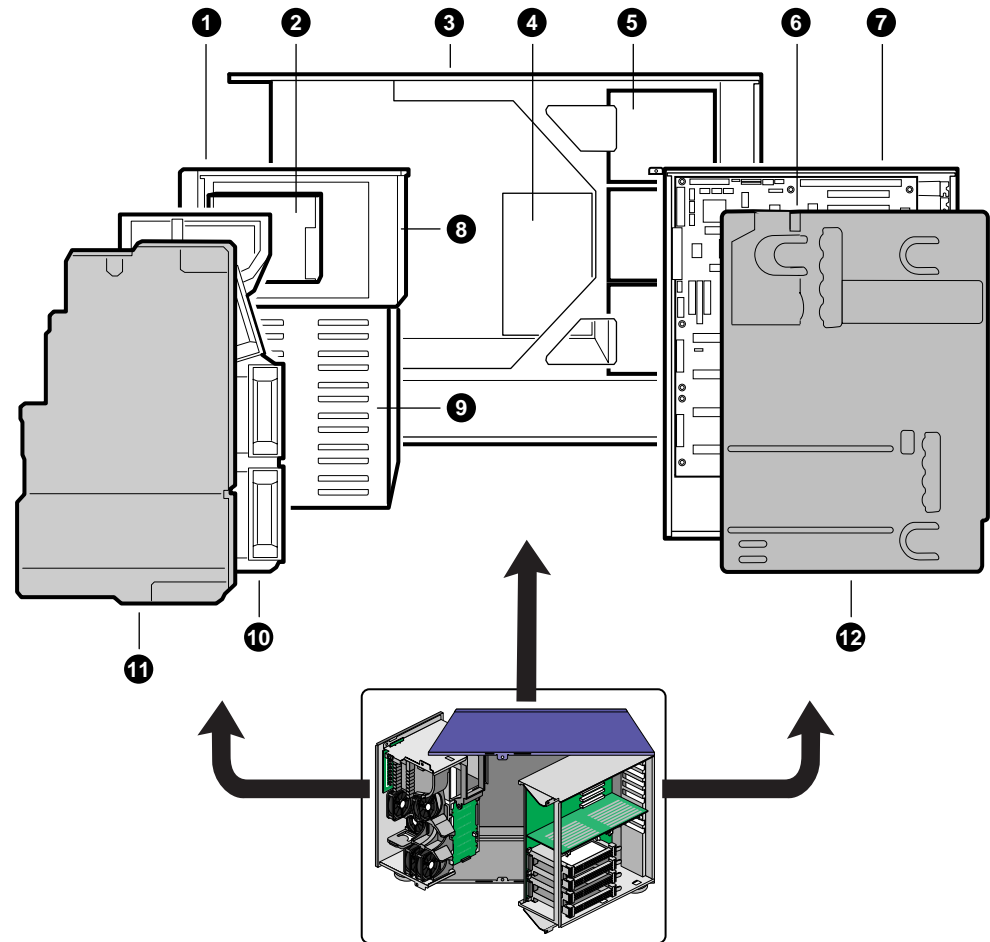
Figure 1-3 shows the controls, connectors, and features on the rear of the server.



**Figure 1-3** Back Controls and Indicators

## Chassis Side View

Figure 1-4 shows a side view of the chassis and locations of key internal components.



**Figure 1-4** Chassis Side View

The components shown in Figure 1-4 are listed as follows:

1. The front swing-out subchassis
2. Diskette drive
3. Main chassis
4. Power backplane
5. Power supplies
6. Baseboard (processor board)
7. Lift-out electronics bay
8. SCSI hard drives bay
9. Rear foam cover
10. Foam fan housing
11. Foam fan housing cover
12. Foam rear cover

## **Server Peripherals Overview**

The following sections describe standard and optional peripherals available with the SGI 1400 server system.

### **3.5-inch Diskette Drive**

The 3.5-inch diskette drive in the 3.5-inch peripheral bay supports 720 KB, 1.2 MB, and 1.44 MB media. The drive is externally accessible from the front of the system.



### 3.5-inch Hard Drive Bays

The chassis contains one hard disk drive bay that holds 3.5-inch-wide (1" high or 1-5/8" high) LVDS SCSI drives with internal cabling. The backplane is hot-swap-capable and can accommodate either six 3.5-inch-wide (1" high) hard drives (or three 1-5/8" high hard disks). The drives are accessed externally from the front of the system. Contact your sales or service representative for information on obtaining additional disks or drive carrier assemblies.

As part of the hot-swap implementation, an integral drive carrier and heatsink assembly is required for the hard disk drives. The drives are mounted in the carrier/heatsink assembly with four screws and the carrier snaps into the chassis. For information on how to install the carrier/heatsink assemblies, see "Mounting a SCSI Hard Disk Drive in a Carrier" in Chapter 5.

A single metal EMI shield and plastic door cover the hard drive bays. Drives can consume up to 22 watts of power and must be specified to run at a maximum ambient temperature of 55 °C.

The system was designed to use an optional Redundant Array of Independent Disks (RAID). A software implementation with onboard SCSI or an add-in board can be used to set up RAID applications. Ask your sales or service representative for information on installation and use of RAID options.

### 5.25-inch Removable Media Device Bays

The chassis has three 5.25-inch half-height bays that are accessible from the front of the system. These bays are intended to provide space for optional removable media devices.

You can convert the 5.25-inch bays to a single full-height bay. We recommend that you do not use these bays for hard disk drives, because they generate EMI (increasing ESD susceptibility), and because of inadequate cooling. To maintain compliance with electromagnetic compatibility (EMC) regulations, each 5.25-inch drive bay must be configured with either:

- An EMC-compliant 5.25-inch peripheral device, or
- A metal cover plate, available from your sales or service representative

**Note:** Integration of the 5.25-inch peripheral bay can affect EMC compliance and is a regulated activity.

**Caution:** To avoid damage to a 5.25-inch peripheral device, ensure the EMI gasketing provided in the lower bay does not bridge or short any open circuits of the exposed peripheral device. If the 5.25-inch device has open circuits, install it in one of the two upper bays.

## Power Supplies

The chassis comes configured with three 400-watt power supplies, each designed to minimize EMI and RFI. Each supply auto-senses within the following voltage ranges and is rated as follows:

- 100-120 V~ at 50/60 Hertz (Hz); 7.6 A maximum
- 200-240 V~ at 50/60 Hz; 3.8 A maximum

The DC output voltages of each power supply are:

- +3.3V at 36 A max
- +5V at 24 A max (total combined output of +3.3 V and +5.5 V not to exceed 195 W)
- +12V at 18.0 A with 19.0 A <10ms peak
- +24V at 50mA
- -12V at 0.5 A
- +5V standby 1.5 A

Power is sourced through the power cable to the 20-pin main connectors on the baseboard. Remote sensing signals are provided through the cable to the 14-pin auxiliary connector on the baseboard.

## System Cooling

The SGI 1400 server system includes the maximum (6) fan configuration for internal cooling and airflow. There is also one fan for each of the three power supplies, and two fans specifically for cooling the hard drives.

**Note:** The access cover must be installed on the system for proper cooling.

## Chassis Security

For information on security features on the SGI 1400 server, see “System Security” in Chapter 2.



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# System Processor Board Description

## Processor Board Features

Table 2-1 lists the major features of the server system's processor board (also called the baseboard).

**Table 2-1** Processor Board Features

Feature	Description
Processor	Installed: Up to four Pentium III Xeon processors, packaged in single edge contact (S.E.C.) cartridges and installed in 330-pin Slot 2 processor connectors, operating at 1.8 V to 3.5 V. The processor board's voltage regulator is automatically programmed by the processor's VID pins to provide the required voltage. Includes connectors for six VRM 8.3-compliant plug-in voltage-regulator modules.
Memory, dynamic random access (DRAM)	Single plug-in module containing 64/72-bit four-way-interleaved pathway to main memory supporting EDO DRAM. Installed: 256 MB to 4 GB of error correcting code (ECC) memory.
Video memory (DRAM)	Installed: 2 MB of video memory.
PCI Segment A bus PCI Segment B bus	<b>PCI-A</b> —Three expansion connectors and four embedded devices: Programmable interrupt device (PID) PCI/ISA/IDE Accelerator (PIIX4E) for PCI-to-ISA bridge, PCI IDE interface, and Universal Serial Bus (USB) controller PCI video controller (Cirrus Logic GD5480) PCI narrow SCSI controller (Symbios SYM53C810AE) <b>PCI-B</b> —Four expansion connectors (one physically shared with the ISA slot) and one embedded device: Wide Ultra/Ultra II SCSI controller (Symbios SYM53C896)
ISA bus	One expansion slot for add-in boards (shared with a PCI-B slot). Embedded PC-compatible support (serial, parallel, mouse, keyboard, diskette).

**Table 2-1 (continued)** Processor Board Features

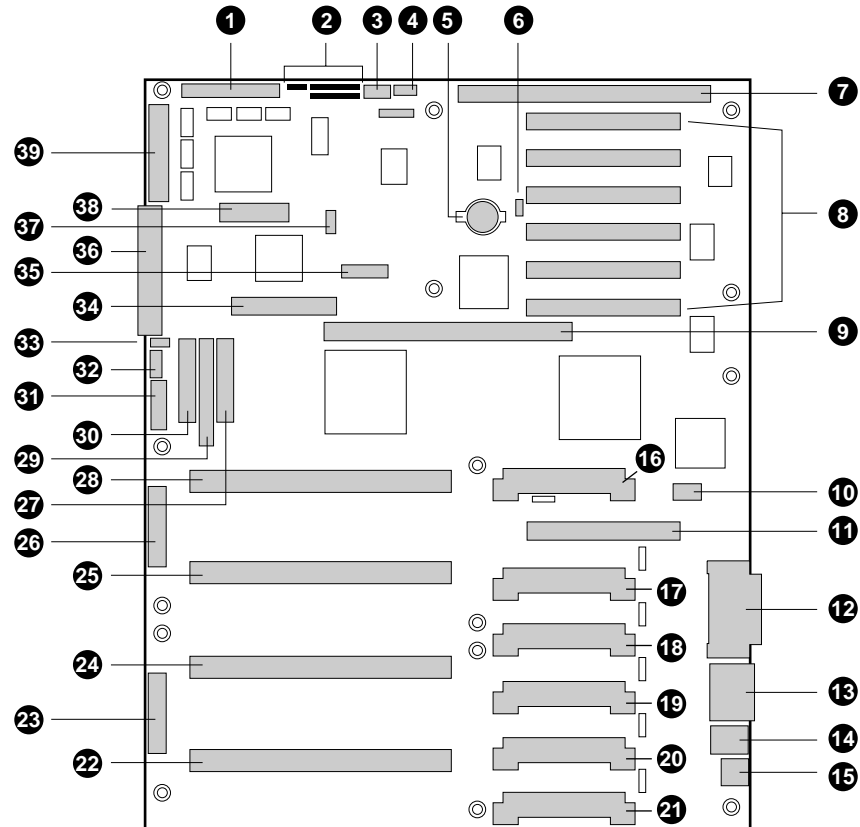
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Server Management	Thermal/voltage monitoring and error handling. Front panel controls and indicators (LEDs).
Graphics	Integrated onboard Cirrus Logic GD5480 super video graphics array (SVGA) controller.
SCSI	Two embedded SCSI controllers: <b>Symbios SYM53C810AE</b> —narrow SCSI controller on PCI-A bus providing support for the legacy 8-bit SCSI devices in the 5.25-inch drive bays. <b>Symbios SYM53C896</b> —dual-channel wide LVD/SE (Ultra2/Ultra) SCSI controller on PCI-B bus driving one SCSI backplane in the system and providing support for external expansion.
System I/O	PS/2-compatible keyboard and mouse ports, 6-pin DIN. Advanced parallel port, supporting Enhanced Parallel Port (EPP) levels 1.7 and 1.9, ECP, compatible 25-pin. VGA video port, 15-pin. Two serial ports, 9-pin (serial port A is the top connector).
Form Factor	Form-factor, 13 × 16 inches, ATX I/O.

---

## Processor Board Connector and Component Locations

Figure 2-2 shows the locations of the main components on the system processor board.



**Figure 2-1** Processor Board Connector and Component Locations

The components include:

1. Wide SCSI B connector (J9J1)
2. System jumpers (J6J1)
3. Hard drive input LED connector (J6J3)
4. System speaker connector (J6J2)
5. Lithium battery (B4H1)
6. Wake on LAN technology connector (J4H1)
7. ISA slot (J1J1)

8. PCI slots B4 (closest to ISA), B3, B2, B1, A3, and A2 (farthest from ISA)
9. Memory module connector (J3G1)
10. ICMB connector (J1E1)
11. PCI slot A1 (J2D1)
12. Video and parallel port connectors (J1C1)
13. Serial port connector (J1B2)
14. Keyboard and mouse connectors (J1B1)
15. USB external connector (J1A1)
16. VRM connector for processor 4 (J4E1)
17. VRM connector for processors 4 and 3 (J4C2)
18. VRM connector for processor 3 (J4C1)
19. VRM connector for processor 2 (J4B1)
20. VRM connector for processors 2 and 1 (J4A2)
21. VRM connector for processor 1 (J4A1)
22. Processor 1 Slot 2 connector (J9A1)
23. Main power connector, primary (J9B1)
24. Processor 2 Slot 2 connector (J9B2)
25. Processor 3 Slot 2 connector (J9D1)
26. Main power connector, secondary (J9D2)
27. Front panel connector (J8E1)
28. Processor 4 Slot 2 connector (J9E1)
29. IDE connector (J9E2)
30. Diskette drive connector (J9E3)
31. Auxiliary power connector (J9E4)
32. USB internal header (JC9F14)
33. SMBus connector (J9F2)
34. F16 expansion connector (J7G1)



35. ITP connector (J6G1)
36. Narrow SCSI connector (J9H1)
37. External IPMB connector (J7H1)
38. SMM connector (J8H1)
39. Wide SCSI A connector (J9H2)

## **System Processors**

Each Pentium III Xeon processor is packaged in a single edge contact (S.E.C.) cartridge. The cartridge includes the processor core with an integrated 16 KB primary (L1) cache; the secondary (L2) cache; a thermal plate; and a back cover.

The processor implements the MMX technology and it has a numeric coprocessor that significantly increases the speed of floating-point operations and complies with ANSI/IEEE standard 754-1985.

Each S.E.C. cartridge connects to the processor board through a 330-pin Slot 2 edge connector. The cartridge is secured by a retention module attached to the processor board. Depending on configuration, your system has one to four processors.

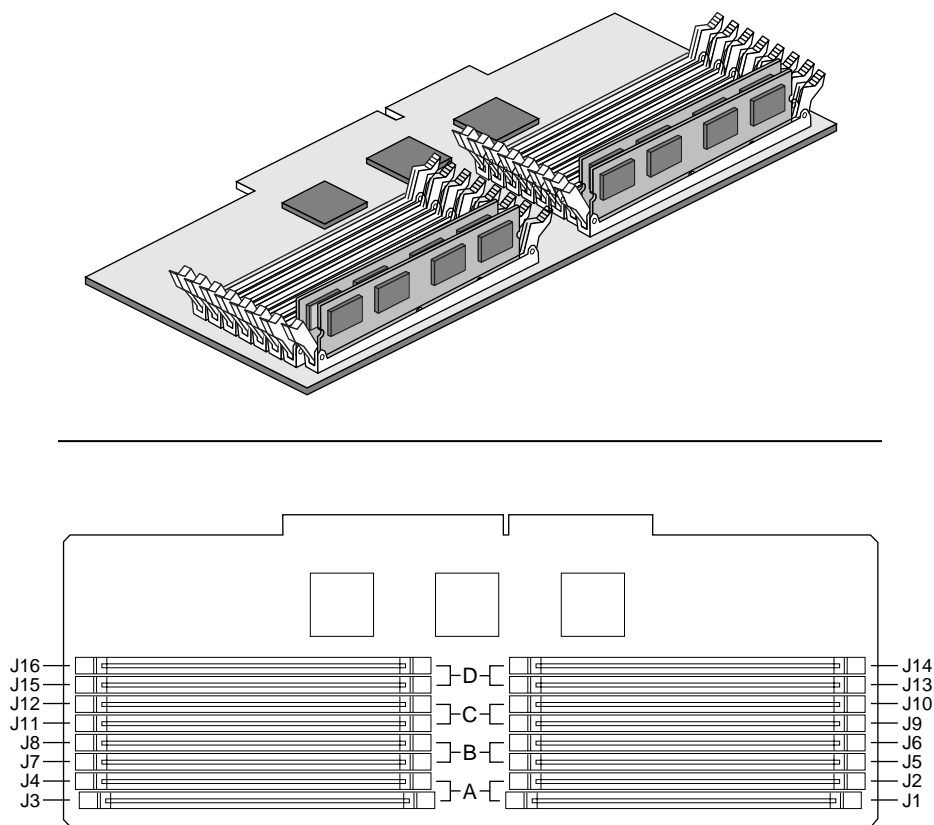
The processor external interface is MP-ready and operates at 100 MHz. The processor contains a local APIC unit for interrupt handling in multiprocessor (MP) and uniprocessor (UP) environments.

The L2 cache is located on the substrate of the S.E.C. cartridge. The cache:

- Includes burst pipelined synchronous static RAM (BSRAM)
- Is offered in 512 KB, 1 MB, and 2 MB configurations
- Has error checking and correction (ECC)
- Operates at the full core clock rate

## Memory

Main memory resides on an add-in board, called a memory module, designed specifically for the SGI 1400 server. The memory module contains slots for 16 DIMMs, each of which must be at least 64 MB, and is attached to the processor board through a 242-pin connector. Memory amounts from 256 MB to 4 GB of DIMM are supported, with a 64/72-bit four-way-interleaved pathway to main memory, which is also located on the module. The 16 slots are divided into four banks of four slots each, labeled A through D. These banks support 4:1 interleaving. The memory controller supports EDO DRAMs. The ECC used for the memory module is capable of correcting single-bit errors (SBEs) and detecting 100 percent of double-bit errors over one code word. Nibble error detection is also provided. Figure 2-2 shows the installation sequence for the memory modules.



**Figure 2-2** Memory Module DIMM Installation Sequence

The first four module group installs in memory bank A, the second in bank B, the third in bank C and the last in Bank D.

System memory begins at address 0 and is continuous (flat addressing) up to the maximum amount of DRAM installed (exception: system memory is noncontiguous in the ranges defined as memory holes using configuration registers). The system supports both base (conventional) and extended memory.

- Base memory is located at addresses 00000h to 9FFFFh (the first 1 MB).
- Extended memory begins at address 0100000h (1 MB) and extends to FFFFFFFFh (4 GB), which is the limit of supported addressable memory. The top of physical memory is a maximum of 4 GB (to FFFFFFFFh).

**Note:** Addressable memory can be extended to 64 GB under certain configurations, but this server is configured to support 4 GB.

Some operating systems and application programs use base memory while others use both conventional and extended memory. Examples:

- Base memory: Windows NT and LINUX
- Conventional and extended memory: Windows NT and LINUX

MS-DOS does not use extended memory; however, some MS-DOS utility programs like RAM disks, disk caches, print spoolers, and windowing environments use extended memory for better performance.

BIOS automatically detects, sizes, and initializes the memory array, depending on the type, size, and speed of the installed DIMMs, and reports memory size and allocation to the system via configuration registers.

In a 4 GB configuration, a small part of memory (typically 32 MB) is not remapped above 4 GB. If your operating system does not support more than 4 GB of physical memory, this small part of the memory is effectively lost.

**Note:** Use DIMMs that have been tested for compatibility with the processor board. Contact your sales or support representative for a list of approved DIMMs. Table 2-2 lists some sample size combinations.

**Table 2-2** Sample DIMM Component Combinations

Bank A (slots J1 - 4)	Bank B (slots J5 - 8)	Bank C (slots J9 - 12)	Bank D (slots J13 - 16)	Total Memory
4 × 64				256 MB
4 × 64	4 × 64			512 MB
4 × 64	4 × 64	4 × 64	4 × 64	1024 MB
4 × 256				1024 MB
4 × 256	4 × 256			2048 MB
4 × 256	4 × 256	4 × 256	4 × 256	4096 MB

## Peripheral Controllers

The following subsections provide a description of the peripheral control devices on the processor board.

### Super I/O Device

The 87309 device supports two serial ports, one parallel port, diskette drive, and PS/2-compatible keyboard and mouse. The system provides the connector interface for each port.

### Serial Ports

Both serial ports are relocatable. By default, port A is physically the top connector, port B on the bottom. Each serial port can be set to one of four different COMx ports, and each can be enabled separately. When enabled, each port can be programmed to generate edge- or level-sensitive interrupts. When disabled, serial port interrupts are available to add-in boards.

## Parallel Port

The 25/15-pin connector stacks the parallel port over the VGA. The 87309 provides one IEEE 1284-compatible 25-pin bidirectional EPP (supporting levels 1.7 and 1.9). BIOS programming of the 87309 registers enables the parallel port and determines the port address and interrupt. When disabled, the interrupt is available to add-in boards.

## Add-in Board Slots

The processor board (also called a baseboard) has one ISA slot that is full-length if the wide SCSI-B slot is not used (and half-length if the wide SCSI-B slot *is* used); the ISA slot supports slave-only boards and is shared with PCI-B slot 4. The ISA has three embedded devices: the Super I/O device, Baseboard Management Controller (BMC), and flash memory for system BIOS. ISA features include:

- Bus speed up to 8.33 MHz
- 16-bit memory addressing
- Type A transfers at 5.33 MB/sec
- Type B transfers at 8 MB/sec
- 8- or 16-bit data transfers
- Plug and Play ready

The processor board has two 32-bit PCI bus segments: PCI-A and PCI-B. These provide seven slots for PCI add-in boards: three on PCI-A and four on PCI-B. PCI-B4 is shared with the ISA slot. PCI-A1 supports half-length boards only. The other slots support full-length boards. PCI features:

- 33 MHz bus speed
- 32-bit memory addressing
- 5 V signaling environment
- Burst transfers of up to 133 MB/sec
- 8-, 16-, or 32-bit data transfers
- Plug and Play ready
- Parity enabled

## Video

The onboard, integrated Cirrus Logic CL-GD5480 64-bit VGA ASIC contains an SVGA controller that is fully compatible with these video standards: CGA, EGA, Hercules Graphics, MDA, and VGA. The standard system configuration comes with 2 MB of 10 ns onboard video memory. The video controller supports pixel resolutions of up to 1600 x 1200 and up to 16.7 M colors.

The SVGA controller supports analog VGA monitors (single and multiple frequency, interlaced and noninterlaced) with a maximum vertical retrace noninterlaced frequency of 100 Hz.

You cannot add video memory to this system. Depending on the environment, the controller displays up to 16.7 M colors in some video resolutions. It also provides hardware-accelerated bit block transfers (BITBLT) of data.

## SCSI Controller

The processor board includes two SCSI controllers. A narrow SCSI controller (SYM53C810AE) is on the PCI-A bus, and a dual-channel wide LVD/SE (Ultra2/Ultra) SCSI controller (SYM53C896) is on the PCI-B bus. The narrow provides support for the legacy 8-bit SCSI devices in the 5.25-inch drive bays. The wide drives one SCSI backplane and provides support for external expansion.

Internally, each wide channel is identical, capable of operations using either 8- or 16-bit SCSI providing 10 MB/sec (Fast-10) or 20 MB/sec (Fast-20) throughput, or 20 MB/sec (Ultra), 40 MB/sec (Ultra-wide) or 80 MB/sec (40 Mhz) (Ultra-2).

The SYM53C810AE (narrow) contains a high-performance SCSI core capable of Fast 8-bit SCSI transfers in single-ended mode. It provides programmable active negation, PCI zero wait-state bursts of faster than 110 MB/sec at 33 MHz, and SCSI transfer rates from 5 to 10 MB/sec. The narrow SCSI comes in a 100-pin rectangular plastic quad flat pack (PQFP) and provides an “AND tree” structure for testing component connectivity.

The Sym53C896 (wide) contains a high-performance SCSI bus interface. It supports SE mode with 8-bit (10 or 20 MB/sec) or 16-bit (20 or 40 MB/sec) transfers and LVD mode with 8-bit (40 MB/sec) or 16-bit (80 MB/sec) transfers in a 329-pin ball grid array (BGA) package.

Each controller has its own set of PCI configuration registers and SCSI I/O registers. As a PCI 2.1 bus master, the SYM53C896 supports burst data transfers on PCI up to the maximum rate of 132 MB per second using on-chip buffers.

In the internal bay, the system supports up to six one-inch SCSI hard disk drives, plus, in the 5.25-inch removable media bays, three SCSI or IDE devices (the controller itself supports more devices, but the 5.25-inch bay can contain a maximum of three devices). A wide SCSI cable provides two connectors for Ultra SCSI devices (one of these connectors is for the internal SCSI backplane). However, SCSI devices do not need to operate at the ultra transfer rate. All drives on the bus must be Ultra-2 (LVD) to run at 80 MB/sec (40 MHz). The 5, 10, and 20 MHz operations can coexist on the bus and each device will interact at its appropriate speed.

No logic, termination, or resistor loads are required to connect devices to the SCSI controller other than termination in the device at the end of the cable. The SCSI bus is terminated on the processor board with active terminators that can be disabled.

## IDE Controller

IDE is a 16-bit interface for intelligent disk drives with AT disk controller electronics onboard. The PCI/ISA/IDE Accelerator, called PIIX4E, is a multifunction device on the processor board that acts as a PCI-based Fast IDE controller. The device controls:

- PIO and IDE DMA/bus master operations
- Mode 4 timings
- Transfer rates up to 22 MB/sec
- Buffering for PCI/IDE burst transfers
- Master/slave IDE mode
- Up to two drives for one IDE channel

**Note: 18-inch maximum length of IDE cable on each channel:** you can connect an IDE signal cable, up to a maximum of 18 inches, to the IDE connector on the processor board. The cable can support two devices, one at the end of the cable and one six inches from the end.

## Keyboard and Mouse

The PS/2-compatible keyboard and mouse connectors are mounted in a single-stacked housing with the mouse connector over the keyboard. External to the system, they appear as two connectors.

You can plug in the keyboard and mouse to either connector before powering up the system. BIOS detects these and configures the keyboard controller accordingly.

The keyboard controller is functionally compatible with the 8042A microcontroller. The system can be locked automatically if no keyboard or mouse activity occurs for a predefined length of time, if specified through the system setup utility (SSU). Once the inactivity (lockout) timer has expired, the keyboard and mouse do not respond until the previously stored password is entered.

## Server Management

Server Management features are implemented using one microcontroller on the processor board known as the Baseboard Management Controller (BMC).

### Baseboard Management Controller (BMC)

The BMC and associated circuitry are powered from 5V\_Standby, which means this device remains active even when system power is switched off.

The primary function of the BMC is to autonomously monitor system platform management events and log their occurrence in the nonvolatile System Event Log (SEL). These events include overtemperature and overvoltage conditions, fan failure, or chassis intrusion. While monitoring, the BMC maintains the nonvolatile sensor data record repository (SDRR), from which run-time information can be retrieved. The BMC provides an ISA host interface to SDRR information, so software running on the server can poll and retrieve the current status of the platform. A shared register interface is defined for this purpose.



SEL contents can be retrieved after system failure for analysis by field service personnel using system management tools like Intel LANDesk Server Manager. Because the BMC is powered by 5V\_Standby, SEL (and SDRR) information is also available by way of the interperipheral management bus (IPMB). An emergency management board like the Intel LANDesk Server Monitor Module board can obtain the SEL and make it remotely accessible using a LAN or telephone line connection. During monitoring, the BMC performs the following functions:

- Processor board temperature and voltage monitoring
- Processor presence monitoring and FRB control
- Processor board fan failure detection and indicator control
- SEL interface management
- Sensor Data Record Repository (SDRR) interface management
- SDR/SEL timestamp clock
- Processor board Field Replaceable Unit (FRU) information interface
- System management watchdog timer
- Periodic SMI timer
- Front panel NMI handling
- Event receiver
- ISA host and IPMB interface management
- Secure mode control, front panel lock/unlock initiation, and video blank and diskette write protect monitoring and control
- Sensor event initialization agent
- Wake on LAN via Magic Packet support
- ACPI Support
- Emergency Management Port (EMP) support

## System Security

To help prevent unauthorized entry or use of the system, the system includes a three-position key lock/switch to permit selected access to drive bays (position is communicated to BMC). The system also includes server management software that monitors the chassis intrusion switch.

### Mechanical Locks and Monitoring

The system includes a chassis intrusion switch. When the access cover is opened, the switch transmits an alarm signal to the processor board, where server management software processes the signal. The system can be programmed to respond to an intrusion by powering down or by locking the keyboard, for example.

### Software Locks via the SSU or BIOS Setup

The SSU provides a number of security features to prevent unauthorized or accidental access to the system. Once the security measures are enabled, access to the system is allowed only after the user enters the correct password(s). For example, the SSU allows you to:

- Enable the keyboard lockout timer so the server requires a password to reactivate the keyboard and mouse after a specified time-out period of 1 to 120 minutes
- Set and enable administrator and user passwords
- Set secure mode to prevent keyboard or mouse input and to prevent use of the front panel reset and power switches
- Activate a hot-key combination to enter secure mode quickly
- Disable writing to the diskette drive when secure mode is set

## Using Passwords

If you set and enable a user password but not an administrator password, enter the user password to boot the system and run the SSU.

If you set and enable both a user and an administrator password:

- Enter either one to boot the server and enable the keyboard and mouse
- Enter the administrator password to access the SSU or BIOS Setup to change the system configuration

## Secure Mode

Configure and enable the secure boot mode by using the SSU. When secure mode is in effect, you:

- Can boot the system and the OS will run, but you must enter the user password to use the keyboard or mouse
- Cannot turn off system power or reset the system from the front panel switches

Secure mode has no effect on functions enabled via the Server Manager Module or power control via the real-time clock (RTC).

Taking the system out of secure mode does not change the state of system power. That is, if you press and release the power switch while secure mode is in effect, the system will not power off when secure mode is later removed. However, if the front panel power switch remains depressed when secure mode is removed, the system will power off.

## Summary of Software Security Features

Table 2-3 lists the software security features and describes what protection each offers. In general, to enable or set the features listed here, you must run the SSU and go to the Security Menu (see “Security Menu” in Chapter 3).

Table 2-3 also refers to other SSU menus and to the Setup utility. For further details and information on these topics see Chapter 3.

**Table 2-3** Server Software Security Features

Feature	Description
Put the system into secure boot mode	<p>How to enter secure mode:</p> <p>Setting and enabling passwords automatically puts the system into secure mode. If you set a hot-key combination (through the SSU or Setup), you can secure the system simply by pressing the key combination. This means you do not have to wait for the inactivity time-out period.</p> <p>When the system is in secure mode:</p> <p>The system can boot and run the OS, but mouse and keyboard input is not accepted until the user password is entered.</p> <p>Your SGI 1400 server default boot device is the C drive (system disk). You can alter this default to be the CD-ROM drive or diskette drive (see Chapter 3). Normally, the system boots from drive C and then goes into secure mode. All enabled secure mode features go into effect at boot time.</p> <p>To leave secure mode:</p> <p>Enter the correct password(s).</p>
Disable writing to diskette	In secure mode, the system will not boot from or write to a diskette unless a password is entered.
Disable the power and reset buttons	If this protection feature is enabled by the SSU, the power and reset buttons are disabled when in secure mode.
Set a time-out period so that keyboard and mouse input are not accepted	You can specify and enable an inactivity time-out period of from 1 to 120 minutes. If no keyboard or mouse action occurs for the specified period, attempted keyboard and mouse input will not be accepted.
Also, screen can be blanked and writes to diskette can be inhibited	If video blanking is enabled, the monitor display will go blank until the correct password(s) is entered.

**Table 2-3 (continued)** Server Software Security Features

---

Control access to using the SSU: set administrator password	<p>To control access to setting or changing the system configuration, set an administrator password and enable it through Setup or the SSU.</p> <p>If both the administrator and user passwords are enabled, either can be used to boot the system or enable the keyboard and/or mouse, but only the administrator password allows changes to Setup and the SSU.</p> <p>Once set, passwords can be disabled by setting the password to a null string or by changing the Clear Password jumper. See Chapter 3 for more information.</p>
Control access to the system other than SSU: set user password	<p>To control access to using the system, set a user password and enable Password on Boot through Setup or the SSU.</p> <p>Once set, passwords can be disabled by setting the password to a null string or by changing the Clear Password jumper.</p>
Boot without keyboard	<p>The system can boot with or without a keyboard. Before the system boots during POST, BIOS automatically detects and tests the keyboard, if present, and displays a message. No entry exists in the SSU for enabling or disabling a keyboard. <i>Do not</i> plug in a keyboard while power is applied to the system.</p>
Specify the boot sequence	<p>The sequence you specify in the Boot Device Priority submenu of the SSU determines the boot order. If secure mode is enabled (user password is set), you will be prompted for a password before the system boots fully. If secure mode is enabled and the “Secure Mode Boot” option is also enabled, the system boots fully but requires a password before accepting any keyboard or mouse input.</p>

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## Configuration Software and Utilities

This chapter describes the Power-on Self Test (POST) and system configuration utilities. Table 3-1 briefly describes the utilities.

**Table 3-1** Configuration Utilities

Utility	Description and brief procedure
Basic input/output system (BIOS) Setup	<p>If the system does not have a diskette drive, or the drive is disabled or misconfigured, use Setup to enable it.</p> <p>Or, you can move the CMOS jumper on the system board from the default setting (Protect CMOS memory) to the Clear setting; this will allow most system configurations to boot. Run the system setup utility (SSU) to configure the system.</p>
System Setup Utility (SSU)	<p>Use for extended system configuration of onboard resources and add-in boards, viewing the system event log (SEL), setting boot device priority, or setting system security options.</p> <p>The SSU can be run from either the NT configuration software CD or from a set of DOS-bootable diskettes. See the printed <i>Quick Start Guide</i> to make a set of SSU diskettes.</p> <p>Note that information entered via the SSU overrides information entered via Setup.</p>
Emergency Management Port (EMP) Console	Use to access and monitor the server remotely.
FRUSDR Load Utility	Use to update the Field Replacement Unit (FRU), Sensor Data Record (SDR), and Desktop Management Interface (DMI) flash components.
BIOS Update Utility	Use to update the BIOS or recover from a corrupted BIOS update.
Firmware Update Utility	Use to update BMC flash ROM.
Symbios SCSI Utility	Use to configure or view the settings of the SCSI host adapters and onboard SCSI devices in the system.

## Hot Keys

Use the keyboard's numeric pad to enter numbers and symbols.

**Table 3-2** Hot Keys

To do this:	Press these keys
Clear memory and reload the operating system—this is a system reset.	Ctrl+Alt+Del
Secure your system immediately.	Ctrl+Alt+hotkey (Set your hot-key combination with the SSU or Setup.)
Enter BIOS Setup during POST BIOS.	F2
Abort memory test during BIOS POST.	Esc (press while BIOS is updating memory size on screen)

## Power-on Self Test (POST)

Each time you turn on the system, the power-on self test (POST) starts running. POST checks the baseboard and its processors, memory, keyboard, and most installed peripheral devices. During the memory test, POST displays the amount of memory it is able to access and test. The length of time needed to test memory depends on the amount of memory installed. POST is stored in flash memory. POST runs in a manner similar to the following:

1. Turn on your video monitor and system. After a few seconds, POST begins to run.
2. After the memory test, these screen prompts and messages appear:

```
Keyboard Detected  
Mouse Initialized  
Press <F2> to enter Setup
```

**Note:** If you do not press F2 and do *not* have a device with an OS loaded, the message listed in step 2 remains for a few seconds while the boot process continues, and the system beeps once. Then this message appears:

```
Operating System not found
```



3. If you do not press **F2**, the boot process continues and various messages appear. The message content may differ based on your system configuration and operating system. User's with NT systems may see a message similar to the following:

Press <Ctrl><C> to enter SCSI Utility

**Note:** The next two steps are applicable to NT users.

4. Press **Ctrl+C** if SCSI devices are installed. When the utility opens, follow the displayed instructions to configure the onboard SCSI host adapter settings and to run the SCSI utilities. If you do not enter the SCSI utility, the boot process continues.
5. Press **Esc** during POST to access a boot menu when POST finishes. From this menu, you can choose the boot device or enter BIOS Setup.

After POST completes, the system beeps once.

What appears on the screen after this depends on if you have an OS loaded and if so, which one.

If the system halts before POST completes running, it emits a beep code indicating a critical system error that requires immediate attention. If POST can display a message on the video display screen, the speaker beeps twice as the message appears.

Note the screen display and write down the beep code you hear; this information is useful for your service representative.

## Using BIOS Setup

This section describes the BIOS Setup options. Use Setup to change the system configuration defaults. You can run Setup with or without an OS being present. Setup stores most of the configuration values in battery-backed CMOS; the rest of the values are stored in flash memory. The values take effect when you boot the system. POST uses these values to configure the hardware; if the values and the actual hardware do not agree, POST generates an error message. You must then run Setup to specify the correct configuration.

## Running Setup

You can run Setup to modify any standard PC baseboard feature such as:

- Select diskette drive
- Select parallel port
- Select serial port
- Set time/date (to be stored in RTC)
- Configure IDE hard drive
- Specify boot device sequence
- Enable SCSI BIOS

## Running the System Setup Utility (SSU) Instead of Setup

You must run the SSU instead of Setup to do the following:

- Enter or change information about a board
- Alter system resources (for example, interrupts, memory addresses, I/O assignments) to user-selected choices instead of choices selected by the BIOS resource manager

## Record Your Setup Settings

If the default values ever need to be restored (after a CMOS clear, for example), you must run Setup again. Referring to the worksheets could make your task easier.

## If You Cannot Access Setup

If the diskette drive is misconfigured so that you cannot access it to run a utility from a diskette, you might need to clear CMOS memory. You must open the system, change a jumper setting, use Setup to check and set diskette drive options, and change the jumper back. This procedure should be done by a trained service person, see the *SGI 1400 Server Family Maintenance and Upgrades Guide*.

## Starting Setup

You can enter and start Setup under several conditions:

- When you turn on the system, after POST completes the memory test
- When you reboot the system by pressing `Ctrl+Alt+Del` while at the DOS operating system prompt
- When you have moved the CMOS jumper on the baseboard to the “Clear CMOS” position (enabled); see the *SGI 1400 Server Family Maintenance and Upgrades Guide*.

In the three conditions listed above, after rebooting, you will see this prompt:

```
Press <F2> to enter SETUP
```

In a fourth condition, when CMOS/NVRAM has been corrupted, you will see other prompts but not the `F2` prompt:

```
Warning:  cmos checksum invalid  
Warning:  cmos time and date not set
```

In this condition, the BIOS will load default values for CMOS and attempt to boot.

## Setup Menus

Setup has six major menus and several submenus:

1. Main Menu
  - Primary IDE Master and Slave
  - Keyboard Features
2. Advanced Menu
  - PCI Configuration
  - PCI Device, Embedded SCSI
  - PCI Devices
  - I/O Device Configuration
  - Advanced Chipset Control
3. Security Menu

4. Server Menu
  - System Management
  - Console Redirection
5. Boot Menu
  - Boot Device Priority
  - Hard Drive
6. Exit Menu

Table 3-3 provides some information on using the menus and submenus.

**Table 3-3** Setup Menu Control Information

<b>To:</b>	<b>Press:</b>
Get general help	F1 or Alt+H
Move between menus	← →
Go to the previous item	Up arrow
Go to the next Item	Down arrow
Change the value of an item	+ or -
Select an item or display a submenu	Enter
Leave a submenu or exit Setup	Esc
Reset to Setup defaults	F9
Save and exit Setup	F10

**Table 3-4** Restricted Menu Selection and Submenus

When you see this:	What it means:
On screen, an option is shown but you cannot select it or move to that field.	You cannot change or configure the option in that menu screen. Either the option is autoconfigured or autodetected, or you must use a different Setup screen, or you must use the SSU.
On screen, the phrase <code>Press Enter</code> appears next to the option.	Press <code>Enter</code> to display a submenu that is either a separate full-screen menu or a pop-up menu with one or more choices.

The following sections list the features that display onscreen after you press `F2` and enter Setup. Not all of the option choices are described:

- a few are not user-selectable and are displayed for information only
- many of the choices are relatively self-explanatory.

## Main Menu

The main menu (see Table 3-5) lists the selections you can make on the main menu itself. Use the submenus for other selections. Default values are in **bold**.

**Table 3-5** Main Menu Features and Descriptions

Feature	Choices	Description
System Time	HH:MM:SS	Sets the system time.
System Date	MM/DD/YYYY	Sets the system date.
Legacy Diskette A:	Disabled 360 KB 720 KB <b>1.44 MB</b> 2.88 MB	Selects the diskette type.

**Table 3-5 (continued)** Main Menu Features and Descriptions

---

Legacy Diskette B:	Disabled 360 KB 720 KB <b>1.44 MB</b> 2.88 MB	Selects the diskette type.
Hard Disk Pre-delay	<b>Disabled</b> 3, 6, 9, 12, 15, 21, or 30 seconds	Adds a delay before the first BIOS access of a hard disk drive. Some hard disk drives hang if accessed before they initialize themselves. This delay ensures the hard disk drive has initialized after power on, before being accessed.
Primary Master	N/A	Enters submenu.
Primary Slave	N/A	Enters submenu.
Keyboard Features	N/A	Enters submenu.
Language	<b>English (US)</b> Spanish Italian French German Japanese (Kanji)	Selects which language BIOS displays. Note: Serial redirection does not work with Kanji.

---

## Primary Master and Slave Submenu

In Table 3-6, the features other than “Type” appear only for Type Auto if a drive is detected.

**Table 3-6** Primary IDE Master and Slave Submenu

Feature	Choices	Description
Type	<b>Auto</b> None CD-ROM IDE Removable ATAPI Removable User	Auto allows the system to attempt autodetection of the drive type. None informs the system to ignore this drive. CD-ROM allows the manual entry of fields described below. User allows the manual entry of all fields described below.
Cylinders	1 to 2048	Number of Cylinders on Drive. This field is changeable only for Type User. This field is informational only for Type Auto.
Heads	1 to 16	Number of read/write heads on drive. This field is available only for Type User. This field is informational only for Type Auto.
Sectors	1 to 64	Number of sectors per track. This field is available only for Type User. This field is informational only for Type Auto.
Maximum Capacity	N/A	Computed size of drive from cylinders, heads, and sectors entered. This field is available only for Type User. This field is informational only for Type Auto.
Multi-Sector Transfers	<b>Disabled</b> 2, 4, 8, or 16 sectors	Determines the number of sectors per block for multisection transfers. This field is informational only for Type Auto.
LBA Mode Control	<b>Disabled</b> Enabled	Enabling LBA causes logical block addressing to be used in place of cylinders, heads, and sectors. This field is informational only for Type Auto.
32 Bit I/O	<b>Disabled</b> Enabled	Enabling allows 32-bit IDE data transfers. This field is informational only for Type Auto.

**Table 3-6 (continued)** Primary IDE Master and Slave Submenu

Transfer Mode	<b>Standard</b> Fast PIO 1 Fast PIO 2 Fast PIO 3 Fast PIO 4	Selects the method for moving data to and from the drive. This field is informational only for Type Auto.
Ultra DMA	<b>Disabled</b> Enabled	For use with Ultra DMA drives. This field is information only for Type Auto.

### Keyboard Features Submenu

Table 3-7 summarizes the features of the keyboard submenu.

**Table 3-7** Keyboard Features Submenu

Feature	Choices	Description
Num Lock	<b>Auto</b> On Off	Selects power-on state for Num Lock.
Key Click	<b>Disabled</b> Enabled	Enables or disables key click.
Keyboard auto-repeat rate	<b>30, 26.7, 21.8, 18.5, 13.3, 10, 6, or 2 per second</b>	Selects key repeat rate.
Keyboard auto-repeat delay	1/4 sec <b>1/2 sec</b> 3/4 sec 1 sec	Selects delay before key repeat.



## Advanced Menu

You can make the following selections on the advanced menu itself, see Table 3-8. Use the submenus for the three other selections that appear on the advanced menu.

**Table 3-8** Advanced Menu Features

Feature	Choices	Description
Plug and Play OS	<b>No</b> Yes	Select <b>Yes</b> if you are booting a Plug and Play-capable OS.
Reset Configuration Data	<b>No</b> Yes	Select <b>Yes</b> if you want to clear the system configuration data during next boot. System automatically resets to <b>No</b> in next boot.
PCI Configuration	N/A	Enters submenu.
I/O Device Configuration	N/A	Enters submenu.
Use Multiprocessor Specification	1.1 <b>1.4</b>	Selects the version of multiprocessor specification to use. Some operating systems require version 1.1 for compatibility reasons.
Large Disk Access Mode	<b>LBA</b> CHS	Applies to IDE drives only; refers to the method used to access the drive. Most OSs use logical block addressing (LBA); some use cylinder head sector (CHS). To verify the correct method, consult your OS documentation.
Pause Before Boot	<b>Enabled</b> Disabled	Enables five-second pause before booting OS.
Advanced Chipset Control	N/A	Enters submenu.

## PCI Configuration Submenu

The PCI Configuration Menu contains selections that access other submenus.

### PCI Device, Embedded SCSI Submenu

Table 3-9 shows the PCI device options in the embedded SCSI submenu.

**Table 3-9** PCI Device, Embedded SCSI Submenu

Feature	Choices	Description
Option ROM Scan	<b>Enabled</b> Disabled	Enables option ROM scan of the selected device.
Enable Master	<b>Disabled</b> Enabled	Enables selected device as a PCI bus master.
Latency Timer	Default 0020h 0040h 0060h 0080h 00A0h <b>00C0h</b> 00E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device can be master on a PCI bus. Typically, option ROM code overwrites the value set by the BIOS.

### PCI Devices Submenu

Table 3-10 shows the options in the PCI devices submenu.

**Table 3-10** PCI Devices Submenu

Feature	Choices	Description
Option ROM Scan	<b>Enabled</b> Disabled	Enables option ROM scan of all devices other than the onboard SCSI controllers.
Enable Master	<b>Enabled</b> Disabled	Enables all devices, other than the onboard SCSI controllers, as a PCI bus master.
Latency Timer	Default 020h <b>040h</b> 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device can be master on a PCI bus. Typically, option ROM code overwrites the value set by the BIOS.

### I/O Device Configuration Submenu

Table 3-11 lists the entries in the I/O device configuration submenu.

**Table 3-11** I/O Device Configuration Submenu

Feature	Choices	Description
Serial Port A	Disabled <b>Enabled</b> Auto OS Controlled	Auto forces BIOS to configure the port. OS Controlled displays when OS controls the port.
Base I/O Address	<b>3F8</b> 2F8 3E8 2E8	Selects the base I/O address for COM port A.
Interrupt	<b>IRQ 4</b> IRQ 3	Selects the IRQ for COM port A.

**Table 3-11 (continued)** I/O Device Configuration Submenu

Serial Port B	Disabled <b>Enabled</b>	
	Auto	Auto forces BIOS to configure the port.
	OS Controlled	OS Controlled displays when OS controls the port.
Mode	<b>Normal</b> <b>IrDA†</b> <b>ASK-IR</b>	Selects mode for COM port B.
Base I/O Address	3F8 <b>2F8</b> 3E8 2E8	Selects the base I/O address for COM port B.
Interrupt	IRQ 4 <b>IRQ 3</b>	Selects the interrupt for COM port B.
Parallel Port	Disabled <b>Enabled</b>	
	Auto	Auto forces BIOS to configure the port.
	OS Controlled	OS Controlled displays when OS controls the port.
Mode	<b>ECP</b> Output only Bidirectional EPP	Selects mode for parallel port.
Base I/O Address	<b>378</b> 278	Selects the base I/O address for parallel port.
Interrupt	IRQ 5 <b>IRQ 7</b>	Selects the interrupt for parallel port.
DMA channel	<b>DMA 1</b> DMA 3	Selects the DMA channel for parallel port.
Floppy disk controller	Disabled <b>Enabled</b>	Enables onboard diskette controller.
Base I/O Address	<b>Primary</b> Secondary	Sets the base I/O address for the diskette controller.
PS/2 Mouse	<b>Auto</b> Disabled Enabled	Enables or disables onboard mouse. Disabling the mouse frees up IRQ 12. If this feature is enabled, the OS can determine whether to enable or disable the mouse.

## Advanced Chipset Control Submenu

Table 3-12 lists the options in the advanced chipset control submenu.

**Table 3-12** Advanced Chipset Control Submenu

Feature	Option	Description
Address Bit Permuting	<b>Disabled</b> Enabled	To be enabled, there must be a power of 2 number of rows, all rows must be the same size, and all populated rows must be adjacent and start at row 0. Two-way or four-way permuting is set automatically based on memory configuration.
Base RAM Step	<b>1 MB</b> 1 KB Every location	Tests base memory once per MB, once per KB, or every location.
Extended RAM Step	<b>1 MB</b> 1 KB Every location	Tests extended memory once per MB, once per KB, or every location.
L2 Cache	<b>Enabled</b> Disabled	When enabled, the secondary cache is sized and enabled. For Core Clock Frequency-to-System Bus ratios equal to two, BIOS automatically disables the L2 cache.
ISA Expansion Aliasing	<b>Enabled</b> Disabled	When enabled, every I/O access with an address in the range x100-x3FFh, x500-x7FFh, x900-xBFF, and xD00-xFFFh is internally aliased to the range 0100-03FFh before any other address range checking is performed.
Memory Scrubbing	<b>Disabled</b> Enabled	When enabled, BIOS automatically detects and corrects SBEs.
Restreaming Buffer	<b>Enabled</b> Disabled	When enabled, the data returned and buffered for a Delayed Inbound Read can be reaccessed following a disconnect.
Read Prefetch for PXB0A	N/A	Information field only. Configures the number of Dwords that are prefetched on Memory Read Multiple commands.
Read Prefetch for PBX0B	N/A	Information field only. Configures the number of Dwords that are prefetched on Memory Read Multiple commands.

## Security Menu

You can make the following selections on the Security Menu. Enabling the Supervisor Password field requires a password for entering Setup. The passwords are not case sensitive (see Table 3-13).

**Table 3-13** Security Menu

Feature	Choices	Description
Administrator Password is	<b>Clear</b> Set	Status only; user cannot modify. Once set, this can be disabled by setting it to a null string or by clearing the password jumper on the baseboard.
User Password is	<b>Clear</b> Set	Status only; user cannot modify. Once set, this can be disabled by setting it to a null string or by clearing the password jumper on baseboard.
Set Administrative Password	Press Enter	When the <code>Enter</code> key is pressed, the user is prompted for a password; press the <code>Esc</code> key to abort. Once set, this can be disabled by setting it to a null string or by clearing the password jumper on the baseboard.
Set User Password	Press Enter	When the <code>Enter</code> key is pressed, the user is prompted for a password; press <code>Esc</code> key to abort. Once set, this can be disabled by setting it to a null string or by clearing the password jumper on baseboard.
Password on Boot	<b>Disabled</b> Enabled	If enabled and the user password is set, the system prompts the user for a password before the system boots.
Fixed Disk Boot Sector	<b>Normal</b> Write Protect	Write-protects boot sector on hard disk to protect against viruses.
System Backup Reminder	<b>Disabled</b> Daily Weekly Monthly	Displays system-backup reminder message at boot.
Virus Check Reminder	<b>Disabled</b> Daily Weekly Monthly	Displays virus-check reminder message at boot.

**Table 3-13 (continued)** Security Menu

Secure Mode Timer	<b>Disabled</b> 1, 2, 5, 10, or 20 min 1 or 2 hr	Period of keyboard or PS/2 mouse inactivity specified for secure mode to activate. A password is required for secure mode to function. Cannot be enabled unless at least one password is enabled.
Secure Mode Hot Key (Ctrl-Alt-)	[ ] [A, B, ..., Z] [0-9]	Key assigned to invoke the secure mode feature. Cannot be enabled unless at least one password is enabled. Can be disabled by entering a new key followed by a backspace or by entering Delete.
Secure Mode Boot	<b>Disabled</b> Enabled	System boots in secure mode. The user must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.
Video Blanking	<b>Disabled</b> Enabled	Blank video when secure mode is activated. The user must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.
Floppy Write Protect	<b>Disabled</b> Enabled	When secure mode is activated, the diskette drive is write protected. The user must enter a password to re-enable diskette writes. Cannot be enabled unless at least one password is enabled.

## Server Menu

Table 3-14 and the following subsections describe and list the submenus and features of the server menu.

**Table 3-14** Server Menu Options

Feature	Choices	Description
System Management	N/A	Enters submenu.
Console Redirection	N/A	Enters submenu.
Processor Retest	<b>No</b> Yes	Instructs BIOS to clear historical processor status and to retest all processors on next boot.

### System Management Submenu

Table 3-15 describes the choices available in the system management submenu.

**Table 3-15** System Management Submenu

Feature	Choices	Description
Server Management Mode	Disabled <b>Enabled</b>	Enabled loads Server Management Interrupt handler, which handles system errors.
System Event Logging	Disabled <b>Enabled</b>	Enabled forces BIOS and BMC to log system events.
Clear Event Log	<b>Disabled</b> Enabled	Enabled clears the system event log.
Assert NMI on AERR	<b>Disabled</b> Enabled	Enabled generates a nonmaskable interrupt (NMI) on an address parity error (AERR).
Assert NMI on BERR	<b>Disabled</b> Enabled	Enabled generates an NMI on a bus error (BERR).
Assert NMI on PERR	<b>Disabled</b> Enabled	Enabled generates an NMI on a parity error (PERR). To activate this feature, the system error (SERR) option must be enabled.
Assert NMI on SERR	<b>Disabled</b> Enabled	Enabled generates an NMI on SERR.
Enabled Host Bus Error	<b>Disabled</b> Enabled	Enables host single-bit errors (SBEs) and multiple-bit errors (MBEs).



## Console Redirection Submenu

Table 3-16 describes the feature choices under the console redirection submenu.

**Table 3-16** Console Redirection Submenu

Feature	Choices	Description
COM Port Address	<b>Disabled</b> 3F8 2F8 3E8	When enabled, console redirection uses the I/O port specified. When disabled, console redirection is completely disabled.
IRQ #	None, 3, or 4	When console redirection is enabled, this displays the IRQ assigned per the address chosen in the COM Port Address field.
Baud Rate	9600 <b>19.2k</b> 38.4k 115.2k	When console redirection is enabled, use the baud rate specified. When the Emergency Management Port (EMP) shares the COM port as console redirection, the baud rate must be set to 19.2k to match EMP baud rate, unless the autobaud feature is used.
Flow Control	No flow control CTS/RTS XON/XOFF <b>CTS/RTS + CD</b>	None disallows flow control. CTS/RTS is hardware flow control. XON/XOFF is software flow control. CTS/RTS + CD is hardware plus carrier-detect flow control.

## Boot Menu

You can make the following menu and submenu selections on the boot menu itself (see Table 3-17 and the following subsections).

**Table 3-17** Boot Menu

Feature	Choices	Description
Floppy Check	<b>Disabled</b> Enabled	If Enabled, system verifies diskette type on boot. Disabled results in a faster boot.
Multi-boot Support	<b>Disabled</b> Enabled	Enable this option only if the total number of hard drives is less than eight.
Boot Device Priority	N/A	Enters submenu.

**Table 3-17 (continued)** Boot Menu

Hard Drive	N/A	Enters submenu.
Removable Devices	N/A	Enters submenu.
Maximum Number of I2O Drives	1 4	Selects the maximum number of I2O drives assigned a DOS drive letter.
Message Timeout Multiplier	1, 2, 8, 10, 50, 100, 1000	All timeout values are multiplied by this number.

### Boot Device Priority Submenu

Use the up- or down-arrow keys to select a device in the boot device priority submenu. Press the + or - key to move the device higher or lower in the boot priority list, see Table 3-18.

**Table 3-18** Boot Device Priority Submenu

Boot Priority	Device	Description
1.	Diskette Drive	Attempts to boot from drive A.
2.	Removable Devices	Attempts to boot from a removable media device.
3.	Hard Drive	Attempts to boot from a hard drive device.
4.	ATAPI CD-ROM Drive	Attempts to boot from an ATAPI CD-ROM drive.

### Hard Drive Submenu

For options on this menu, use the up or down arrow keys to select a device, see Table 3-19. Press the + or - key to move the device higher or lower in the boot priority list.

**Table 3-19** Hard Drive Submenu

Option	Description
1. Drive #1 (or actual drive string)	N/A
2. Other bootable cards (additional entries for each drive that has a PnP header)	Covers all the boot devices that are not reported to the system BIOS through the BIOS boot specification mechanism.

## Exit Menu

You can make the following selections on the exit menu, as shown in Table 3-20. Select an option using the up or down arrow keys. Press `Enter` to run the option. Pressing `Esc` does not exit the menu, you *must* select an item from the menu or menu bar to exit.

**Table 3-20** Exit Menu

Choices	Description
Exit Saving Changes	Exits after writing all modified Setup item values to NVRAM.
Exit Discarding Changes	Exits leaving NVRAM unmodified and continues POST. User is prompted if any of the Setup fields were modified.
Load Setup Defaults	Loads default values for all Setup items.
Load Custom Defaults	Loads settings from custom defaults.
Save Custom Defaults	Saves present Setup values to custom defaults. These settings override the standard BIOS defaults; BIOS loads these values when CMOS is corrupted or when the Clear CMOS jumper is in the clear position. <b>CAUTION:</b> Verify that custom defaults are saved before saving. Failure to do so can result in system malfunction.
Discard Changes	Reads previous values of all Setup items from NVRAM.
Save Changes	Writes all Setup item values to NVRAM.

## Using the System Setup Utility (SSU)

The SSU is on the configuration software CD shipped with the server. The SSU provides a graphical user interface (GUI) over an extensible framework for server configuration. The SSU framework supports the following functions and capabilities:

- Assigns resources to baseboard devices and add-in boards before loading the OS
- Lets you specify boot device order and system security options
- Permits viewing and clearing of the system event log (SEL)
- Permits viewing of the system FRU and SDRs
- Allows troubleshooting of the server when the OS is not operational
- Provides a system-level view of the server's I/O devices

### When to Run the SSU

The SSU is a DOS-based utility that supports extended system configuration operations for onboard resources and add-in boards. Use the SSU when you need to:

- Add and remove boards affecting the assignment of resources (ports, memory, IRQs, DMA)
- Modify the server's boot device order or security settings
- Change the server configuration settings
- Save the server configuration
- View or clear the SEL
- View FRU information
- View the SDR table

If you install or remove an ISA add-in board, you must run the SSU to reconfigure the server. Running the SSU is optional for PCI and Plug and Play ISA add-in boards.

The SSU is PCI-aware and complies with the ISA Plug and Play specifications; it works with any compliant configuration (.CFG) files supplied by the peripheral device manufacturer.

The baseboard comes with a `.CFG` file describing the characteristics of the board and the system resources it requires. The configuration registers on PCI and ISA Plug and Play add-in boards contain the same type of information in a `.CFG` file. Some ISA boards also come with a `.CFG` file.

The SSU uses the information provided by `.CFG` files, configuration registers, flash memory, and the information that you enter, to specify a system configuration. The SSU then writes the configuration information to flash memory.

The SSU stores configuration values in flash memory. These values take effect when you boot the server. POST checks the values against the actual hardware configuration; if the values do not agree, POST generates an error message. You must then run the SSU to specify the correct configuration before the server boots.

The SSU always includes a checksum with the configuration data so the BIOS can detect any potential data corruption before the actual hardware configuration takes place.

## **What You Need to Do Before Running the SSU**

You can run the SSU directly from the configuration software CD after you have installed a CD-ROM drive, or from a set of DOS diskettes.

If you choose to run the SSU from DOS diskettes, you must copy the SSU from the CD to the diskettes and follow the instructions in the included `README.TXT` file to prepare the diskettes.

If your diskette drive is disabled or improperly configured, you must use the flash-resident Setup utility to enable it so you can use the SSU. If necessary, you can disable the drive after exiting the SSU. Information entered using the SSU overrides any entered using Setup.

## Running the SSU

You can run the SSU either locally or remotely. The following subsections describe these options.

### Running the SSU Locally

Running the `ssu.bat` file provided on the SSU media starts the SSU. If the server boots directly from the SSU media, the `ssu.bat` file runs automatically. If the server boots from different media, the SSU can be started manually or by another application. When the utility starts in the local execution mode (the default mode), the SSU accepts input from the keyboard and/or mouse. The SSU presents a VGA-based GUI on the primary monitor.

The SSU runs from writable, nonwritable, removable, and nonremovable media. If the SSU is run from nonwritable media, user preference settings (like screen colors) cannot be saved.

The SSU supports the ROM-DOS V6.22 OS. It can run on other ROM-DOS compatible OSs, but they are not supported. The SSU will not operate from a “DOS window” running under another OS.

### Running the SSU Remotely

To run the SSU remotely, you must invoke the `SSU.BAT` file with the `/t` switch and redirect the text-mode output via BIOS console redirect.

## Starting the SSU

The SSU is a collection of task-oriented modules plugged into a common framework called the Application Framework (AF). The AF provides a launching point for individual tasks and a location for setting customization information.

1. Turn on your video monitor and your system.
2. Start the SSU through one of two ways:

### **Directly from the Server Configuration Software CD:**

- Insert the configuration software CD into your server's CD-ROM drive.
- Press the reset button or **Ctrl+Alt+Del** to reboot. When prompted to do so, press **F2** to enter BIOS Setup.
- From the Boot Menu, select the Boot Device Priority option and press **Enter**.
- Select CD-ROM as your primary boot device by using the **+** key to move it to the top of the list.
- Press **Esc** to exit the Boot Menu and **F10** to save your choice.
- The server will boot from the CD-ROM and display a menu of options. Follow the instructions in the menu to start the SSU.

### **After creating a set of SSU diskettes from the CD:**

- Insert the first SSU diskette in drive A.
  - Press the reset button or **Ctrl+Alt+Del** and press **F2** to enter the BIOS Setup and reconfigure your system to reboot the server from the diskette.
  - Use the same steps as listed above for the CD drive but select the diskette drive.
3. When the SSU title appears on the screen, select Utilities and press **Enter**.
  4. Select Run System Setup Utility then press **Enter**.

- 5. The mouse driver loads if it is available; press **Enter** to continue.

This message appears:

Please wait while the Application Framework loads....

When the main window of the SSU appears, you can customize the user interface (UI) before continuing.

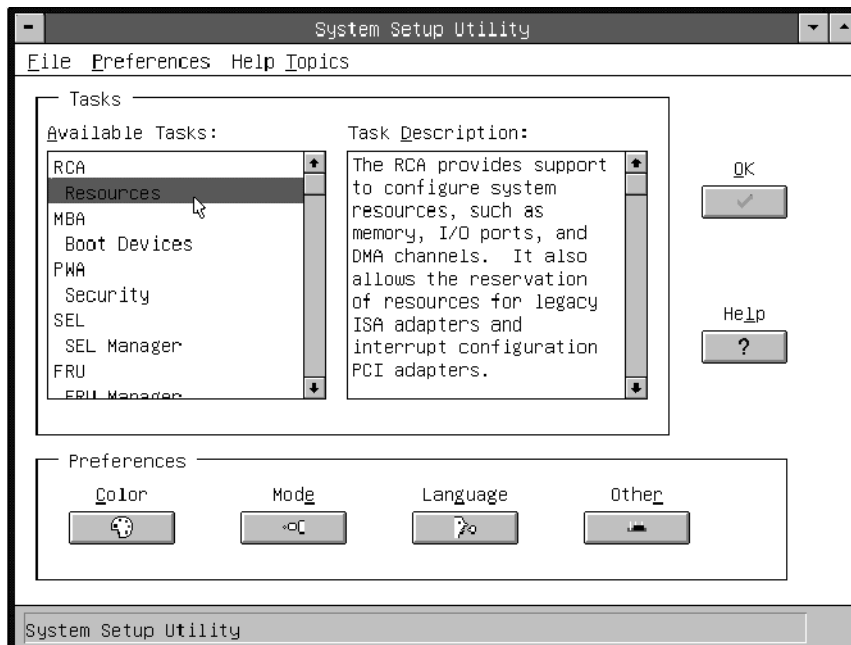


Figure 3-1 SSU Main Window



## Customizing the SSU

You can customize the UI according to your preferences. The AF sets these preferences and saves them in the AF.INI file so that they take effect the next time you start the SSU. Use these four user-customizable settings:

1. **Color**—lets you change the default colors associated with different items on the screen to predefined color combinations. The changes are instantaneous.
2. **Mode**—lets you set the desired expertise level.
  - Novice
  - Intermediate
  - Expert

The expertise level determines which tasks are visible in the Available Tasks section and what actions each task performs. For a new mode setting to take effect, you must exit the SSU and restart it. In the current implementation, there is no distinction between these three different modes.

3. **Language**—lets you change the text displayed in the SSU to the appropriate language. For a new language setting to take effect, you must exit the SSU and restart it.
4. **Other**—lets you change other miscellaneous options in the SSU. The changes are immediate.

To change the interface default values, do one of the following:

- Use the mouse to click on the proper button in the Preferences section of the SSU Main window.
- Use the **Tab** and arrow keys to highlight the desired button, and press the spacebar or **Enter**.
- Access the menu bar with the mouse or hot keys (**Alt** + underlined letter).

**Note:** If you run the SSU from non-writable media (like a CD-ROM), these preferences will be lost when you exit the SSU.

## Launching a Task

It is possible to have many tasks open at the same time, although some tasks might require complete control to avoid possible conflicts. The tasks achieve complete control by commanding the center of operation until you close the task window.

To launch a task, do one of the following:

- In the SSU Main window, double-click on the task name under Available Tasks to display the main window for that task.
- Highlight the task name, and click OK.
- Use the `Tab` and arrow keys to highlight the desired button, and press the spacebar or `Enter`.

## Resource Configuration Add-in (RCA) Window

The RCA provides three major functions:

- Creates representations of devices that cannot be discovered by the system (ISA boards)
- Modifies the contents of the system by adding and removing devices
- Modifies the resources used by devices

You can use the RCA window to define or add an ISA board by clicking on the appropriate button. To remove an ISA board, highlight the board in the Devices section of the screen before clicking on the button. You can add only as many ISA boards as there are ISA slots available.

1. From the SSU main window, launch the RCA by selecting the Resources task under the RCA heading in the task box.
2. When the RCA window appears, it displays messages similar to the following:

```
Baseboard: System Board
PCI Card: Bus 00 dev 00 -- Host Processor Bridge
PCI Card: Bus 00 dev 0D -- Multifunction Controller
PCI Card: Bus 00 dev 0F -- Ethernet Controller
PCI Card: Bus 00 dev 12 -- Multifunction Controller
PCI Card: Bus 00 dev 14 -- VGA Controller
```

3. To configure a device, click on it or select its name in the Devices section of the RCA window and press the spacebar or **Enter**.
4. You can close the RCA window and return to the AF by clicking on the Close button. Any changes made will be kept in memory for use by the RCA when it is rerun.
5. Save all changes by clicking Save. Saving writes your current configuration to nonvolatile storage where it will be available to the system after every reboot.
6. Closing the window by clicking on the system menu (the dash in the upper-left corner) discards all changes.

### Defining an ISA Board

An ISA board usually comes with a vendor-created `.CFG` file that specifies the resources the card requires to function properly. If the `.CFG` file is unavailable, you must manually create it or define the board through the SSU. Defining an ISA board consists of specifying the name of the board and the resources it consumes. This allows the RCA to consider the ISA board resource requirements when the RCA tries to resolve conflicts. BIOS also uses this information to configure hardware when the system is booted.

1. To add or remove ISA board resources, click on the appropriate resource buttons, select the desired value, and click Add or Remove.
2. After you complete the necessary information, click Save.

3. To edit a board, click Load to retrieve the board information. After making changes, click Save.
4. To create a board, click New.
5. To remove a current definition of a board, click Delete.

### **Adding and Removing ISA Boards**

Adding and removing boards through the RCA provides a way for the RCA to run its conflict detection algorithms on the resources requested by the boards. This alerts you to any possible problems with that particular board in the current configuration.

To add an ISA board:

1. Click Add ISA Board in the RCA window.
2. Specify the directory for the .CFG file.
3. Select the file and click OK.

To remove an ISA board:

1. Select a valid ISA board in the Devices section of the RCA window.
2. Click on Remove ISA Board.

### **Modifying Resources**

Modifying the resources of a device may be necessary to accommodate certain operating system applications, and drivers. It may also be necessary to modify resources to resolve a conflict.

To modify the resources associated with a device:

1. Highlight the device in the Devices section of the RCA window.
2. Press the spacebar or **Enter**, or double-click on the entry.

This displays the functions of the selected device along with possible choices and the resources associated with those choices.

To make a modification:

1. Highlight the function in the Configuration window.
2. Press the spacebar or **Enter**, or double-click on the entry (this updates the choice and resource lists).
3. Press the **Tab** key to get to the choice list, and press **Enter**.
4. Use the arrow keys to select a proper choice, and press **Enter** again.
5. If the choice allows multiple possible values for a particular resource, use the hot key to select a resource and press the spacebar or double-click on the resource.
6. Select the desired resource, and click OK.

### **System Resource Usage**

Click on Resource Use in the Configuration window to display the System Resource Usage window, which shows the resources each device consumes. This information is useful if a conflict occurs. Devices can be organized according to the resources you want to examine using the options in the Resource section of the screen. The resource information can also be written to a plain text file through this window.

### **Multiboot Options Add-in**

In this window, you can change the boot priority of a device.

1. Select a device.
2. Press **+** to move the device up in the list (higher priority). Press **-** to move it down.

## **Security Add-in**

In this window, you can set the User and Administrator passwords and security options.

### **To Set the User Password**

1. Click on User Password.
2. Enter the password in the first field.
3. Confirm the password by entering it again in the second field.

### **To Change or Clear the User Password**

1. Click on User Password.
2. Enter the old password in the first field.
3. Enter the new password in the second field (or leave it blank to clear).
4. Confirm the password by entering it again in the second field (leave blank to clear).

### **To Set the Administrator Password**

1. Click on Administrator Password.
2. Enter the password in the first field.
3. Confirm the password by entering it again in the second field.

### **To Change or Clear the Administrator Password**

1. Click on Administrator Password.
2. Enter the old password in the first field.
3. Enter the new password in the second field (or leave it blank to clear).
4. Confirm the password by entering it again in the second field (leave blank to clear).

## Security Options

In the security options window, you can set the other security options:

- **Hot Key**—sets a key sequence that puts the server into secure mode when the key is pressed.
- **Lock-Out Timer**—sets an interval that puts the server into secure mode when no activity occurs during the interval.
- **Secure Boot Mode**—forces the server to boot directly into secure mode.
- **Video Blanking**—turns off the video when the server is in secure mode.
- **Floppy Write**—controls access to the diskette drive when the server is in secure mode.
- **Reset/Power Switch Locking**—controls the power and reset buttons when the server is in secure mode.

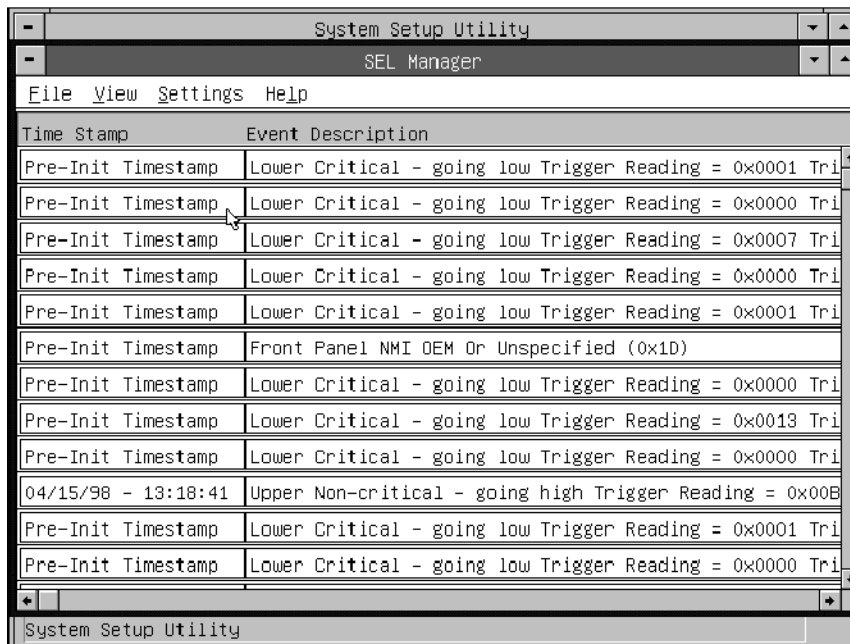
## System Event Log (SEL) Viewer Add-in

Clicking on the SEL add-in task brings up the SEL viewer add-in, which allows users to:

- Examine SEL records via the BMC in hex or verbose mode
- Examine SEL records by sensor or event type in hex or verbose mode
- Examine SEL records from a previously stored binary file in hex or verbose mode
- Save SEL records to a file in either text or binary form
- Clear SEL entries from the non-volatile storage area

The SEL viewer's main window provides access to features of the add-in. Each option included on the main menu supports an accelerator key. Accelerator keys are indicated by an underlined letter in the text listing the option. The main window includes support to display the following information for each SEL entry: record identifier, event type, time stamp information, generator identifier, emv revision, sensor type, sensor number, and event description.

Figure 3-2 shows the SEL viewer main window.



**Figure 3-2** SEL Viewer Add-in Main Window

Table 3-21 shows the SEL viewer menu options.

**Table 3-21** SEL Viewer Menus

Menu	Options
File	<p><b>Open SEL:</b> Views data from previously saved SEL file</p> <p><b>Save SEL:</b> Saves the currently loaded SEL data to a file</p> <p><b>Clear SEL:</b> Clears the SEL data from the BMC</p> <p><b>Exit:</b> Quits the SEL Viewer</p>
View	<p><b>SEL Info:</b> Displays information about the SEL (display only)</p> <p><b>All Events:</b> Displays the current SEL data from the BMC</p> <p><b>By Sensor:</b> Displays a pop-up menu allowing you to view the data from a certain sensor type</p> <p><b>By Event:</b> Displays a pop-up menu allowing you to view the data from a certain event type</p>



**Table 3-21 (continued)** SEL Viewer Menus

---

Settings	<b>Display Hex/Verbose:</b> Toggles between Hex/interpreted mode of displaying the SEL records <b>Output Text/Binary:</b> Determines whether SEL data will be saved to the file (and under File - Save) in binary format or verbose format
Help	<b>About:</b> Displays the SEL Viewer version information

---

## Sensor Data Record (SDR) Manager Add-In

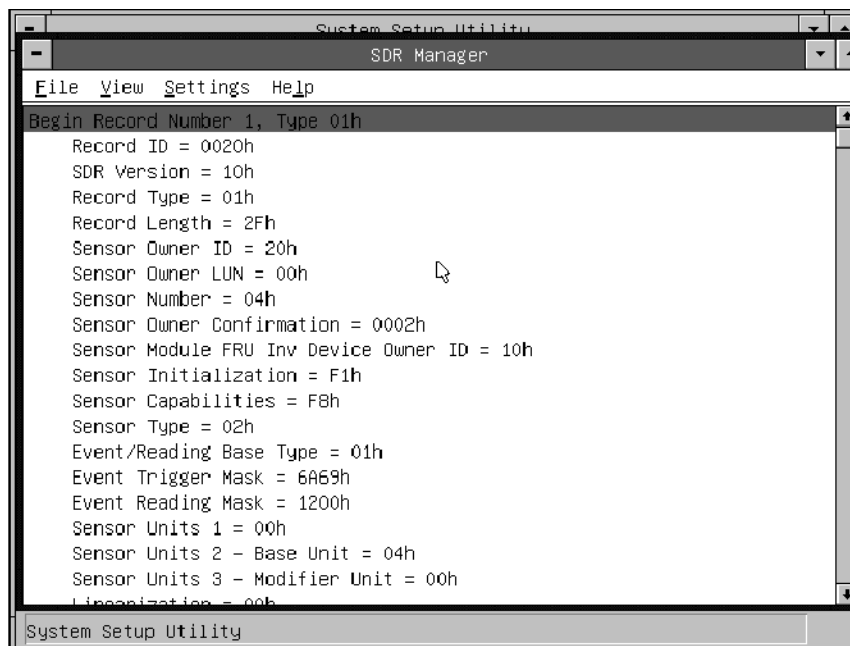
In this window, you can:

- Examine all SDR records through the BMC (in either Hex or Verbose mode)
- Examine SDR records by Record type (in either Hex or Verbose mode)
- Examine SDR records from a previously stored binary file (in either Hex or Verbose mode)
- Save the SDR records to a file (in either text or binary form)

The SDR Manager can display SDR records in either raw form (hexadecimal) or in an interpreted, easy-to-understand textual form (verbose).

The SDR Manager's main window provides access to features of the add-in through menus. Each option included on the main menu supports an accelerator key. Accelerator keys are indicated by an underlined letter in the text listing the option.

Figure 3-3 shows the SDR Manager main window. The SDR Manager Menu lists the window's menus and options, see Figure 3-3 for an example.



**Figure 3-3** SDR Manager Main Window

Table 3-22 lists the options available under the SDR manager menus.

**Table 3-22** SDR Manager Menus

Menu	Options
File	<p><b>Open FRU:</b> Opens FRU data from a previously saved file</p> <p><b>Save SDR:</b> Saves SDR data to a file in binary raw or verbose text format</p> <p><b>Exit:</b> Quits the SDR Manager</p>
View	<p><b>SDR Info:</b> Displays SDR information as returned by the GetSDRInfo interface of the BMC</p> <p><b>All Records:</b> Displays all records in the SDR repository</p> <p><b>By Record:</b> Displays all records in the SDR repository, sorted by record type</p>

**Table 3-22 (continued)** SDR Manager Menus

---

Settings	<b>Display HEX:</b> Displays SDR records in Hex format <b>Display Verbose:</b> Displays SDR records in verbose format <b>Output Text:</b> Saves SDR data in verbose format <b>Output Binary:</b> Saves SDR data in binary format
Help	<b>About:</b> Displays SDR Manager version information

---

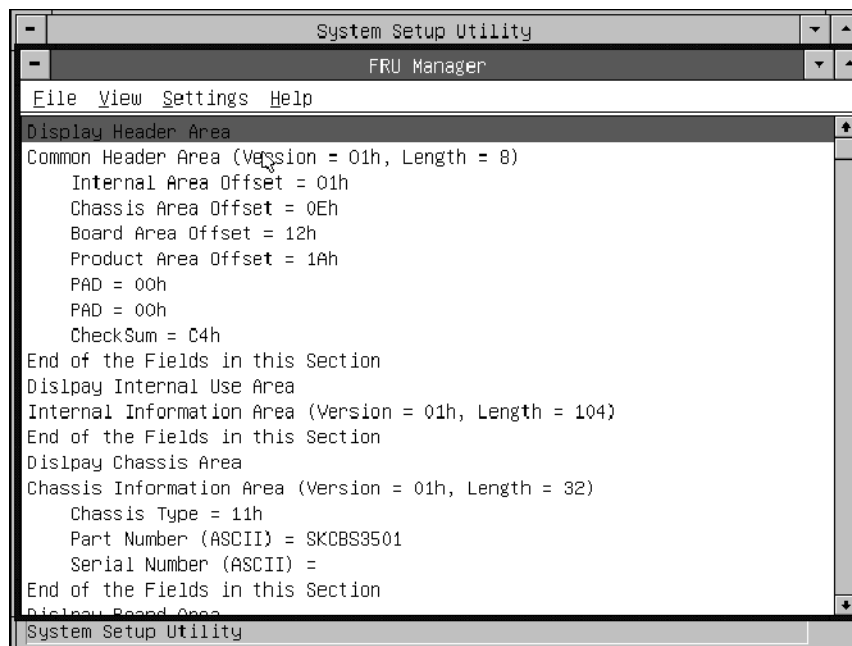
### Field Replaceable Unit (FRU) Manager Add-In

In this window you can:

- Examine all FRU Inventory areas on the server (in either Hex or Verbose mode)
- Examine individual FRU Inventory areas (in either Hex or Verbose mode)
- Examine FRU Inventory areas from a previously stored binary file (in either Hex or Verbose mode)
- Save the FRU Inventory areas to a file (in either text or binary form)

The FRU Manager can display the FRU Inventory areas in either raw form (hexadecimal) or in an interpreted, easy-to-understand textual form (verbose). The FRU manager's main window provides access to features of the add-in through menus. Each option included on the main menu supports an accelerator key. Accelerator keys are indicated by an underlined letter in the text listing the option.

Figure 3-4 shows the FRU Manager main window. FRU Manager Menus lists the window's menus and options, see Figure 3-4 for an example.



**Figure 3-4** FRU Manager Main Window

Table 3-23 describes the FRU manager menus and options.

**Table 3-23** FRU Manager Menus

Menu	Options
File	<b>Open FRU:</b> Opens FRU data from a previously saved file <b>Save FRU:</b> Saves FRU data to a file in binary raw or verbose text format <b>Exit:</b> Quits the FRU Manager
View	<b>FRU Info:</b> Displays FRU information of the selected device <b>All FRU Areas:</b> Displays FRU areas of all devices <b>By Device Type:</b> Displays FRU areas sorted by device type

**Table 3-23 (continued)** FRU Manager Menus

---

Settings	<b>Display HEX:</b> Displays FRU areas in Hex format <b>Display Verbose:</b> Displays FRU areas in verbose format <b>Output Text:</b> Saves FRU data in verbose format <b>Output Binary:</b> Saves FRU data in binary format
Help	<b>About:</b> Displays FRU Manager version information

---

## Exiting the SSU

Exiting the SSU causes all windows to close.

1. Exit the SSU by opening the menu bar item **F**ile in the SSU Main window.
2. Click on Exit

or

Highlight Exit, and press **Enter**.

## Emergency Management Port (EMP) Console

The EMP console provides an interface, called the console manager, to the EMP. This interface allows remote server management by way of a modem or direct connection. The EMP console is used only with a Windows operating system.

The following server control operations are available with the console manager:

- Connecting to remote servers
- Powering the server on or off
- Resetting the server
- Switching the server console between EMP active and BIOS re-direct modes

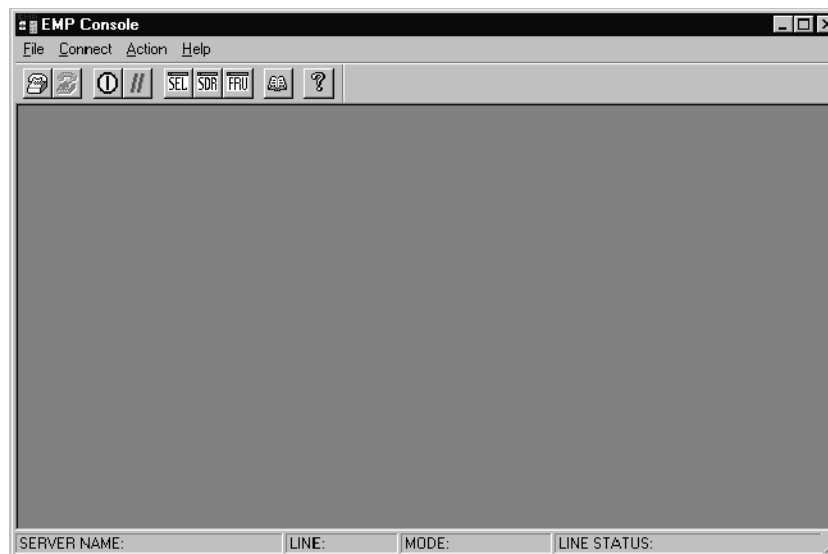
The console manager uses three management plug-ins to monitor the server: the SEL, SDR, and FRU viewers.

The console manager also has a support plug-in phonebook, which you can use to create and maintain a list of servers and their phone numbers. You can launch the Connect dialog directly from the Phonebook dialog to connect to a selected server.

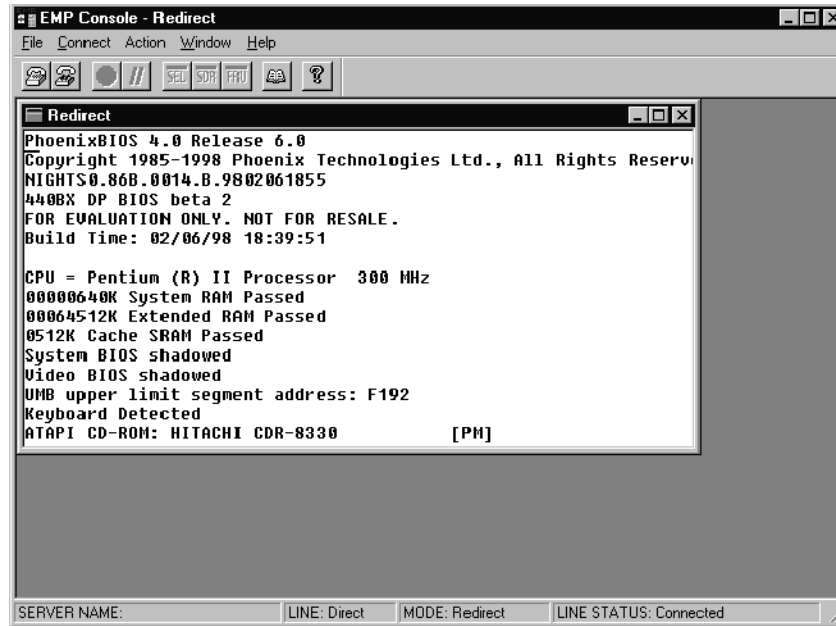
## How the EMP Console Works

The EMP shares the COM2 port with the system. When the EMP has control of the port, the port operates in command state. When the system has control of it, the port operates in redirect state. When connecting to a server, the EMP console checks to determine the current COM2 port state. See Figure 3-5 for an example screen of the EMP console in command state and Figure 3-6 for an example of the EMP console in redirect state.

- **Command state**—the default COM2 state. In this state, the EMP console communicates with the server's firmware, allowing the client to remotely reset or power the server up or down. The client can also view the server's SEL, FRU information, or SDR table.
- **Redirect state**—the EMP console serves as a PC ANSI terminal window for BIOS console redirection. Commands typed in this terminal window are transmitted through BIOS to the server's console, and text displayed on the server console is displayed on the EMP console's terminal window. With the EMP in this state, you can remotely view boot messages, access BIOS setup, and run DOS text mode applications through the EMP console's terminal window.



**Figure 3-5** EMP Console in Command State



**Figure 3-6** EMP Console in Redirect State

When you use the EMP console window in redirect state with the terminal window, the text that appears on the server monitor displays in the redirect window.

Availability of the various EMP console features is determined by two things:

- the EMP access mode selected during configuration in the System Management Submenu of the BIOS Server Menu
- whether the server's COM2 port is configured for console redirect in BIOS.

The three EMP access modes are disabled, pre-boot, and always active. See Table 3-24 for a listing of the access modes.

**Table 3-24** EMP Console Access Modes (Server Configured for Console Redirect)

Mode	Server is powered off	During POST	After OS boots
Disabled	Redirect window appears, but is blank	Redirect window	Redirect window
Pre-boot	EMP commands available	Redirect window <sup>a</sup>	Redirect window
Always Active	EMP commands available	Redirect window <sup>a</sup>	EMP commands available

a. Note that you can modify the operation mode by selections in the POST reset and POST power-up dialogs. These are server control dialogs available with the EMP Console.

Table 3-25 lists the access modes when the server is *not* configured for console redirection.

**Table 3-25** EMP Console Access Modes (Server *Not* Configured for Console Redirect)

Mode	Server is powered off	During POST	After OS boots
Disabled	Redirect window appears, but is blank	Redirect window appears, but is blank	Redirect window appears, but is blank
Pre-boot	EMP commands available	EMP commands available	Redirect window appears, but is blank
Always Active	EMP commands available	EMP commands available	EMP commands available



## EMP Console Requirements

This section outlines the requirements and configurations necessary for using the EMP console.

Operating System:

- Windows NT
  - Windows NT 4.0 or later
  - 24 MB of RAM, 32 MB recommended
  - 20 MB disk space

**Client Configuration:** The EMP console will support all COM ports on the client system, along with any Windows NT compatible modem.

**Server Configuration:** The EMP console requires that the server's COM2 port be connected to an external modem or directly connected to a serial cable.

**Direct Connect Configuration:** A null modem serial cable is needed. Connect one end of the cable into the COM2 port of the server and the other into a port on the client machine.

**Modem Configuration:** On the client, the EMP console uses the Windows application program interface (API) to determine if a modem is connected and available. The EMP Console does not configure the modem; it should be preconfigured through Windows.

For modem support, the server must use a Hayes-compatible 14400 bps modem. The modem must be on the NT hardware compatibility list provided by Microsoft. The server modem must be set in autoanswer mode for the EMP console to be able to connect to it.

## Setting Up the Server for the EMP

To use the EMP, you must configure BIOS with specific settings. Enter these settings in two submenus of the BIOS Server Menu: the System Management Submenu and the Console Redirect Submenu. The section above on BIOS settings shows all available options. The sections below focus on the settings that must be configured to use the EMP.

### System Management Submenu

All EMP-related settings occur from the System Management Submenu of the server Main Menu. Change only the items below; all other default settings should remain the same.

**EMP Password:** Any time you attempt to initiate a connection, a prompt for the user password appears. If you never set up the EMP password, anyone can access the EMP by clicking OK through the password prompt.

In the EMP password area of the System Management Submenu, type in a password of up to eight alphanumeric characters. If the system beeps, the password was not accepted; you must enter a different password.

**EMP Access Modes:** Choose either disabled, pre-boot, or always active, depending on the type of EMP access needed. Table 3-24 and Table 3-25 list what is available with a given setting.

**EMP Restricted Mode Access:** Set restricted mode to either enabled or disabled. In enabled mode, the EMP console's server control options, Power On/Off and Reset, are NOT available. In disabled mode, these options ARE available.

**EMP Direct Connect/Modem Mode:** Select Direct Connect if a null modem serial cable directly connects the server's COM2 port to the EMP console client machine. If they are connected via a modem, select Modem Mode.

### Console Redirection Submenu

To use the EMP, you must set the following options exactly as noted.

**COM Port Address:** Select 2F8. This is the COM2 port that the EMP must use. The IRQ# setting is automatically assigned with the correct number based on the COM port address choice.

**Baud Rate:** Select 19.2k.

**Console Type:** Choose PC ANSI.

**Flow Control:** Choose CTS/RTS + CD.

## Main EMP Console Window

The main EMP console window provides a graphical user interface (GUI) to access server control operations and to launch the management plug-ins. A menu and tool bar at the top of the GUI provide options to initiate plug-ins and other support features. A status bar at the bottom displays connection information like server name, line status, and mode.

### Toolbar

The toolbar buttons combine server control and management plug-in options available from the Connect and Action Menus.



Connects to a selected server.



Disconnects from the currently connected server.



Powers the selected server on or off.



Resets the selected server.



Opens the SEL viewer.



Opens the SDR viewer.



Opens the FRU viewer.



Opens the phonebook.



Opens online help.

### Status Bar

The status bar displays at the bottom of the current window. It contains the following status information:

- **Server Name:** The name of the connected server.
- **Line:** The type of line connection (direct or modem).
- **Mode:** Either redirect or EMP, depending on whether the EMP has control of the COM2 port.
- **Line Status:** Gives status information on the server connection. For example, if a server is connected, the status bar says Connected. Otherwise, the line is blank.

### EMP Console Main Menu

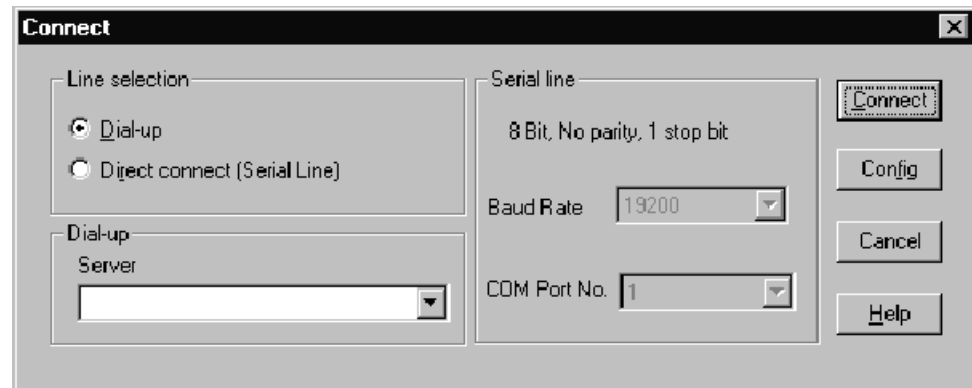
- File
  - **Exit:** Exits the EMP console.
- Connect
  - **Disconnect:** Disconnects the server connection.
  - **[Re]Connect:** Raises the connect dialog.
  - **(A list of the five most recent connections):** Initiates connection to selected server.
- Action
  - **Power On/Off:** Powers the server on or off with POST power-up options.
  - **Reset:** Resets the server with POST reset options.
  - **SEL Viewer:** Opens the SEL viewer.
  - **SDR Viewer:** Opens the SDR viewer.
  - **FRU Viewer:** Opens the FRU viewer.
  - **Phonebook:** Opens the phonebook dialog.
- **Help:** Provides version information and help topics for the EMP console.

## Server Control Operations

Three server control operations are available from the menu or toolbar of the main EMP console window, remote server connection, powering the server on and off, and resetting the server. The server console mode can also be switched between EMP active and BIOS redirect modes through POST power-up and reset options.

### Connect to Remote Server

Select [Re]Connect from the Connect Menu and follow the Connect dialog. Connect Dialog allows you to connect to a selected server, see Figure 3-7. If the client machine is already connected to a server, initiating connection generates a warning message. The message states that the existing connection will be terminated if you continue trying to initiate the new connection. You are prompted to enter the EMP password whenever a connection is attempted.



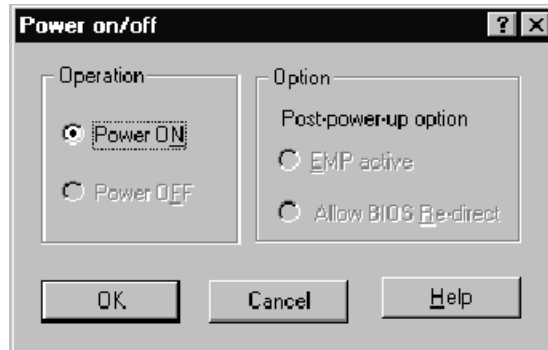
**Figure 3-7** Connect Dialog

Options available in the dialog are:

- **Line Selection:** Allows distinction between direct or dial-up modem connection to the server.
  - **Dial-up:** Connects to a selected server with a modem.
  - **Direct connect (Serial Line):** Connects to the selected server directly using a null modem serial cable.
- **Server:** Displays a list of available servers in a drop-down edit list box. You can select or enter a server name; a server must be selected when the line selection is dial-up.
- **Serial Line:** Must be filled out when the line selection is set to direct connect (serial line).
  - **Baud Rate:** Specifies baud rate; must be 19200 for EMP to connect properly.
  - **COM Port No.:** Sets the COM port number to which the null modem serial cable is connected.
- **Connect:** Initiates connection to the server. When you click this button, you are prompted for the EMP password.
- **Config:** Displays the Phonebook dialog.
- **Cancel:** Exit the Connect dialog with no action taken.
- **Help:** Display dialog-level help information.

### Power the Server On or Off Remotely

Selecting Power On/Off from the Action Menu allows you to power the server on or off, with POST power-on options. It generates the Power on/off dialog. See Figure 3-8 for an example.



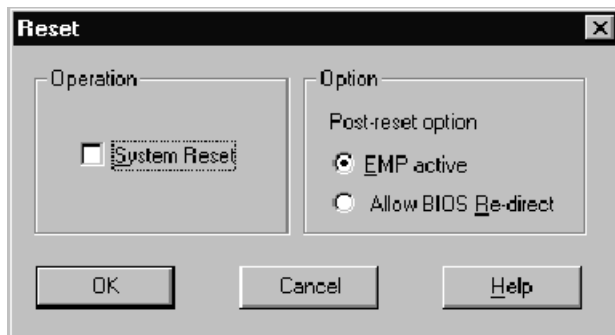
**Figure 3-8** Power On/Off Dialog

Options available in the dialog are:

- **Power ON:** Powers on the server.
- **Power OFF:** Powers off the server. This option is not allowed if the server is configured in restricted mode for EMP operations.
- **Post-power-up option:** Sets the server mode EMP active or BIOS redirection. The setting is effective at the next power-up. The default selection is EMP active.
- **Cancel:** Exits the dialog with no action taken.
- **Help:** Displays dialog-level help information.

### Reset the Server Remotely

Selecting Reset from the Action Menu generates the Reset dialog so that you can remotely reset the server with POST reset options.



**Figure 3-9** Reset Dialog

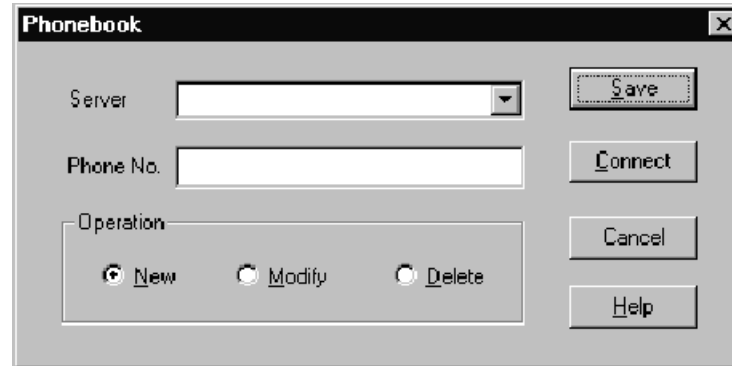
Options available in the dialog are:

- **System Reset:** Resets the server with the selected POST reset options. This operation is not allowed if the server is configured in restricted mode for EMP operations.
- **Option Group:** Sets the POST reset option that will be effective after reset. The options are EMP active or BIOS redirection. The default selection is EMP active.
- **Cancel:** Exits the dialog with no action taken.
- **Help:** Displays dialog-level help information.



## Phonebook

The EMP console provides a phonebook, a support plug-in that stores names and numbers of servers in a list that can be updated by adding, modifying, or deleting entries. You can open the phonebook from the Main Menu and tool bars, or launch it by clicking the Config button.



**Figure 3-10** Phonebook Dialog

Options available in the dialog are:

- **Server:** Displays a drop-down list of server names previously stored in the phonebook. If the New radio button is selected in the Operation area, the server area is cleared.
- **Phone No.:** Displays the number of the selected server. If the New radio button is selected in the Operation area, this area is cleared.
- **Operation**
  - **New:** Makes a new entry in the phonebook. Selecting this option clears the Server and Phone No. fields. You must click Save to add the entry to the phonebook.
  - **Modify:** Edits an existing entry. Before selecting this option, you must first select an existing entry from the Server drop-down edit box and modify the existing phone number. Click on Save to store this entry in the phonebook.
  - **Delete:** Deletes an entry from the phonebook. You must first select an existing server from the Server drop-down edit box before selecting this option. Click Save to delete the entry.

- **Save:** Saves a new or modified phonebook entry or deletes an entry if you have already selected the Delete radio button.
- **Connect:** Raises the Connect dialog with the server from the phonebook's Server drop-down edit box already populating the Connect dialog's Server drop-down edit box.
- **Cancel:** Exits the dialog with no action taken.
- **Help:** Displays dialog-level help information.

## Management Plug-ins

The following subsections list information on the SEL viewer and its options.

### System Event Log (SEL) Viewer

The SEL viewer can display records in either hexadecimal or text (verbose) form. These options are available through the SEL viewer:

- View the SEL from a file
- Save the SEL to a file
- View SEL summary information
- View all SEL entries
- View SEL info by event type
- View SEL info by sensor type
- Set SEL display mode to either Hex or verbose mode
- Set the SEL output file format to either text or binary format
- Close the SEL viewer
- Exit the EMP console

## SEL Viewer Menu Options

The following menu options are available on the SEL viewer menu bar:

- **File**
  - **Open:** Allows you to view SEL data from a previously saved file if it was stored in binary format. Selecting the Open Menu item lets you specify a filename under which the data are found. The default filename is SELLOG.DAT. If the file cannot be opened, the program displays an error message.
  - **Close:** Closes the SEL viewer.
  - **Save As:** Dumps the SEL data to a file in either binary raw or verbose text format. The binary file can be retrieved later. Selecting this option lets you specify a filename to which the data can be saved. The default filename is SELLOG.DAT. If no data exist, an error message displays.
  - **Exit:** Exits the EMP console.
  - **SEL Information:** Displays SEL summary information.
  - **All Events:** Displays all events in the SEL.
  - **By Sensor Type:** Displays all events in the SEL generated by a specific sensor type, such as voltage, temperature, etc.
  - **By Event:** Displays all events in the SEL of a particular type, for example, by memory or threshold. A pop-up menu lets you select the event type to display. This menu displays all event types that can be generated by the particular hardware.
- **Settings:** Lets you change several operating parameters for the SEL viewer. This menu displays the following suboptions:
  - **Display HEX/Verbose:** Toggles between HEX mode and interpreted mode of displaying SEL records.
  - **Output Text/Binary:** Specifies whether SEL data will be saved to the file in binary format or verbose format.
- **Window:** Gives options for displaying currently open windows.
- **Help:** Provides version information for the SEL viewer and provides help topics on the EMP console.

### Sensor Data Record (SDR) Viewer

The SDR viewer lets you view the records retrieved from the SDR repository. Options available through the SDR viewer are:

- View all SDR records
- View SDR entries by SDR type
- View SDR summary information
- Set SDR display mode to either Hex or verbose mode
- Close the SDR viewer
- Exit the EMP console

### SDR Viewer Menu Options

The SDR viewer menu bar contains the following:

- **File**
  - **Close:** Closes the SDR viewer.
  - **Exit:** Exits the EMP console.
- **View**
  - **Display all Records:** Displays all records from the SDR repository.
  - **SDR Type:** Displays the records of a particular SDR type. You select an SDR type from a pop-up menu that displays all the SDR types available for the given hardware.
  - **SDR Info:** Displays the SDR summary information.
- **Settings:** Lets you change operating parameters for the SDR viewer. This menu displays the following suboption:
  - **Display HEX/Verbose:** Toggles between HEX mode and interpreted mode of displaying SDR records.
- **Window:** Gives options for displaying currently open windows.
- **Help:** Provides version information for the SDR viewer and provides help topics on the EMP console.

### Field Replaceable Unit (FRU) Viewer

The FRU viewer lets you view data from the server's baseboard FRU information area. Options available with the FRU viewer are:

- View all FRU records
- View FRU summary information
- Set FRU display mode to either Hex or verbose mode
- Close the FRU viewer
- Exit the EMP console

### FRU Viewer Menu Options

The following menu options are on the FRU viewer menu bar:

- **File**
  - **Close:** Closes the FRU viewer.
  - **Exit:** Exits the EMP console.
- **View**
  - **Display all Records:** Displays all FRU data, which consist of chassis, board, and product information.
  - **FRU Info:** Displays the FRU summary information.
- **Settings:** Lets you change operating parameters for the FRU viewer. This menu displays the following suboption:
  - **Display HEX/Verbose:** Toggles between HEX mode and interpreted mode of displaying FRU records.
- **Window:** Gives options for displaying currently open windows.
- **Help:** Provides version information for the FRU viewer and provides help topics on the EMP console.

### **FRU and SDR Load Utility**

The Field Replacement Unit (FRU) and Sensor Data Record (SDR) load utility is a DOS-based program used to update the server management subsystem's product level FRU, SDR, and the Desktop Management Interface (DMI) nonvolatile storage components (EEPROMs). The utility:

- Discovers the product configuration based on instructions in a master configuration file
- Displays the FRU information
- Updates the EEPROM associated with the Baseboard Management Controller (BMC) that holds the SDR and FRU area
- Updates the DMI FRU area located in the BIOS nonvolatile storage device
- Generically handles FRU devices that might not be associated with the BMC

### **When to Run the FRUSDR Load Utility**

You should run the FRUSDR load utility each time you upgrade or replace the hardware in your server, excluding add-in boards, hard drives, and RAM. For example, if you replace an array of fans, you need to run the utility. It programs the sensors that need to be monitored for server management.

Because the utility must be reloaded to properly initialize the sensors after programming, turn the server off and remove the AC power cords from the server. Wait approximately 30 seconds, then reconnect the power cords and turn on the server.

### **What You Need to Do**

You can run the utility directly from the configuration software CD or from diskettes you create from the CD.

If you choose to run the FRUSDR Load Utility from a diskette, you must copy the utility from the CD and follow the instructions in the included `README.TXT` file.

If your diskette drive is disabled, or improperly configured, you must use BIOS Setup to enable it. If necessary, you can disable the drive after you are done with the FRUSDR utility.

## How You Use the FRUSDR Load Utility

The utility:

- Is compatible with ROM-DOS Ver. 6.22, MS-DOS Ver. 6.22, and later versions
- Accepts CFG, SDR, and FRU load files (the executable file for the utility is `frusdr.exe`)
- Requires the following supporting files
  - one or more `.fru` files describing the system's field replaceable units
  - a `.cfg` file describing the system configuration
  - an `.sdr` file describing the sensors in the system

### FRUSDR Command Line Format

The basic command line format is

```
frusdr [-?] [-h] [-d {dmi, fru, sdr}] [-cfg filename.cfg] [-fru filename.fru]
```

Table 3-26 lists the FRUSDR commands and describes them.

**Table 3-26** FRUSDR Command Line Format

Command	Description
<code>frusdr</code>	Is the name of the utility
<code>-?</code> or <code>-h</code>	Displays usage information
<code>-d {dmi, fru, sdr}</code>	Displays requested area only
<code>-cfg filename.cfg</code>	Uses custom CFG file
<code>-p</code>	Pause between blocks of data
<code>-v</code>	Verbose, display any additional details

### Parsing the Command Line

The FRUSDR load utility allows only one command line function at a time. A command line function can consist of two parameters. Example: `-cfg filename.cfg`. Invalid parameters cause an error message and exit the program. You can use either a slash (/) or a minus sign (-) to specify command line options. The `-p` and `-v` flags can be used with any of the other options.

### Displaying Usage Information

When the utility is run with the `-?` or `-h` command line flags, the following message is displayed when the verbose flag `-v` is added to the help command:

```
FRU & SDR Load Utility Version 2.1 Revision R.1.1
```

```
Usage:   frusdr
         -? or -h           Displays usage information
         -d {dmi,fru,sdr}  Only displays requested area.
         -cfg filename.cfg  Uses custom CFG file.
         -p                 Pause between blocks of data.
         -v                 Verbose, display any additional details.
```

```
Copyright (c) 1999, Intel Corporation, All Rights Reserved
```

This utility must be run from a system executing DOS. Running in a Windows DOS box is insufficient and will provide incorrect results. Programming the BMC FRU area clears the SDR table; therefore the SDR table must be reprogrammed. Upon completing the programming of the FRU and SDR areas, the server should be rebooted.

**Note:** DOS users may alternatively use a '/' instead of the '-'.



The following information displays if the `-v` option is included in the command line.

The `/D FRU` command may be followed with up to 16 device addresses. These device addresses are used to view up to 16 different FRU areas, instead of the default of displaying the BMC FRU. The arguments following the `-d FRU` are in the same order and value as the `NVS_TYPE`, `NVS_LUN`, `DEV_BUS` and `DEV_ADDRESS` which are found in the FRU file header in each FRU file. The LUN address is optional. If the LUN address is used, it must start with an `L`.

```
Usage:    FRUSDR -d fru (device) [lun] (bus) (addr) (addr2) (etc)
```

```
Example: FRUSDR /D FRU IMBDEVICE L00 00 C0 C2
```

The configuration file may be used to load multiple FRU and SDR files. In the configuration file, you may define which FRU and SDR areas are to be programmed. Additionally, you may request information from the user or ask the user to choose which areas to program.

### Displaying a Given Area

When the utility is run with the `-d DMI`, `-d FRU`, or `-d SDR` command line flag, the indicated area is displayed. Each area represents one sensor for each instrumented device in the server. If the given display function fails because of an inability to parse the data present or a hardware failure, the utility displays an error message and exits.

### Displaying DMI Area

Each DMI area displayed is headed with the DMI area designated name. In each area, each field has a field name header followed by the field in ASCII or as a number.

Example:

To display the DMI area, type `frusdr -d dmi` and press **Enter**.

### Displaying FRU Area

The FRU area is displayed in ASCII format when the field is ASCII or as a number when the field is a number. Each FRU area displayed is headed with the FRU area designated name. Each field has a field name header followed by the field in ASCII or as a number. The board, chassis, and product FRU areas end with an END OF FIELDS CODE that indicates there are no more data in the area. The internal use area is displayed in hex format, 16 bytes per line.

Example:

To display the FRU area, type `frusdr -d fru` and press **Enter**.

### Displaying SDR Area

The SDR nonvolatile storage area is displayed in the following hex format. The data are separated by a sensor record number X header, where X is the number of that sensor record in the SDR area. The next line after the header is the sensor record data in hex format delineated by spaces. Each line holds up to 16 bytes. The data on each line are followed by the same data in ASCII format; note that nonprintable characters are substituted by a period (.).

Example:

To display the SDR area, type `frusdr -d sdr` and press **Enter**.

### Using Specified CFG File

The utility can be run with the command line parameter of `-cfg filename.cfg`. The filename can be any DOS-accepted, eight-character filename string. The utility loads the specified CFG file and uses the entries in that file to probe the hardware and to select the proper SDRs to load into nonvolatile storage.

### Displaying the Utility Title and Version

The utility displays its title:

```
FRU & SDR Load Utility, Version 2.0, Revision X.XX
```

where X.XX is the revision number for the utility.

## Configuration File

The configuration file is in ASCII text. The utility executes commands formed by the strings present in the configuration file. These commands cause the utility to run tasks needed to load the proper SDRs into the nonvolatile storage of the BMC and possibly generic FRU devices. Some of the commands may be interactive and require you to make a choice.

## Prompting for Product Level FRU Information

Through the use of a configuration file, the utility might prompt you for FRU information.

## Filtering Records From the SDR File

The `MASTER.SDR` file has all the possible SDRs for the system. These records might need to be filtered based on the current product configuration. The configuration file directs the filtering of the SDRs.

## Updating the SDR Nonvolatile Storage Area

After the utility validates the header area of the supplied SDR file, it updates the SDR repository area. Before programming, the utility clears the SDR repository area. The utility filters all tagged SDRs depending on the product configuration set in the configuration file. Nontagged SDRs are automatically programmed. The utility also copies all written SDRs to the `SDR.TMP` file, as it contains an image of what was loaded. The `TMP` file is also useful for debugging the server.

## Updating FRU Nonvolatile Storage Area

After the configuration is determined, the utility updates the FRU nonvolatile storage area. First it verifies the common header area and checksum from the specified FRU file. The internal use area is read out of the specified `.FRU` file and is programmed into the nonvolatile storage. The chassis area is read out of the specified `.FRU` file. Finally, it reads the product area out of the specified FRU file, then the area is programmed into the FRU nonvolatile storage. All areas are also written to the `FRU.TMP` file.

### Updating DMI FRU Nonvolatile Storage Area

After programming the BMC FRU area, the utility programs the chassis, board, and product FRU information to the DMI fields. The update happens only if the DMI flag follows each FRUAREA command in the configuration file.

### Cleaning Up and Exiting the Nonvolatile Storage Area

If an update was successfully performed, the utility displays a single message and then exits.

If the utility fails, it immediately exits with an error message and an exit code.

## Changing the BIOS Settings

Before you change or upgrade the BIOS, prepare the system by recording the current BIOS settings, obtaining the upgrade utility, and making a copy of the current BIOS. Read the following subsections for information on these procedures.

### Recording the Current BIOS Settings

1. Boot the computer and press **F2** when you see the message:

```
Press F2 Key if you want to run SETUP
```

2. Write down the current settings in the BIOS Setup program.

**Note:** Do not skip step 2. You will need these settings to configure your computer at the end of the procedure.

## Obtaining the Upgrade Utility

You can upgrade to a new version of the BIOS using the new BIOS files and the BIOS upgrade utility, iFLASH.EXE. You can obtain the BIOS upgrade file and the iFLASH.EXE utility through your support provider or from the Intel World Wide Web site:

<http://www.intel.com>

**Note:** Please review the instructions distributed with the upgrade utility before attempting a BIOS upgrade.

This upgrade utility lets you:

- Upgrade the BIOS in flash memory.
- Update the language section of the BIOS.

The following steps explain how to upgrade the BIOS.

## Creating a Bootable Diskette

1. Use a DOS or Windows 95 system to create the diskette.
2. Insert a diskette in drive A.
3. At the `C:\` prompt, for an unformatted diskette, type:  
`format a:/s`  
or, for a formatted diskette, type:  
`sys a:`
4. Press **Enter**.

## Creating the BIOS Upgrade Diskette

The BIOS upgrade file is a compressed self-extracting archive that contains the files you need to upgrade the BIOS.

1. Copy the BIOS upgrade file to a temporary directory on your hard disk.
2. From the `C:\` prompt, change to the temporary directory.
3. To extract the file, type the name of the BIOS upgrade file, for example:  

```
10006BI1.EXE
```
4. Press **Enter**. The extracted file contains the following files:  

```
LICENSE.TXT  
README.TXT  
BIOS.EXE
```
5. Read the `LICENSE.TXT` file, which contains the software license agreement, and the `README.TXT` file, which contains the instructions for the BIOS upgrade.
6. Insert the bootable diskette into drive A.
7. To extract the `BIOS.EXE` file to the diskette, change to the temporary directory that holds the `BIOS.EXE` file and type:  

```
BIOS A:
```
8. Press **Enter**.
9. The diskette now holds the BIOS upgrade and recovery files.

## Upgrading the BIOS

1. Boot the computer with the diskette in drive A. The BIOS upgrade utility screen appears.
2. Select Update Flash Memory From a File.
3. Select Update System BIOS. Press **Enter**.
4. Use the arrow keys to select the correct `.bio` file then press **Enter**.
5. When the utility asks for confirmation that you want to flash the new BIOS into memory, select Continue with Programming. Press **Enter**.
6. When the utility displays the message upgrade is complete, remove the diskette and press **Enter**.

7. As the computer boots, check the BIOS identifier (version number) to make sure the upgrade was successful.
8. To enter the Setup program, press **F2** when you see the message:  
`Press F2 Key if you want to run SETUP`
9. For proper operation, load the Setup program defaults. To load the defaults, press **F9**.
10. To accept the defaults, press **Enter**.
11. Set the options in the Setup program to the settings you wrote down before the BIOS upgrade.
12. To save the settings, press **F10**.
13. To accept the settings, press **Enter**.
14. Turn off the computer and reboot.

## Recovering the BIOS

It is unlikely that anything will interrupt the BIOS upgrade; however, if an interruption occurs, the BIOS could be damaged. In that case, you must recover the BIOS.

**Note:** Because of the small amount of code available in the nonerased boot block area, there is no video support. You will not see anything on the screen during the procedure. Monitor the procedure by listening to the speaker and looking at the diskette drive LED.

The procedure for recovering the BIOS is covered in the *SGI 1400 Server Family Maintenance and Upgrades Guide*. After doing the procedure, leave the upgrade disk in drive A and turn on the server, then continue with the BIOS upgrade.

## Changing the BIOS Language

You can use the BIOS upgrade utility to change the language BIOS displays. Use a bootable diskette containing the proper flash utility and language files.

1. Boot the computer with the bootable diskette in drive A. The BIOS upgrade utility screen appears.
2. Select Update Flash Memory From a File.
3. Select Update Language Set. Press **Enter**.
4. Select drive A and use the arrow keys to select the correct `.lng` file. Press **Enter**.
5. When the utility asks for confirmation that you want to flash the new language into memory, select Continue with Programming. Press **Enter**.
6. When the utility displays the message upgrade is complete, remove the diskette. Press **Enter**.
7. The computer will reboot and the changes will take effect.

## Using the Firmware Update Utility

The Firmware Update Utility is a DOS-based program used to update the BMC's firmware code. You need to run the utility only if new firmware code is necessary.

### Running the Firmware Update Utility

1. Create a DOS-bootable diskette. The version of DOS must be 6.0 or higher.
2. Place the firmware update utility (`FWUPDATE.EXE`) and the `*.hex` file on the diskette. Make a note of the `*.hex` filename, because you will need it later.
3. Insert the diskette into the drive and boot to it.
4. At the DOS prompt, run the executable file (`FWUPDATE.EXE`).
5. The utility will display a menu screen. Select Upload Flash.
6. The utility will ask for a filename. Enter the name of the `*.hex` file.
7. The program will load the file and then ask if it should upload boot block. Press **n** to continue.
8. The program will next ask if it should upload operational code. Press **y** to continue.



9. Once the operational code has been updated and verified, press any key to continue. Then press **ESC** to exit the program.
10. Shut the system down and remove any diskettes in the system.
11. Disconnect all AC power cords from the system and wait 60 seconds.
12. Reconnect the AC power cords and power up the system.

## Installing Video Drivers

After configuring the system, you need to install video drivers to take full advantage of the features of the onboard CL-GD5480 super VGA video controller.

- The NT configuration software CD includes video drivers for use with DOS and Windows NT. Check the `README.TXT` file on the CD for information on installing these drivers.
- For other operating systems, see your OS instructions for installing device drivers.

## Using the Symbios SCSI Utility for NT

The Symbios SCSI utility detects the SCSI host adapters on the system board. Use the utility to:

- Change default values
- Check and/or change SCSI device settings that may conflict with those of other devices in the server

### Running the SCSI Utility

When this message appears on the video monitor:

```
Press Ctrl-C to run SCSI Utility...
```

Press **Ctrl+C** to run the utility. When it appears, choose the host adapter that you want to configure.



---

# Solving Problems

This chapter helps you identify and solve problems that might occur while you are using the system.

## Resetting the System

To do this:	Press:
Soft boot reset, which clears system memory and reloads the operating system.	Ctrl+Alt+Del
Clear system memory, restart POST, and reload the operating system.	Reset button
Cold boot reset, which clears system memory, restarts POST, reloads the operating system, and halts power to all peripherals.	Power off/on

## Initial System Startup

Problems that occur at initial system startup are usually caused by incorrect installation or configuration. Hardware failure is a less frequent cause. Use the following checklist to help determine the source of a failure.

### Checklist

- Are all cables correctly connected and secured?
- Are the processors fully seated in their slots on the baseboard?
- Are all add-in ISA and PCI boards fully seated in their slots on the baseboard?
- Are all switch and jumper settings on the baseboard correct?
- Are all jumper and switch settings on add-in boards and peripheral devices correct? To check these settings, refer to the manufacturer's documentation that comes with them. If applicable, ensure that there are no conflicts—for example, two add-in boards sharing the same interrupt.
- Are all DIMMs installed correctly?
- Are all peripheral devices installed correctly?
- If the system has a hard disk drive, is it properly formatted or configured?
- Are all device drivers properly installed?
- Are the configuration settings made with the SSU correct?
- Is the operating system properly loaded? Refer to the operating system documentation.
- Did you press the system power on/off switch on the front panel to turn the server on (power-on light should be lit)?
- Are the system power cords properly connected to the system and plugged into a NEMA 5-15R outlet for 100-120 V~ or a NEMA 6-15R outlet for 200-240 V~?
- Is AC power available at the wall outlet?
- If these items are correct but the problem recurs, see “More Problem-solving Procedures” on page 103.

## Running New Application Software

Problems that occur when you run new application software are usually related to the software. Faulty equipment is much less likely, especially if other software runs correctly.

### Checklist

- Does the system meet the minimum hardware requirements for the software? See the software documentation.
- Is the software an authorized copy? If not, get one; unauthorized copies often do not work.
- If you are running the software from a diskette, is it a good copy?
- If you are running the software from a CD-ROM disk, is the disk scratched or dirty?
- If you are running the software from a hard disk drive, is the software correctly installed? Were all necessary procedures followed and files installed?
- Are the correct device drivers installed?
- Is the software correctly configured for the system?
- Are you using the software correctly?
- If the problems persist, contact the software vendor's customer service representative.

## After the System Has Been Running Correctly

Problems that occur after the system hardware and software have been running correctly often indicate equipment failure. Many situations that are easy to correct, however, can also cause such problems; sometimes the problem stems from changes made to the system, such as hardware or software that has been added or removed.

### Checklist

- If you are running the software from a diskette, try a new copy of the software.
- If you are running the software from a CD-ROM disk, try a different disk to see if the problem occurs on all disks.
- If you are running the software from a hard disk drive, try running it from a diskette. If the software runs correctly, there may be a problem with the copy on the hard disk drive. Reinstall the software on the hard disk, and try running it again. Make sure all necessary files are installed.
- If the problems are intermittent, there may be a loose cable, dirt in the keyboard (if keyboard input is incorrect), a marginal power supply, or other random component failures.
- If you suspect that a transient voltage spike, power outage, or brownout might have occurred, reload the software and try running it again. (Symptoms of voltage spikes include a flickering video display, unexpected system reboots, and the system not responding to user commands.)

**Note: Random errors in data files:** if you are getting random errors in your data files, they may be getting corrupted by voltage spikes on your power line. If you are experiencing any of the above symptoms that might indicate voltage spikes on the power line, you may want to install a surge suppressor between the power outlet and the system power cords.

## More Problem-solving Procedures

The following subsections provide a more detailed approach to identifying a problem and locating its source.

### Preparing the System for Diagnostic Testing

**Caution: Turn off devices before disconnecting cables:** before disconnecting any peripheral cables from the system, turn off the system and any external peripheral devices. Failure to do so can cause permanent damage to the system and/or the peripheral devices.

1. Turn off the system and all external peripheral devices. Disconnect all of them from the system, except the keyboard and video monitor.
2. Make sure the system power cords are plugged into a properly grounded AC outlet.
3. Make sure your video display monitor and keyboard are correctly connected to the system. Turn on the video monitor. Set its brightness and contrast controls to at least two-thirds of their maximum ranges (see the documentation supplied with your video display monitor).
4. If the operating system normally loads from the hard disk drive, make sure there is no diskette in drive A. Otherwise, place a diskette containing the operating system files in drive A.
5. Turn on the system. If the power LED does not light, see “Power Light Does Not Light” on page 105.

### Using PC Diagnostics

A diagnostics package for the system is contained on the configuration software CD that comes with the system. For documentation about the test modules, see the Diagnostic help disks that end with the extension `.HLP`. They are ASCII files that you can print to form a manual of all tests in this product.

- The program called `Testview` uses a simple DOS-based menu system.
- The program called `T.EXE` is a noninteractive test executable used to run test program modules from DOS batch files.
- The `README.TXT` file for diagnostics tells how to install the program.

**Caution: Read help information for a test before running it:** the diagnostic package contains many optional tests that should be used only by a user with advanced technical knowledge. Inadvertent actions could be damaging, such as running a hard drive write test on a hard disk. All tests that require external hardware, user interaction, or are destructive, are disabled in the default configurations. Before using such a test, make sure you read and understand the help information for that test.

## Monitoring POST

For detailed information on POST see the section “Power-on Self Test (POST)” in Chapter 3.

## Verifying Proper Operation of Key System Lights

As POST determines the system configuration, it tests for the presence of each mass storage device installed in the system. As each device is checked, its activity light should turn on briefly. Check for the following:

- Does the diskette drive activity light turn on briefly? If not, see “Diskette Drive Activity Light Does Not Light” on page 108.
- If a second diskette drive is installed, does its activity light turn on briefly? If not, see “Diskette Drive Activity Light Does Not Light” on page 108.
- If there is a hard disk drive or SCSI devices installed in the system, does the hard disk drive activity light on the control panel turn on briefly? If not, see “Hard Disk Drive Activity Light Does Not Light” on page 108.

## Confirming Loading of the Operating System

Once the system boots up, the operating system prompt appears on the screen. The prompt varies according to the operating system. If the operating system prompt does not appear, see “Initial System Startup” on page 99.



## Specific Problems and Corrective Actions

This section provides possible solutions for these specific problems:

- Power light does not light.
- No beep or incorrect beep pattern.
- No characters appear on screen.
- Characters on the screen appear distorted or incorrect.
- System cooling fans do not rotate.
- Diskette drive activity light does not light.
- Hard disk drive activity light does not light.
- CD-ROM drive activity light does not light.
- Problems with application software.
- The startup prompt `Press F2 key if you want to run Setup` does not appear on the screen.
- The bootable CD-ROM is not detected.

Try the solutions in the order given. If you cannot correct the problem, contact your service representative for assistance.

### Power Light Does Not Light

Check the following:

- Are all the power supplies plugged in? Is the power turned on to the power strip or outlet? Do you have a blown fuse or breaker?
- Is the system operating normally? If so, the power LED is probably defective or the cable from the front panel to the baseboard is loose.
- Are there other problems with the system? If so, check the items listed under “System Cooling Fans Do Not Rotate Properly.”

If all items are correct and problems persist, contact your service representative or authorized dealer for assistance.

## No Beep Codes

If the system operates normally, but there was no beep, the speaker may be defective. If the speaker is enabled, but the speaker does not function, contact your service representative or authorized dealer for assistance.

Record the beep code emitted by POST, and see “Error and Informational Messages” on page 110.

## No Characters Appear on Screen

If there are no characters on the screen check the following:

- Is the keyboard working? Check to see that the Num Lock light is functioning.
- Is the video monitor plugged in and turned on? Many modern video monitors shut down when inactive and may require a moment to warm up when activated.
- Are the brightness and contrast controls on the video monitor properly adjusted?
- Are the video monitor switch settings correct?
- Is the video monitor signal cable properly installed?
- Is the onboard video controller enabled?

If you are using an add-in video controller board, do the following:

1. Verify that the video controller board is fully seated in the baseboard connector (and verify that the video monitor is plugged in to the ACTIVE video controller).
2. Reboot the system for changes to take effect.
3. If there are still no characters on the screen after you reboot the system and POST emits a beep code, write down the beep code you hear. This information is useful for your service representative.
4. If you do not receive a beep code and characters do not appear, the video display monitor or video controller may have failed. You can verify this by trying the monitor on another system or trying a different monitor on this system. Contact your service representative or authorized dealer for assistance.

### **Characters Are Distorted or Incorrect**

Check the following:

- Are the brightness and contrast controls properly adjusted on the video monitor? See the manufacturer's documentation.
- Are the video monitor signal and power cables properly installed?
- Is the correct monitor/video board installed for your operating system?

If the problem persists, the video monitor may be faulty or it may be the incorrect type. Contact your service representative for assistance.

### **System Cooling Fans Do Not Rotate Properly**

If the system cooling fans are not operating properly, system components could be damaged. Check the following:

- Is AC power available at the wall outlet?
- Are the system power cords properly connected to the system and the wall outlet?
- Did you press the power on/off push-button switch?
- Is the power-on light lit?
- Have any of the fan motors stopped (use the server management subsystem to check the fan status)?
- Are the fan power connectors properly connected to the baseboard?
- Is the cable from the front panel board connected to the baseboard?
- Are the power supply cables properly connected to the baseboard?
- Are there any shorted wires caused by pinched cables or power connector plugs forced into power connector sockets the wrong way?

If the switches and connections are correct and AC power is available at the wall outlet, contact your service representative for assistance.

### Diskette Drive Activity Light Does Not Light

Check the following:

- Are the diskette drive power and signal cables properly installed?
- Are all relevant switches and jumpers on the diskette drive set correctly?
- Is the diskette drive properly configured?
- Is the diskette drive activity light always on? If so, the signal cable may be plugged in incorrectly.

If you are using the onboard diskette controller, use the SSU to make sure that Onboard Floppy is set to Enabled. If you are using an add-in diskette controller, make sure that Onboard Floppy is set to Disabled. To run the SSU, see “When to Run the SSU” in Chapter 3.

If the problem persists, there may be a problem with the diskette drive, baseboard, or drive signal cable. Contact your service representative for assistance.

### Hard Disk Drive Activity Light Does Not Light

If you have installed one or more hard disk drives in your system, check the following:

- Are the power and signal cables to the drive properly installed?
- Are all relevant switches and jumpers on the hard drive and adapter board set correctly?
- Is the onboard IDE controller enabled? (IDE hard drives only)
- Is the hard disk drive properly configured?

**Note: Front panel hard disk LED indicates IDE and SCSI devices:** the hard disk drive activity light on the front panel lights when either an IDE hard disk drive, or a SCSI device controlled by the onboard SCSI host controller, is in use. This LED does not display CD-ROM activity.

## CD-ROM Drive Activity Light Does Not Light

Check the following:

- Are the power and signal cables to the CD-ROM drive properly installed?
- Are all relevant switches and jumpers on the drive set correctly?
- Is the drive properly configured?
- Is the onboard IDE controller enabled?

**Note: Front panel hard disk LED indicates IDE and SCSI devices:** the hard disk drive activity light on the front panel lights when either an IDE hard disk drive, or a SCSI device controlled by the onboard SCSI host controller, is in use. This LED does not display CD-ROM activity.

## Network Problems

If you have network problems, consult the documentation that came with the network board you purchased for this server.

## PCI Installation Tips

Some common PCI tips are listed here.

- Reserve interrupts (IRQs) and/or memory addresses specifically for ISA adapters. This prevents PCI boards from trying to use the same settings ISA boards are using. Use the SSU to keep track of ISA adapter resources.
- Certain drivers may require interrupts that are not shared with other PCI drivers. The SSU can be used to adjust the interrupt numbers for PCI devices. For certain drivers, it may be necessary to alter settings so that interrupts are not shared.
- Check PCI interrupt interdependencies among slots and onboard devices.

## Problems with Application Software

If you have problems with application software, do the following:

- Verify that the software is properly configured for the system. See the software installation and operation documentation for instructions on setting up and using the software.
- Try a different copy of the software to see if the problem is with the copy you are using.
- Make sure all cables are installed correctly.
- Verify that the baseboard jumpers are set correctly.
- If other software runs correctly on the system, contact your vendor about the failing software.

If the problem persists, contact the software vendor's customer service representative for assistance.

## Bootable CD-ROM Is Not Detected

Check the following:

- Is the BIOS set to allow the CD-ROM to be the first bootable device?

## Error and Informational Messages

When you turn on the system, POST displays messages that provide information about the system. If a failure occurs, POST emits beep codes that indicate errors in hardware, software, or firmware. If POST can display a message on the video display screen, it causes the speaker to beep twice as the message appears.

## POST Codes and Countdown Codes

The BIOS indicates the current testing phase during POST after the video adapter has been successfully initialized by outputting a 2-digit hex code to I/O location 80h. If a port-80h ISA POST board is installed, it displays the 2-digit code on a pair of hex display LEDs, see Table 4-1.

**Table 4-1** Port-80 Codes

Normal Port 80 Codes	Beeps	Error
02		Verify Real Mode
04		Get processor type
06		Initialize system hardware
08		Initialize chipset registers with initial POST values
09		Set in POST flag
0A		Initialize processor registers
0B		Enable processor cache
0C		Initialize caches to initial POST values
0E		Initialize I/O
0F		Initialize the local bus IDE
10		Initialize Power Management
11		Load alternate registers with initial POST valuesnew
12		Restore processor control word during warm boot
14		Initialize keyboard controller
16	1-2-2-3	BIOS ROM checksum
18		8254 timer initialization
1A		8237 DMA controller initialization
1C		Reset Programmable Interrupt Controller
20	1-3-1-1	Test DRAM refresh

<b>Table 4-1 (continued)</b>		Port-80 Codes
<b>Normal Port 80 Codes</b>	<b>Beeps</b>	<b>Error</b>
22	1-3-1-3	Test 8742 Keyboard Controller
24		Set ES segment register to 4 GB
28	1-3-3-1	Autosize DRAM
2A		Clear 512K base RAM
2C	1-3-4-1	RAM failure on address line xxxx*
2E	1-3-4-3	RAM failure on data bits xxxx* of low byte of memory bus
30	1-4-1-1	RAM failure on data bits xxxx* of high byte of memory bus
32		Test processor bus-clock frequency
34		Test CMOS
35		RAM Initialize alternate chipset registers
36		Warm start shut down
37		Reinitialize the chipset (MB only)
38		Shadow system BIOS ROM
39		Reinitialize the cache (MB only)
3A		Autosize cache
3C		Configure advanced chipset registers
3D		Load alternate registers with CMOS valuesnew
40		Set Initial processor speed new
42		Initialize interrupt vectors
44		Initialize BIOS interrupts
46	2-1-2-3	Check ROM copyright notice
47		Initialize manager for PCI Option ROMs
48		Check video configuration against CMOS



<b>Table 4-1 (continued)</b>		Port-80 Codes
<b>Normal Port 80 Codes</b>	<b>Beeps</b>	<b>Error</b>
49		Initialize PCI bus and devices
4A		Initialize all video adapters in system
4B		Display QuietBoot screen
4C		Shadow video BIOS ROM
4E		Display copyright notice
50		Display processor type and speed
51		Initialize EISA board
52		Test keyboard
54		Set key click if enabled
56		Enable keyboard
58	2-2-3-1	Test for unexpected interrupts
5A		Display prompt <code>Press F2 to enter SETUP</code>
5C		Test RAM between 512K and 640K
60		Test extended memory
62		Test extended memory address lines
64		Jump to UserPatch1
66		Configure advanced cache registers
68		Enable external and processor caches
6A		Display external cache size
6C		Display shadow message
6E		Display non-disposable segments
70		Display error messages
72		Check for configuration errors

<b>Table 4-1 (continued)</b>		Port-80 Codes
<b>Normal Port 80 Codes</b>	<b>Beeps</b>	<b>Error</b>
74		Test real-time clock
76		Check for keyboard errors
7A		Test for key lock on
74		Test real-time clock
76		Check for keyboard errors
7A		Test for key lock on
7C		Set up hardware interrupt vectors
7E		Test coprocessor if present
80		Detect and install external RS-232 ports
82		Detect and install external parallel ports
85		Initialize PC-compatible PnP ISA devices
86		Re-initialize on board I/O ports
88		Initialize BIOS Data Area
8A		Initialize Extended BIOS Data Area
8C		Initialize floppy controller
90		Initialize hard disk controller
91		Initialize local bus hard disk controller
92		Jump to UserPatch2
93		Build MPTABLE for multi-processor boards
94		Disable A20 address line
95		Install CD-ROM for boot
96		Clear huge ES segment register
98	1-2	Search for option ROMs. One long, two short beeps on checksum failure

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<b>Table 4-1 (continued)</b>		Port-80 Codes
<b>Normal Port 80 Codes</b>	<b>Beeps</b>	<b>Error</b>
9A		Shadow option ROMs
9C		Set up Power Management
9E		Enable hardware interrupts
A0		Set time of day
A2		Check key lock
A4		Initialize typematic rate
A8		Erase F2 prompt
AA		Scan for F2 key stroke
AC		Enter SETUP
AE		Clear in-POST flag
B0		Check for errors
B2		POST done – prepare to boot Operating System
B4	1	One short beep before boot
B5		Display MultiBoot menu
B6		Check password (optional)
B8		Clear global descriptor table
BC		Clear parity checkers
BE		Clear screen (optional)
BF		Check virus and backup reminders
C0		Try to boot with INT 19
DO		Interrupt handler error
D4		Pending interrupt error
D6		Initialize option ROM error

**Table 4-1 (continued)** Port-80 Codes

Normal Port 80 Codes	Beeps	Error
D8		Shutdown error
DA		Extended Block Move
DC		Shutdown 10 error

## POST Error Codes and Messages

The following error codes and messages are representative of various conditions BIOS identifies. The exact strings and error numbers may be different from those listed here.

**Table 4-2** POST Error Codes and Messages

Code	Error message
0162	BIOS unable to apply BIOS update to processor 1
0163	BIOS unable to apply BIOS update to processor 2
0164	BIOS does not support current stepping for processor 1
0165	BIOS does not support current stepping for processor 2
0200	Failure Fixed Disk
0210	Stuck Key
0211	Keyboard error
0212	Keyboard Controller Failed
0213	Keyboard locked - Unlock key switch
0220	Monitor type does not match CMOS - Run SETUP
0230	System RAM Failed at offset
0231	Shadow RAM Failed at offset
0232	Extended RAM Failed at offset
0250	System battery is dead - Replace and run SETUP

**Table 4-2 (continued)** POST Error Codes and Messages

<b>Code</b>	<b>Error message</b>
0251	System CMOS checksum bad - Default configuration used
0260	System timer error
0270	Real-time clock error
0297	ECC Memory error in base (extended) memory test in Bank xx
02B2	Incorrect Drive A type - run SETUP
02B3	Incorrect Drive B type - run SETUP
02D0	System cache error - Cache disabled
02F5	DMA Test Failed
02F6	Software NMI Failed
0401	Invalid System Configuration Data - run configuration utility
None	System Configuration Data Read Error
0403	Resource Conflict
0404	Resource Conflict
0405	Expansion ROM not initialized
0406	Warning: IRQ not configured
0504	Resource Conflict
0505	Expansion ROM not initialized
0506	Warning: IRQ not configured
0601	Device configuration changed
0602	Configuration error - device disabled
8100	Processor 1 failed BIST
8101	Processor 2 failed BIST
8104	Processor 1 Internal Error (IERR) failure
8105	Processor 2 Internal Error (IERR) failure

**Table 4-2 (continued)** POST Error Codes and Messages

<b>Code</b>	<b>Error message</b>
8106	Processor 1 Thermal Trip failure
8107	Processor 2 Thermal Trip failure
8108	Watchdog Timer failed on last boot, BSP switched
810A	Processor 2 failed initialization on last boot
810B	Processor 1 failed initialization on last boot
810C	Processor 1 disabled, system in uniprocessor mode
810D	Processor 2 disabled, system in uniprocessor mode
810E	Processor 1 failed FRB Level 3 timer
810F	Processor 2 failed FRB Level 3 timer
8110	Server Management Interface failed to function
8120	IOP subsystem is not functional
8150	NVRAM Cleared by Jumper
8151	NVRAM Checksum Error, NVRAM cleared
8152	NVRAM Data Invalid, NVRAM cleared

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# Installing or Replacing Drives and Power Supplies

## SCSI Hard Disk Drives

The system supports a variety of low-voltage differential (LVD) and single-ended SCSI devices. As shipped from the factory, the system might contain only a single hard disk drive (sometimes called the “system disk”). Contact your sales or service representative for a list of optional approved SCSI devices.

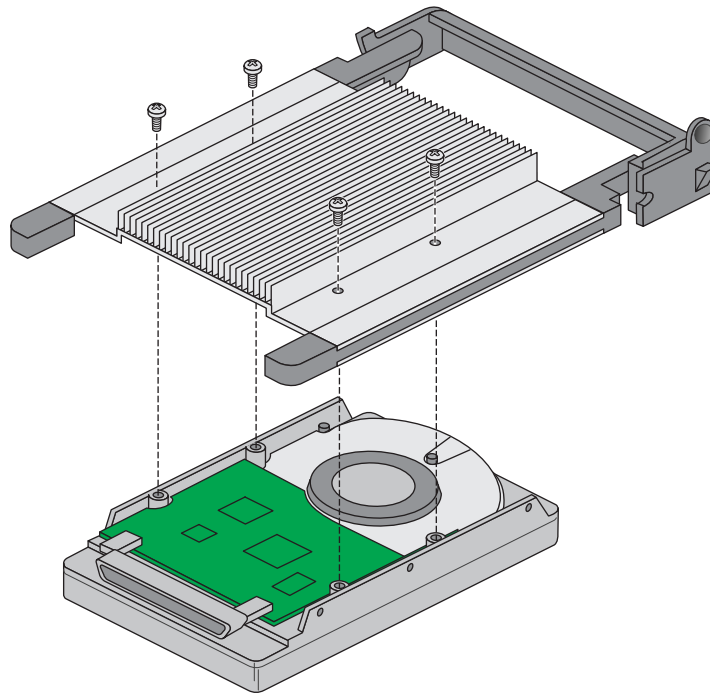
**Caution: Electrostatic discharge (ESD):** ESD can damage disk drives, add-in boards, and other components. The server can withstand normal levels of environmental ESD while you are hot-swapping SCSI hard disk drives. However, we recommend doing all procedures in this manual only at an ESD-protected workstation. If one is not available, you can provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground of the server—any unpainted metal surface—when handling components.

### Mounting a SCSI Hard Disk Drive in a Carrier

The SGI 1400 servers use an integrated drive sled and heatsink assembly for installing hard disks into the server. If you plan to use SCSI drives whose power exceeds 15 watts, you must have heatsinks on those drives.

1. Remove the 3.5-inch hard drive from its wrapper and place it on an antistatic surface.
2. Record the drive model and serial number in your equipment log.

3. Orient the drive so the connector is near the top surface of the drive, then place the plastic carrier and heatsink assembly on top of the drive (Figure 5-1).
4. Using four screws of the correct size and length, attach the carrier to the drive.



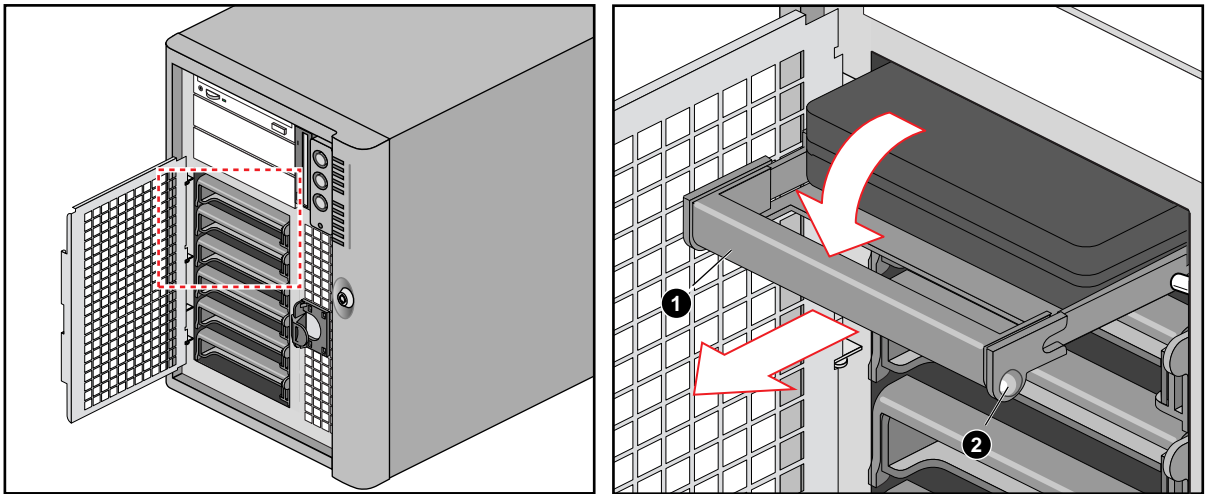
**Figure 5-1** Mounting the Carrier and Heatsink Assembly to the Hard Disk Drive

### Hot-swapping a SCSI Hard Disk Drive

A bank of six yellow LEDs on the front panel monitors the drive status of each drive in the hot-docking bay. Each LED corresponds directly to a drive, so that the upper-most LED reflects activity in the upper-most drive. The six LEDs and corresponding drives are numbered (top to bottom) zero through five. When a yellow LED is on continuously, it is okay to hot-swap (replace) a bad drive with a good one. You DO NOT need to shut the system down to hot-swap a drive.



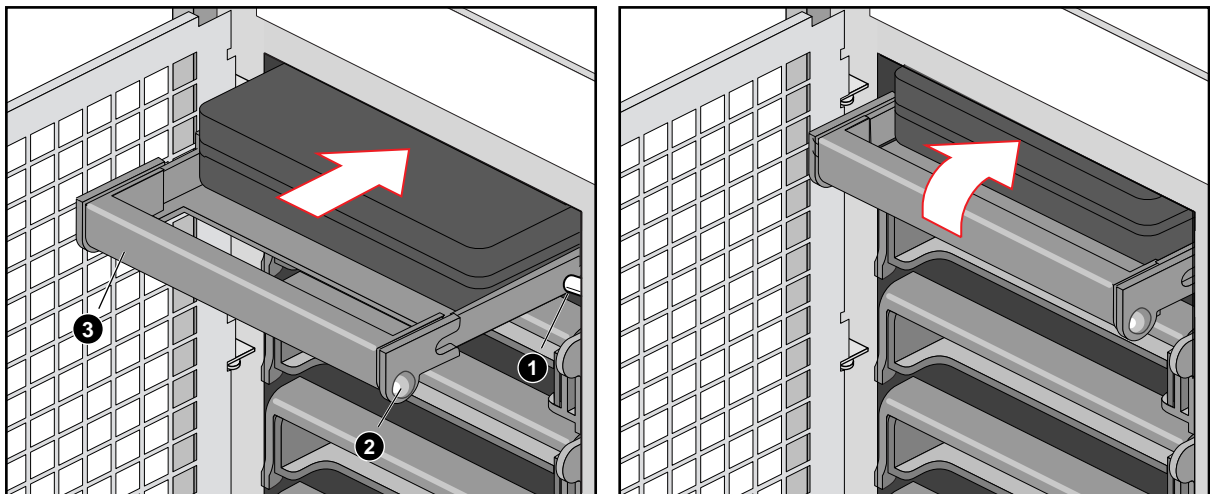
1. Open the front bezel by rotating its right side out and to the left.
2. If you installed a padlock on the metal door to the bays, unlock the padlock and remove it.
3. Loosen the plastic latch securing the metal door to the chassis, and open the door.
4. Check the bank of yellow LEDs on the front panel to determine which drive is bad.
5. Press the rounded tab (callout 2 in Figure 5-2) in on the right of the carrier to the left (toward the center of the drive) while gently pulling straight down on the carrier handle (callout 1 in Figure 5-2). This disengages the latch that secures the carrier to the chassis.
6. Grasp the plastic carrier handle and pull it toward you to disengage the drive connector from the backplane connector.



**Figure 5-2** Disengaging Drive Carrier from Chassis

7. Carefully slide the bad drive forward out of the bay. Place the drive on an antistatic surface.
8. Position the new plastic carrier and drive assembly so that it engages the bay guide rails.

9. Gently push the new drive into the bay. To engage the latch, the carrier handle should be approximately at a 45° angle from the vertical front of the chassis. As you push the drive into the bay, the two rounded notches in the carrier handle slide onto the two round pegs inside the drive bay (see Figure 5-3). When they engage, push the handle straight up to lock the notches onto the pegs and press the rounded tab on the right of the carrier to the left until it clears the edge of the bay and snaps into place.
10. Close the metal door, and secure it to the chassis with the plastic latch.
11. For security and to prevent unauthorized access to the bays, insert a padlock through the metal loop protruding through the door.
12. Close the front bezel.



**Figure 5-3** Installing a New Drive

1. Round peg inside drive bay
2. Round notches on carrier handle (must fit over pegs in drive bay)
3. Carrier handle

## Removing or Installing a Power Supply

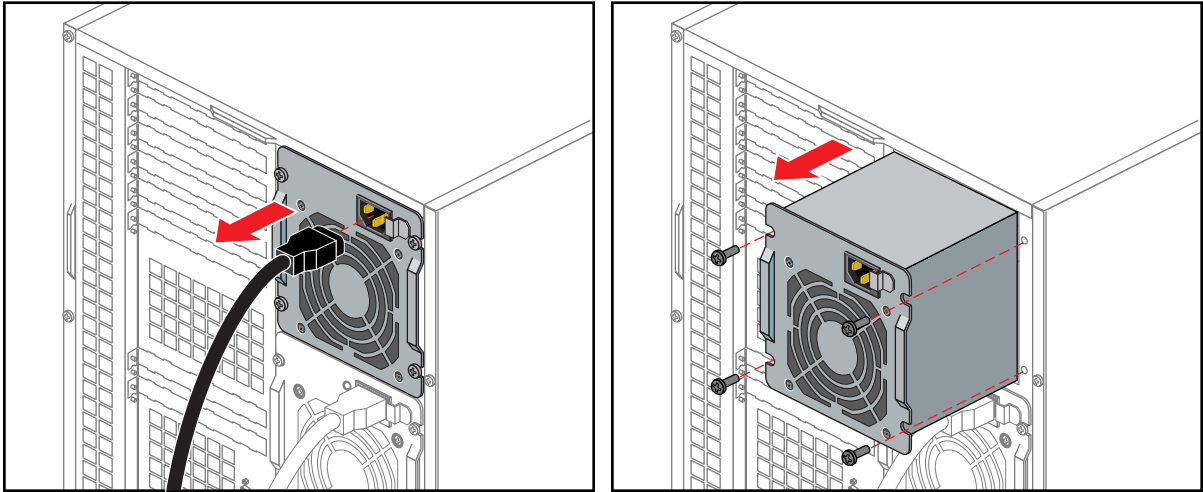
The SGI 1400 server comes standard with three power supplies. All three should be plugged in to provide your system with high availability. If one power supply fails, the server will continue to run uninterrupted. The SGI 1400 server also comes with a power share board (PSB). The PSB supports one to three supplies. Never replace the power share board with a power distribution board (which is intended to work in systems using one power supply only). Power share boards should only be replaced by trained installers. Information on replacing PSBs is included in the *SGI 1400 Server Family Maintenance and Upgrades Guide*.

**Caution:** Hazardous voltage, current, and energy levels are present inside the power supply. There are no user-serviceable parts inside it; servicing should be done by technically qualified personnel only.

### Removing a Power Supply

1. Disconnect the AC power cable from the system.
2. Remove the four screws holding the power supply to the back of the chassis.
3. Using the flared, vertical edges as handles, slide the supply straight back from its bay (Figure 5-4 shows an example).

**Caution:** You might feel initial resistance in sliding the power supply from its bay. Do not tilt or twist the supply; this can damage components. Resistance is caused by the supply disengaging from its 40-pin connector. Use even, steady force to remove the supply.



**Figure 5-4** Removing a Power Supply

### Installing a Power Supply

Use the following steps to install a new power supply into the server.

1. Slide the power supply into its bay.
2. With even force on the flared, vertical edges, push toward the front of the system until the edges rest against the rear of the chassis and the supply engages its connector.
3. Install and tighten the four screws holding the supply to the back of the chassis.
4. Install the access cover.
5. Connect the AC power cable. You must slide the cover on the AC connector to access the connector itself.
6. Run the FRUSDR load utility to properly configure the system after adding new components, see “Sensor Data Record (SDR) Manager Add-In” in Chapter 3.

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# Environmental and Regulatory Specifications

## Environmental and Regulatory Specifications

The following sections and tables present information that may be important to the operation of your SGI 1400 server. Table A-1 provides environmental specifications.

**Table A-1** Environmental Specifications

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Temperature	
Nonoperating	-40 °C to 70 °C (-55 °F to 150 °F)
Operating	10 °C to 35 °C (41 °F to 95 °F); derated 0.5 °C for every 1000 ft (305 m) Altitude to 10,000 ft max; maximum rate of change = 10 °C per hour
Humidity	
Nonoperating	95% relative humidity (noncondensing) at 30 °C (86 °F)
Operating wet bulb	Not to exceed 33 °C (91.4 °F) (with diskette drive or hard disk drive)
Shock	
Operating Packaged	2.0 g, 11 msec, 1/2 sine Operational after 30-inch (76.2 cm) free fall (cosmetic damage might occur)
Acoustic noise	< 55 dBA with three power supplies at 28 °C +/- 2 °C
Electrostatic discharge (ESD)	Tested to 20 kilovolts (kV) per Intel environmental test specifications; no component damage
AC Input Power	
100-120 V~	100-120 V~, 7.6 A, 50/60 Hz
200-240 V~	200-240 V~, 3.8 A, 50/60 Hz

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## **Manufacturer's Regulatory Declarations**

The SGI 1400 server products conform to several national and international specifications and European Directives listed on the "Manufacturer's Declaration of Conformity." The CE insignia displayed on each device is an indication of conformity to the European requirements.

**Caution:** Each SGI 1400 server system has several governmental and third-party approvals, licenses, and permits. Do not modify this product in any way that is not expressly approved by Silicon Graphics. If you do, you may lose these approvals and your governmental agency authority to operate this device.

## **Server CMN Number**

The CMN (model) number, for the SGI 1400 server is A021. This model number is also shown on the system label on the back of the unit.

## **Series Number**

The series number is on the serial number label on the back of the SGI 1400 server.

You need to know the series number and CMN number for downloading the Manufacturer's Declaration of Conformity from the World Wide Web.

## **Manufacturer's Declaration of Conformity**

A "Manufacturer's Declaration of Conformity" is available on the World Wide Web. Look on your system (regulatory) label on the rear of the system to determine your CMN (model) number, and on the serial number label to determine your series number. You need both to identify your Declaration of Conformity. To locate the information on the World Wide Web, enter the following in your Web browser location window:

`http://www.sgi.com/compliance`

## Upgrade Regulatory Label

If you received a regulatory label with an upgrade, place it on the back of the system near the Manufacturer's Declaration of Conformity label.

## Class A Compliance

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**Caution:** The user is cautioned that changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## Electromagnetic Emissions

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.

Also, 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.

## VCCI Notice (Japan Only)

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

## NOM 024 Information (Mexico Only)

La información siguiente se proporciona en el dispositivo o en dispositivos descritos en este documento, en cumplimiento con los requisitos de la Norma Oficial Mexicana (NOM 024):

Exportador: Silicon Graphics, Inc.  
Importador: Silicon Graphics, Inc.  
Embarcar a: Av. Vasco de Quiroga  
No. 3000  
Col. Santa Fe  
C.P. 01210  
México, D.F. México



Tensión alimentación:

100/240 ~ VAC

Frecuencia: 50/60 Hz: Consumo de corriente: 7.6 A

### Chinese Class A Regulatory Notice

警告使用者：

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

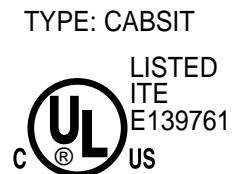
### Industry Canada Notice (Canada Only)

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

Cet appareil numérique n'émet pas de perturbations radioélectriques dépassant les normes applicables aux appareils numériques de Classe A prescrites dans le Règlement sur les interférences radioélectriques établi par le Ministère des Communications du Canada.

### CE Notice

Marking by the “CE” symbol indicates compliance of the device to directives of the European Community. A “Declaration of Conformity” in accordance with the standards has been made and is available from Silicon Graphics upon request.



## **Korean Class A Regulatory Notice**

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

## **Shielded Cables**

The SGI 1400 server system is FCC-compliant under test conditions that include the use of shielded cables between the server and its peripherals. Your 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.

Optional monitor cables supplied with your server system use additional filtering molded into the cable jacket to reduce radio frequency interference. Always use the cable supplied with your system. If your monitor cable becomes damaged, a replacement cable should be obtained from Silicon Graphics.

## **Electrostatic Discharge**

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

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

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

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# SGI 1400 Server Rackmount Installation

## Safety Guidelines

Before you remove a server cover, observe these safety guidelines:

- Only technically qualified personnel should mount the server in a rack.
- Turn off all peripheral devices connected to the server.
- Turn off the server using the push-button on/off power switch on the front panel of the server, and unplug the AC power cord from each power supply or wall outlet.
- Label and disconnect all peripheral cables attached to the I/O panel on the back of the server.

## Server Precautions



**Warning:** SERVER POWER ON/OFF: The push-button on/off power switch on the front panel of the server does not turn off the AC power. To remove AC power from the server, you must unplug each AC power cord from each power supply or wall outlet.

**HAZARDOUS CONDITIONS—POWER SUPPLY AND POWER SHARE BACKPLANE:** Hazardous voltage, current, and energy levels are present inside the power supply and the power share backplane enclosures. There are no user-serviceable parts inside them; servicing should only be done by technically qualified personnel.

**HAZARDOUS CONDITIONS—DEVICES AND CABLES:** Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the server and disconnect telecommunications systems, networks, modems, and each power cord attached to the server before opening it. Otherwise, personal injury or equipment damage can result.

**SHOCK AND VIBRATION CONDITIONS:** The server's mounting rails do not provide dampening and insulation from excess mechanical vibration and shock. If you are installing the server in a location that is subject to shock and vibration in excess of the values these units are rated to, you must obtain an appropriate mounting system.

**Note:** Although the hardware supplied with the server enables you to mount these systems in most all 19-inch equipment racks, installation in such racks may require submittal to an approved safety agency for evaluation, certification, and licensing for the new rack-system combination. Check with your local building inspector for requirements applicable to your location.



**Warning:** AVOID INJURY: To avoid personal injury when unpacking the server, use two people and/ or a mechanical assist unit to lift it off the shipping pallet. The minimum server configuration weighs 38 kg (85 lbs); the maximum weighs 45 kg (100 lbs). Use only a hand-truck or other mechanical assist unit to move the server from one location to another.

**Caution:** ELECTROSTATIC DISCHARGE (ESD) AND ESD PROTECTION: ESD can damage disk drives, add-in boards, and other components. This server can withstand normal levels of environmental ESD while hot-swapping SCSI hard disk drives. However, we recommend doing all procedures in this manual only at an ESD-protected workstation. If one is not available, you can provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground of the server—any unpainted metal surface—when handling components.

**SERVER COOLING AND AIRFLOW:** Operating the server with the covers removed can damage the server components. For proper cooling and airflow, always replace the covers before turning on the server.

## Equipment Rack Precautions



**Warning:** ANCHOR THE EQUIPMENT RACK: The equipment rack must be anchored to an unmovable support to prevent it from falling over when one or more servers are extended in front of it on slide assemblies. The anchors must be able to withstand a force of up to 113 kg (250 lbs). You must also consider the weight of any other device installed in the rack.

**MAIN AC POWER DISCONNECT:** You are responsible for installing an AC power disconnect for the entire rack unit. This main disconnect must be readily accessible, and it must be labeled as controlling power to the entire unit, not just to the server(s).

**GROUNDING THE RACK INSTALLATION:** To avoid the potential for an electrical shock hazard, you must include a third wire safety grounding conductor with the rack installation. If server power cords are plugged into AC outlets that are part of the rack, then you must provide proper grounding for the rack itself. If server power cords are plugged into wall AC outlets, the safety grounding conductor in each power cord provides proper grounding only for the server. You must provide additional, proper grounding for the rack and other devices installed in it.



**Warning:** Overcurrent protection: The server is designed for an AC line voltage source with up to 20 amperes of overcurrent protection. If the power system for the equipment rack is installed on a branch circuit with more than 20 amperes of protection, you must provide supplemental protection for the server. If more than one server is installed in the rack, the power source for each server must be from a separate branch circuit. The overall current rating of a server configured with three power supplies is under 12 amperes.

**Caution: Temperature:** The operating temperature of the server, when installed in an equipment rack, must not go below 5 °C (41 °F) or rise above 35 °C (95 °F). Extreme fluctuations in temperature can cause a variety of problems in your server.

**Ventilation:** The equipment rack must provide sufficient airflow through the front of the server to maintain proper cooling. It must also include ventilation sufficient to exhaust a maximum of 4,100 Btu's per hour for the server. The rack selected and the ventilation provided must be suitable to the environment in which the server will be used.

## Introduction

The SGI 1400 server is designed to either stand upright (pedestal mode) or be mounted in a rack (rack mode). Figure 1-1 in Chapter 1 shows examples of these configurations. If you ordered a rackmountable server, the information in this appendix explains the proper procedure for mounting it.

Table B-1 provides size information that may help the processes of installing the server in an EIA-compatible 19-inch equipment rack.

**Table B-1** Server Physical Specifications

Specification	Pedestal Mode	Rack Mode
Height	48.26 cm (19 inches)	7u
Width	31.12 cm (12.25 inches)	19 inch rack
Depth	63.5 cm (25 inches)	25 inches
Weight	38.25 kg (85 lbs) minimum configuration 45 kg (100 lbs) maximum configuration	38.25 kg (85 lbs) minimum configuration 45 kg (100 lbs) maximum configuration
Required front clearance	10 inches (inlet airflow <35 °C / 95 °F)	10 inches (inlet airflow <35 °C / 95 °F)
Required rear clearance	8 inches (no airflow restriction)	8 inches (no airflow restriction)
Required side clearance	0.0 inches (additional side clearance required for service)	N/A
Shock Operating	2.0 g, 11 msec, 1/2 sine	2.0 g, 11 msec, 1/2 sine

## Tools You Need

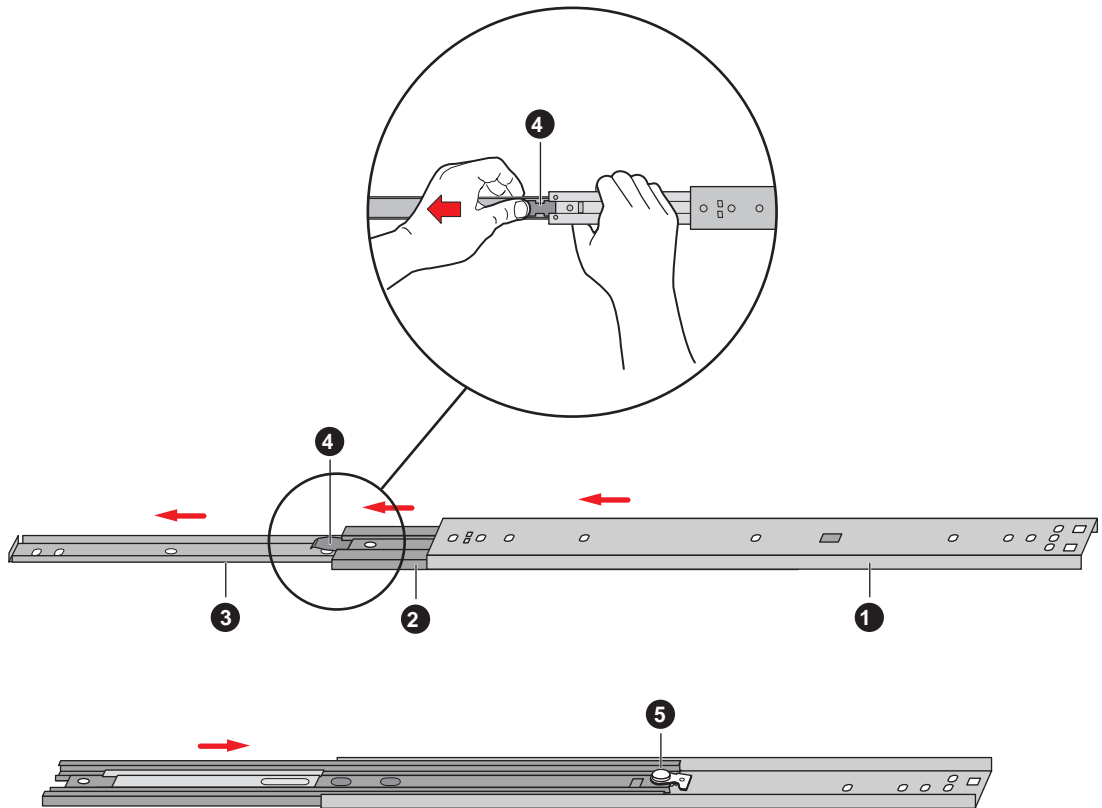
You will need the following tools to complete the installation:

- Phillips (cross-head) screwdriver (#1 and #2 bits)
- Pencil

## Prepare the Slide Assemblies

Use Figure B-1 and the following steps to prepare the rackmounting slide assemblies.

1. Remove the slide assemblies from the kit.
2. Orient a slide assembly so that the smallest outer bar is facing down.
3. Fully extend the telescoping slide assembly until the center bar hits the safety latch on the small outer bar (all three overlapping bars will be visible).
4. Grasp the small outer bar with your hand so that your thumb is on the safety latch of the small outer bar.
5. Press and hold the safety latch down, and at the same time, grasp the large outer bar with your free hand.
6. Pull the small bar out of the center bar; this takes a little force to separate them. Set the small bar aside to attach to the chassis in a later step.
7. Orient the center bar and large outer bar assembly so that the center bar is facing up.
8. Grasp the center bar with one hand and the large outer bar with your other hand so that your thumb is on the safety latch of the center bar.
9. Press the safety latch, and slide the bars together. Set the center bar and large outer bar assembly aside to attach to the equipment rack in a later step.
10. Prepare the other slide assembly by repeating steps 2–9 above.



**Figure B-1** Outer Slide Assembly

Figure B-1 components shown are:

1. Large outer bar
2. Center bar
3. Small outer bar
4. Safety latch on the small outer bar
5. Safety latch on the center bar



## Prepare the Server

Before you can install the server in the 19-inch equipment rack, you must install a bezel, handles, and the small bars of the slide assemblies onto the sides of the server.

### Attaching the Bezel Frame and Door

To be installed in a rack, the server needs a bezel frame with rectangular cutouts where the chassis handles fit.

1. Attach the bezel frame by inserting the tabs at the corner of the frame into their corresponding rectangular slots on the chassis.
2. Attach the bezel door: with the door all the way open (down, as the server lay as it would when inserted in a rack), align the tabs on the door with their corresponding hinge loops on the chassis; slide the door to the right to engage the tabs in the loops.

### Attach the Chassis Handles

Before you can attach the chassis handles, the server must be on its side, in the horizontal position in which you will slide it into the rack. If the server is not already in the proper position, you must move it. See step one, below.

**Caution:** The server is heavy (up to 45 kg [100 lbs]), be sure to read all the warnings at the beginning of this appendix. Always use at least two people to mount the server in a rack.

1. If the server is not already in the proper position, then face the front of the server and, with the help of a mechanical assist unit, carefully tip it onto its side. The long front edges (19 inches) should now be horizontal; the short front edges (12.25 inches) should now be vertical, with the front-panel LEDs at the top left and the hard drive bays at the bottom right of the front panel.

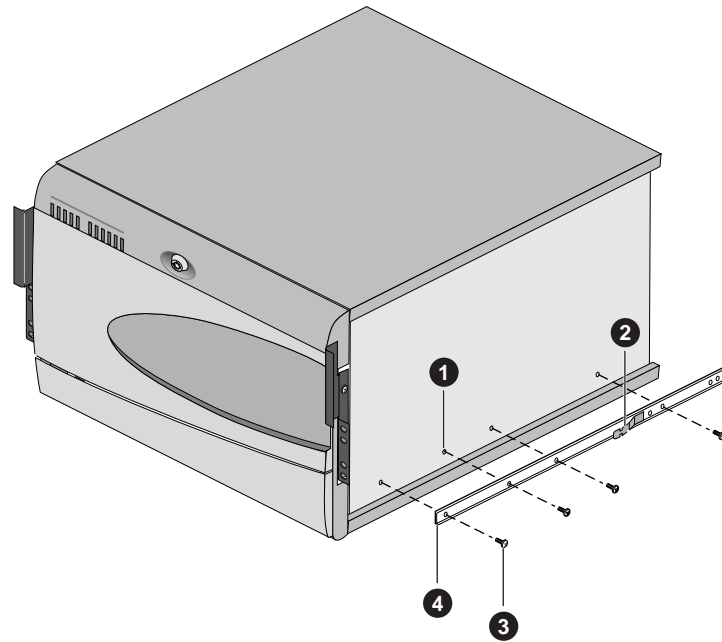
The bezel frame has rectangular cutouts on its edges where the chassis handles fit; you should be able to see two threaded holes in that cut-out space where the handles attach to the chassis.

2. Orient each handle so the two screw holes on the long edge of each handle align with the threaded holes in the chassis. Because the bezel frame's cutouts act as guides, the handles can be installed in only one way.
3. Use four screws from the kit to attach the handles to the chassis.

### **Attach the Small Bar of the Slide Assembly to the Server**

Use Figure B-2 and the following steps to properly attach the small bar of the slide assembly to the server chassis.

1. Remove four screws from the kit.
2. While facing the side of the server, orient the small bar so that the flat side faces the top and the right-angle end faces the front of the server.
3. Align the first hole in the right-angle end of the bar with the first threaded hole in the side of the chassis.
4. Insert a screw through the hole in the bar and into the chassis wall. Then loosely tighten the screw.
5. Align the rest of the holes in the bar with the remaining three threaded holes along the side of the chassis.
6. Insert three more screws through the bar and into the threaded holes in the chassis wall. Then tighten all four screws firmly (6.0 inch-pounds).
7. To install the remaining small bar on the other side of the chassis, repeat steps 1–6.



**Figure B-2** Small Bar of the Slide Assembly

Figure B-2 components shown are:

1. Threaded hole in chassis
2. Safety latch
3. Screw
4. Small outer bar (right-angle end)

## Preparing the Equipment Rack

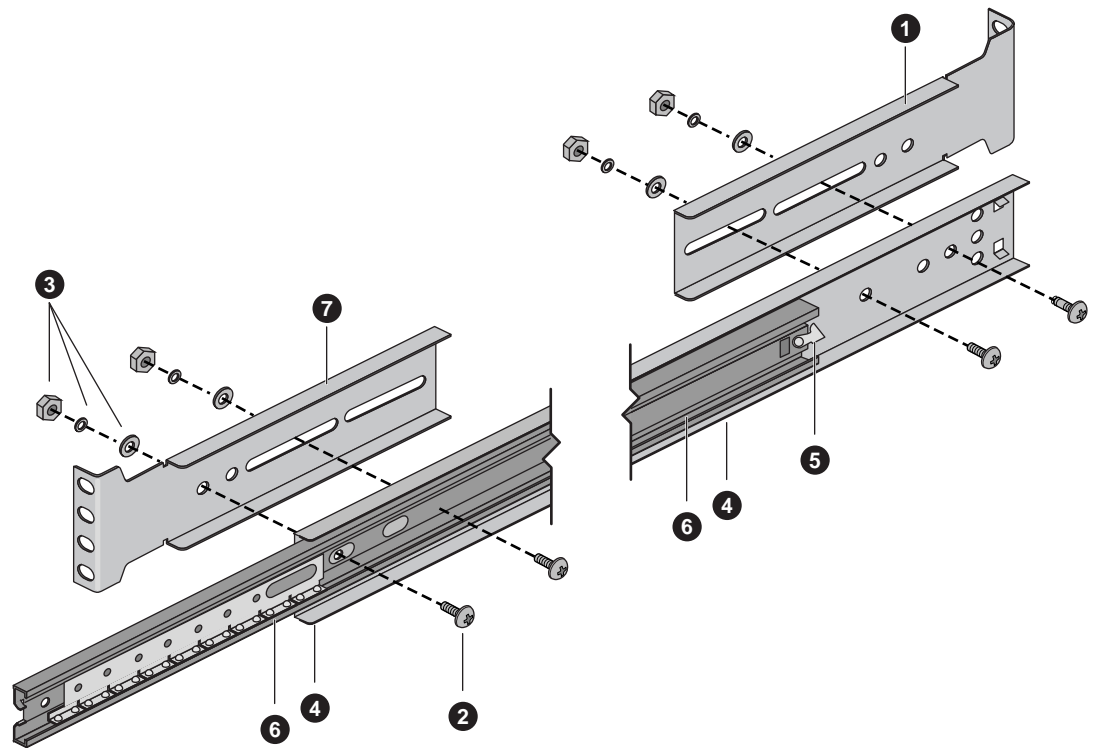
Before you can install the server in the 19-inch equipment rack, you must attach the center bar and large outer bar assemblies to the vertical rails of the rack.

### Attach the Center and Large Outer Bar Assemblies

When mounting the server in a rack you should connect the sliding bar assemblies to the right-angle brackets prior to installing them.

Use the following steps and Figure B-3 to attach the center bar and outer bar assemblies to the right-angle brackets that screw onto the vertical rack rails.

1. Orient a center bar and large outer bar assembly so that the flat side is facing toward the brackets attached to the vertical rails and the safety latch on the center bar is near the back of the rack.
2. Press the flat side of the outer bar into the U-shaped sections of the brackets.
3. Slide the assembly toward the front of the rack until the end of the outer bar is flush with the end of the U-shaped section of the front bracket, see Figure B-3.
4. Gently slide the center bar toward the front of the rack, and position the oblong slot in it over the first hole in the large outer bar. Insert a screw through the hole in the bar and the first hole in the front angle-bracket. Place a lock washer and a nut on the screw, and loosely tighten it.
5. Position the oblong slot in the center bar over the third hole back from the front of the large outer bar. Insert an 8-32 screw through the hole and the oblong slot in the front bracket. Place a lock washer and an 8-32 nut on the screw, and loosely tighten it.
6. The back bracket has two holes and three slots in it. This end of the outer bar has four holes in it. Which holes and slots you use depend on the depth of the equipment rack. After fitting the bar into the bracket, insert two screws through the holes in the bar and the appropriate oblong slots in the bracket. Place a lock washer and a nut on each screw, and loosely tighten them.



**Figure B-3** Center Bar and Large Outer Bar Assembly

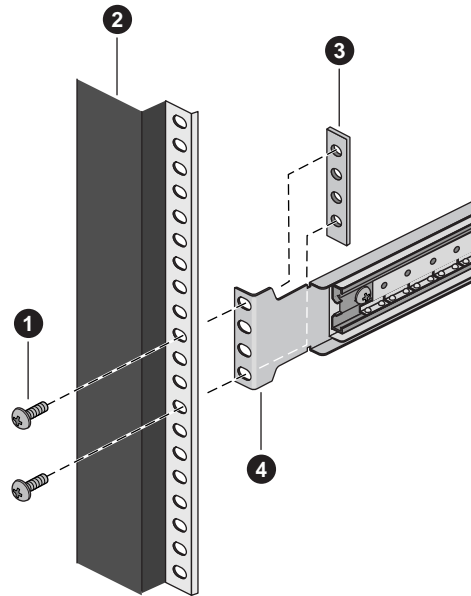
Figure B-3 shows the bar assembly and specific components:

1. Back right-angle extension bracket
2. Screws and their mounting locations
3. Flat washer, lock washer, and nut
4. Large outer bar
5. Safety latch location on the center bar
6. Center bar
7. Front right-angle extension bracket

### **Attach the Bracket and Rail Assemblies to the Equipment Rack**

**Note:** Mounting holes in the vertical rails of equipment racks are commonly spaced in a 5/8 x 5/8 x 1/2-inch sequence. Perform the following steps carefully; brackets must be mounted with precision to allow room for the next server you install in a rack. You may want to mark the appropriate top and bottom holes with a pen or pencil.

1. Remove two screws, and a bar nut from the kit.
2. Select one of the right-angle bracket and rail assemblies that you put together using the information in “Attach the Center and Large Outer Bar Assemblies” on page 140.
3. While facing the front or back of the rack, orient the right-angle extension bracket and rail assembly so that the short side with the four mounting holes is facing toward the outside edge of the vertical rail.
4. Position the bracket behind the mounting holes in the vertical rail, see Figure B-4 for an example.
5. With a pencil, mark the top and bottom hole locations of the bracket on both sides of the vertical rail; no hole numbers are printed on the rail.
6. Insert a screw through the marked top hole in the rail and through the top hole in the bracket. Place a bar nut on the screw and loosely tighten it. Repeat for the marked bottom hole.
7. Go to the rear of the system and make sure the bracket and slide-rail assembly is in horizontal alignment with the front. Repeat the connection procedure from step 6.
8. Install the other right-angle extension brackets and slide rail assembly on the other side by repeating steps 1–7.
9. Ensure that the brackets and bars are positioned correctly in the rack. Then tighten *all* bracket and rail screws firmly (6.0 inch-pounds).



**Figure B-4** Right-angle Bracket and Vertical Rail

Figure B-4 components shown are:

1. Screw
2. Vertical rail
3. Bar nut
4. Right-angle extension bracket

## Install the Server in the Rack

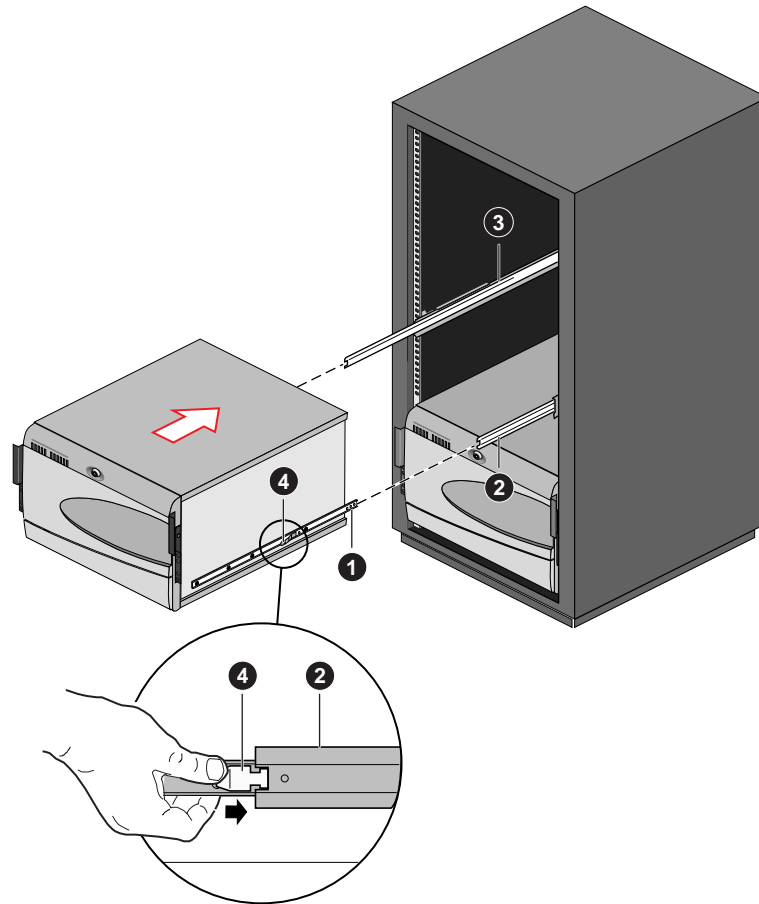


**Warning:** ANCHOR THE EQUIPMENT RACK: The equipment rack must be anchored to an unmovable support to prevent it from falling over when one or more servers are extended in front of it on slide assemblies. The anchors must be able to withstand a force of up to 113 kg (250 lbs). You must also consider the weight of any other device installed in the rack.

Use the following steps to install the server in the rack:

1. Pull the telescoping center bars out of the large outer bars until they are fully extended and locked in place.
2. Use a mechanical assist unit to carefully pick up the server; gently slide the small bars attached to each side of the server into the extended center bars.
3. When the server stops, press in on the safety latches on the small bars and gently slide the server into the rack.
4. Connect all external cables and the power cord(s) to the server.





**Figure B-5** Installing the Server in the Rack

Figure B-5 components shown are:

1. Small outer bar
2. Center bar
3. Large outer bar
4. Safety latch



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