SC450NX MP
Server System
Product Guide

Order Number: 700059-002

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1 Chassis Description

The SC450NX MP server is designed to either stand upright (pedestal mode) or be mounted in a rack (rack mode). Figures 1 and 2 show examples of these configurations. Before operation, you must purchase an adapter kit to configure the server for one of the two modes. If you have already created a pedestal server but now want to install it in a rack, you will also need an adapter kit.

If you have not already purchased a kit for your particular task, contact your customer service representative for details. For instructions on mounting your server, see the printed *SC450NX MP Server System Rack/Pedestal Kit Installation Guide* accompanying your kit.

Table 1.   SC450NX MP 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
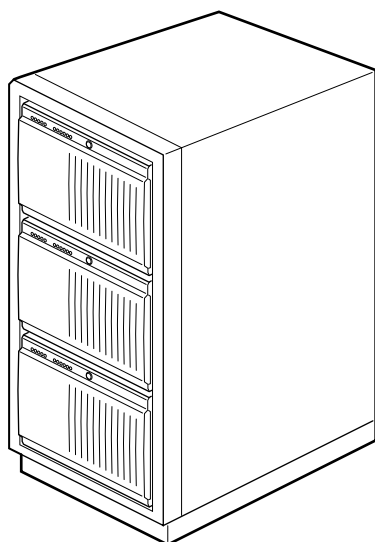
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Figure 1. Equipment Rack with Three Servers
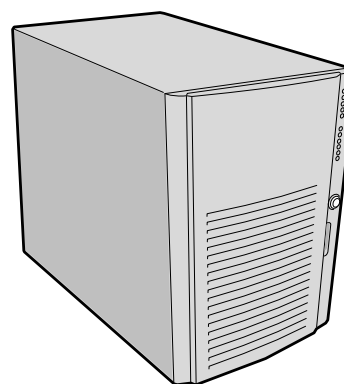
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Figure 2. Single Server in Pedestal Mode

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 two 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 easy access to 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 2.   Chassis Feature Summary

Feature	Description
Drives	Installed:
	1.44 MB, 3.5-inch diskette drive, accessible from front subchassis.
	Expansion capacity:
	Three 5.25-inch-wide bays that are externally accessible, designed to hold half-height standard removable media devices; the bays can be converted into a single full-height bay.
	Also, one externally accessible bay can hold up to six one-inch drives with an optional SCSI backplane, or up to two drives without the backplane.
Expansion slot covers	Up to eight slot covers can be used; every slot opening that does not have an add-in board installed must have a slot cover installed.
Baseboard	Form-factor, 16×13 inches, ATX I/O.
Power supply	Up to three 400-watt power supplies with integrated cooling fans and detachable AC power cords.
Cooling	Up to 11 fans provide cooling and airflow: three system fans inside the chassis (and three more needed only for redundant cooling), one fan for each power supply (up to three), and two fans for cooling hard drives.

Chassis Front Controls and Indicators
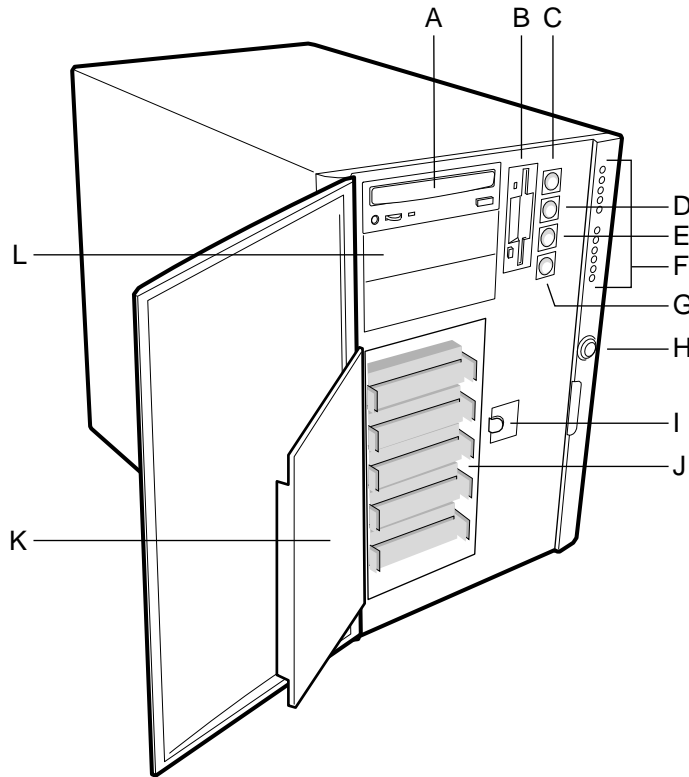
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Figure 3. Front Controls and Indicators

A. External drive bay (5¼"); CD-ROM drive shown installed (not included)

B. Diskette drive

C. 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)

D. Sleep/Service button (holding down this button for LESS THAN four seconds enters sleep mode, which requires an ACPI-compliant OS; 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)

E. Reset button

F. Front panel LEDs (Top to bottom: top five are power on, disk bay power on, HDU activity, fan failure, power supply failure; bottom six are hard-drive activity LEDs, labeled 0-5)

G. NMI button

H. System security lock

I. EMI shield lock

J. Internal drive bays (3½"). Five are shown installed, but maximum capacity is six.

K. Metal EMI shield

L. Expansion drive bay (5¼")

Chassis Back Controls and Features
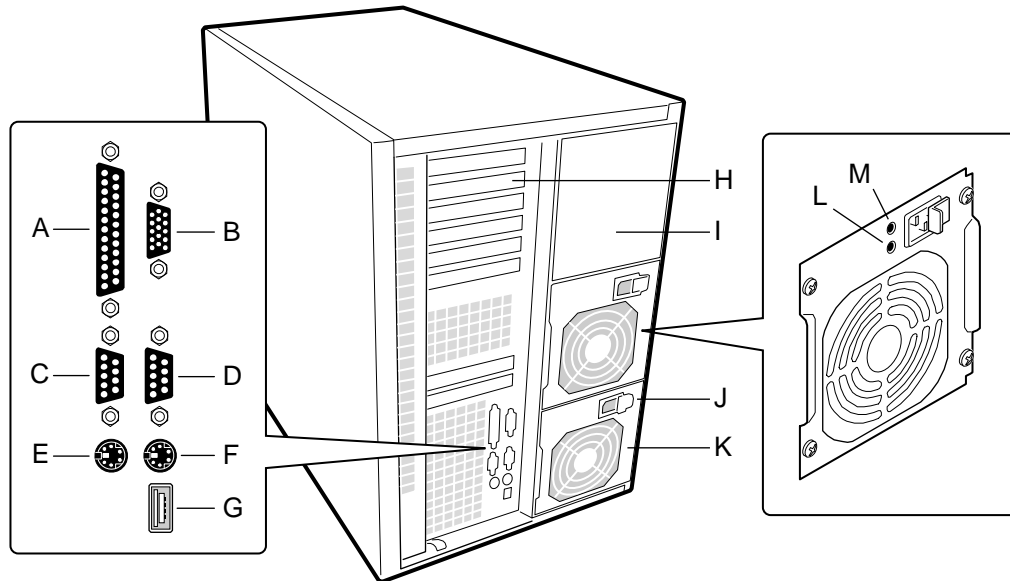
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Figure 4. Back Controls and Indicators

A. Parallel port
B. VGA† monitor connector
C. Serial port A, COM1
D. Serial port B, COM2
E. Mouse connector
F. Keyboard connector
G. Universal serial bus connector
H. Expansion slot covers (six slot connectors provided on baseboard)
I. Power supply bay
J. AC input power connector
K. Power supply fan
L. Power supply LED
M. Power supply failure LED (LED not lit means failure)

Chassis Side View
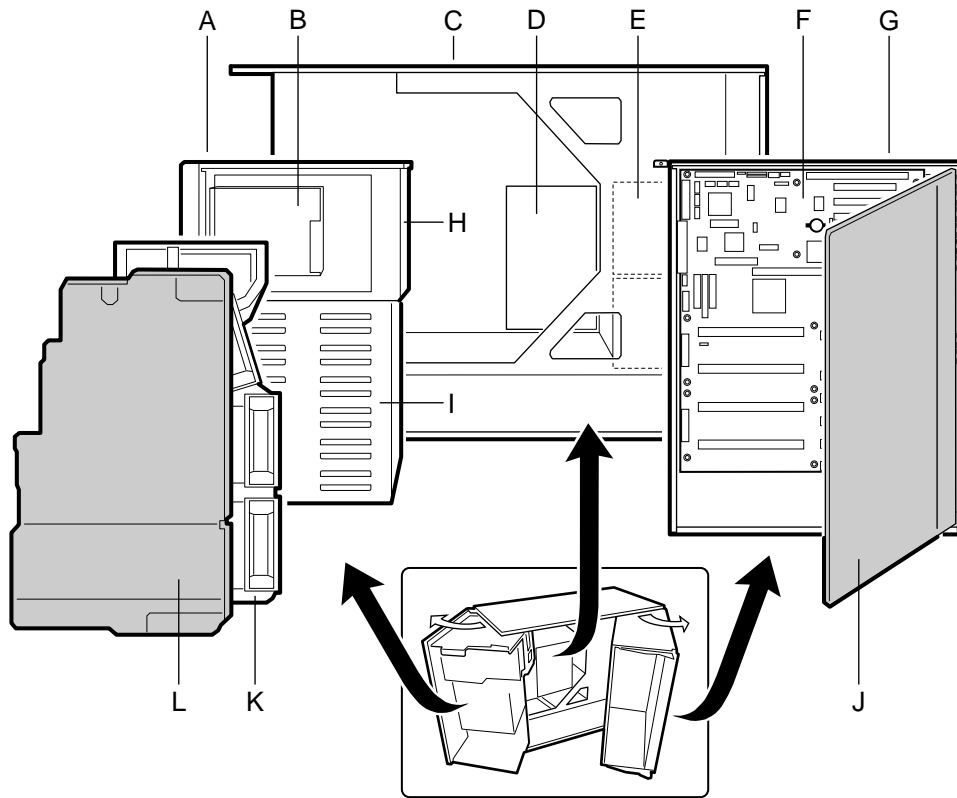
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Figure 5. Chassis Side View

A.   Front swing-out subchassis
B.   Diskette drive
C.   Main chassis
D.   Power backplane
E.   Power supply(s)
F.   Baseboard
G.   Lift-out electronics bay
H.   5.25" device bay
I.   SCSI hard drive bay
J.   Foam cover
K.   Foam fan housing
L.   Foam fan housing cover

Peripherals

3.5-inch Diskette Drive

The 3.5-inch diskette drive in the 3.5-inch peripheral bay supports 720 KB, 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 bay for two 3.5-inch-wide (1" high or 1-5/8" high) LVDS SCSI hard drives with internal cabling. An optional hot-swap-capable backplane can accommodate six 3.5-inch-wide (1" high) or three 3.5-inch (1-7/8" high) hard drives, which are accessed externally from the front of the system. To upgrade to a backplane, or to upgrade your existing backplane, you must buy a kit.

As part of the hot-swap implementation, a drive carrier is required. The drives are mounted in the carrier with four fasteners and the carrier snaps into the chassis. Drives whose power exceeds 15 watts require heatsinks and system fans for extra cooling. These parts are available in an optional kit.

- For information on how and when to install heatsinks, see "Installing Heatsinks on High-Power Drives" on page 82.
- For information on how and when to install extra fans, see "Installing Fans for High-Power Drives" on page 106.

A single metal EMI shield and plastic door cover the drive bays. A hot-docking bay is provided for drives that are 3.5 inches wide and 1 inch high. 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 allow the user to install a 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.

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 tape backup or other removable 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.

Power Supplies

The chassis can be configured with one, two, or three 400-watt power supplies, each designed to minimize EMI and RFI. Each supply operates 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:

- +3.3 V at 36 A max
- +5 V at 24 A max (total combined output of +3.3 V and +5.5 V not to exceed 195 W)
- +12 V at 18.0 A with 19.0 A <10ms peak
- +24 V at 50mA
- -12 V at 0.5 A
- +5 V 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 minimum chassis configuration includes three fans for cooling and airflow (and can accept up to five more). The number of additional fans depends on your configuration: one fan for each power supply (up to three) and two fans for cooling hard drives.

⟹ **NOTE**

The access cover must be on the system for proper cooling.

Chassis Security

For information on security features on the SC450NX MP server, see "System Security" on page 28.

2 Baseboard Description

Baseboard Features

Table 3.   Baseboard Features

Feature	Description
Processor	Installed: Up to four Pentium® II 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 baseboard'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: 128 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	**PCI-A**—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) **PCI-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).
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: **Symbios SYM53C810AE**—narrow SCSI controller on PCI-A bus providing support for the legacy 8-bit SCSI devices in the 5.25-inch drive bays. **Symbios SYM53C896**—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.

Baseboard Connector and Component Locations

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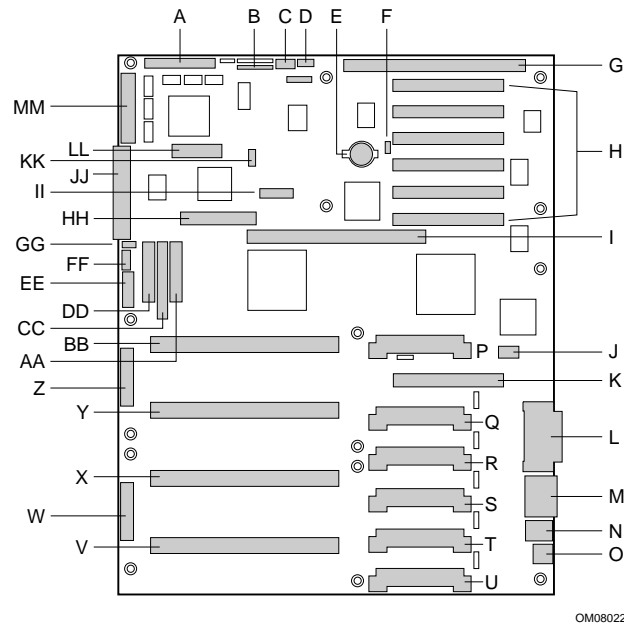
Figure 6. Baseboard Connector and Component Locations

A. Wide SCSI B connector (J9J1)
B. System jumpers (J6J1)
C. Hard drive input LED connector (J6J3)
D. System speaker connector (J6J2)
E. Lithium battery (B4H1)
F. Wake on LAN[†] technology connector (J4H1)
G. ISA slot (J1J1)
H. PCI slots B4 (closest to ISA), B3, B2, B1, A3, and A2 (farthest from ISA)
I. Memory module connector (J3G1)
J. ICMB connector (J1E1)
K. PCI slot A1 (J2D1)
L. Video and parallel port connectors (J1C1)
M. Serial port connector (J1B2)
N. Keyboard and mouse connectors (J1B1)
O. USB external connector (J1A1)
P. VRM connector for processor 4 (J4E1)
Q. VRM connector for processors 4 and 3 (J4C2)
R. VRM connector for processor 3 (J4C1)
S. VRM connector for processor 2 (J4B1)
T. VRM connector for processors 2 and 1 (J4A2)

U. VRM connector for processor 1 (J4A1)
V. Processor 1 Slot 2 connector (J9A1)
W. Main power connector, primary (J9B1)
X. Processor 2 Slot 2 connector (J9B2)
Y. Processor 3 Slot 2 connector (J9D1)
Z. Main power connector, secondary (J9D2)
AA. Front panel connector (J8E1)
BB. Processor 4 Slot 2 connector (J9E1)

CC. IDE connector (J9E2)
DD. Diskette drive connector (J9E3)
EE. Auxiliary power connector (J9E4)
FF. USB internal header (JC9F14)
GG. SMBus connector (J9F2)
HH. F16 expansion connector (J7G1)
II. ITP connector (J6G1)
JJ. Narrow SCSI connector (J9H1)
KK. External IPMB connector (J7H1)
LL. SMM connector (J8H1)
MM. Wide SCSI A connector (J9H2)

Processor

Each Pentium II 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 maintains full backward compatibility with the 8086, 80286, Intel386™, Intel486™, Pentium, and Pentium Pro processors. The processor's numeric coprocessor significantly increases the speed of floating-point operations and complies with ANSI/IEEE standard 754-1985.

Each S.E.C. cartridge connects to the baseboard through a 330-pin Slot 2 edge connector. The cartridge is secured by a retention module attached to the baseboard. 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 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 SC450NX MP server. The memory module contains slots for 16 DIMMs, each of which must be at least 32 MB, and is attached to the baseboard through a 242-pin connector. Memory amounts from 128 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.
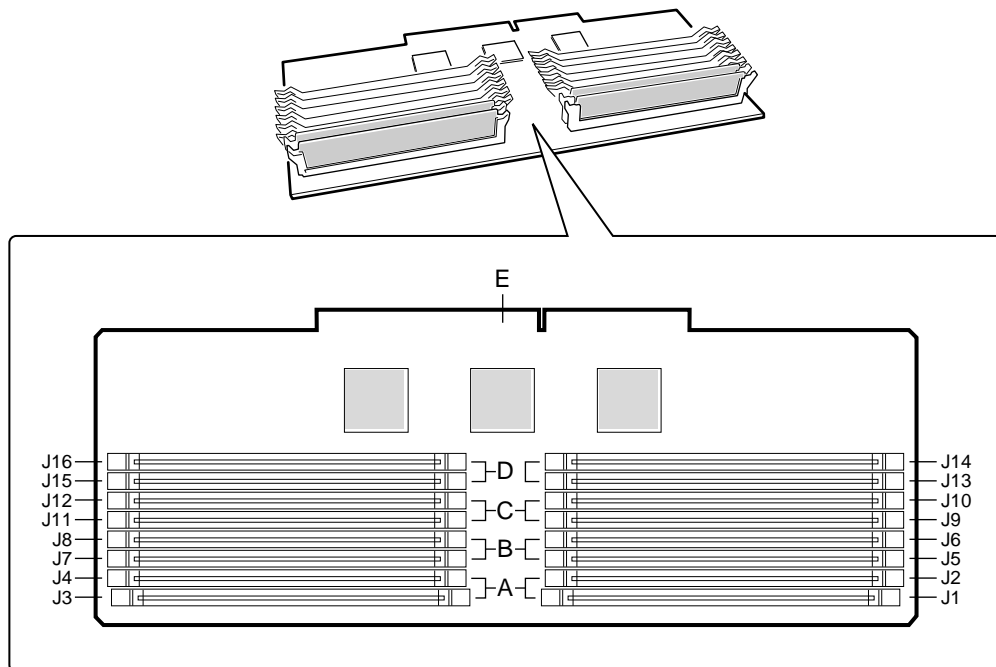
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Figure 7. Memory Module DIMM Installation Sequence

    A. Memory bank A (install first)

    B. Memory bank B (install second)

    C. Memory bank C (install third)

    D. Memory bank D (install last)

    E. Memory module connector

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 OSs and application programs use base memory while others use both conventional and extended memory. Examples:

- Base memory: MS-DOS[†], OS/2[†], Windows NT[†], and UNIX[†]
- Conventional and extended memory: OS/2, Windows NT, and UNIX

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 OS does not support more than 4 GB of physical memory, this small part of the memory is effectively lost.

⟹ **NOTE**

> **DIMM sizes and compatibility:** use DIMMs that have been tested for compatibility with the baseboard. Contact your sales representative or dealer for a list of approved DIMMs. The table below lists some sample size combinations.

Table 4.   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
4x32				128 MB
4x32	4x32			256 MB
4x32	4x32	4x32	4x32	512 MB
4x64	4x64	4x64	4x64	1024 MB
4x128	4x128	4x128	4x128	2048 MB

Peripherals

Super I/O Chip

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 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 chip, Baseboard Management Controller (BMC), and flash memory for system BIOS. ISA features:

- 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 baseboard 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 chip 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 can not 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 baseboard 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/sec 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 optional SCSI backplane, if your system has that). 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 80MB/sec (40Mhz). The 5, 10, and 20Mhz 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 baseboard 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 baseboard 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

$\Longrightarrow$ **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 baseboard. 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.

The user 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 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, the Baseboard Management Controller (BMC).

Baseboard Management Controller (BMC)

The BMC and associated circuitry are powered from 5V_Standby, which remains active 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 via the interperipheral management bus (IPMB). An emergency management board like the Intel LANDesk SMM 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:

- Baseboard temperature and voltage monitoring
- Processor presence monitoring and FRB control
- Baseboard fan failure detection and indicator control
- SEL interface management
- Sensor Data Record Repository (SDRR) interface management
- SDR/SEL timestamp clock
- Baseboard 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 baseboard, 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 5 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 (described in this manual on page 41). The table also refers to other SSU menus and to the Setup utility. For greater detail, see Chapter 3, beginning on page 31.

Table 5.   Software Security Features

Feature	Description
Put the system into secure boot mode	**How to enter secure mode:**
	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. See "Security Menu" on page 41.
	When the system is in secure mode:
	The system can boot and run the OS, but mouse and keyboard input is not accepted until the user password is entered.
	At boot time, if a CD is detected in the CD-ROM drive or a diskette in drive A, the system prompts for a password. When the password is entered, the system boots from CD or diskette and disables the secure mode.
	If you have not yet installed a CD-ROM drive, if there is no CD in the drive or diskette in drive A, the system boots from drive C and automatically goes into secure mode. All enabled secure mode features go into effect at boot time.
	To leave secure mode:
	Enter the correct password(s).
Disable writing to diskette	In secure mode, the system will not boot from or write to a diskette unless a password is entered. To set these features, see "Secure Mode Boot" and "Floppy Write Protect" in "Security Menu," page 41.
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 Also, screen can be blanked and writes to diskette can be inhibited	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. To set this feature, see "Secure Mode Timer" in "Security Menu," page 41.
	If video blanking is enabled, the monitor display will go blank until the correct password(s) is entered. To set this feature, see "Video Blanking" in "Security Menu," page 41.

Table 5.   Software Security Features (continued)

Feature	Description
Control access to using the SSU: set administrator password	To control access to setting or changing the system configuration, set an administrator password and enable it through Setup or the SSU.
	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.
	Once set, passwords can be disabled by setting the password to a null string or by changing the Clear Password jumper. See "Security Menu," page 41; or, to change a jumper, see "Baseboard Jumpers," page 151.
Control access to the system other than SSU: set user password	To control access to using the system, set a user password and enable Password on Boot through Setup or the SSU.
	Once set, passwords can be disabled by setting the password to a null string or by changing the Clear Password jumper. See "Security Menu," page 41; or, to change a jumper, see "Baseboard Jumpers," page 151.
Boot without keyboard	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. Do not plug in a keyboard while power is applied to the system.
Specify the boot sequence	The sequence you specify in the Boot Device Priority Submenu (see page 44) of the SSU's Boot Menu 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.

3 Configuration Software and Utilities

This chapter describes the Power-on Self Test (POST) and system configuration utilities. The table below briefly describes the utilities.

Table 6.   Configuration Utilities

Utility	Description and brief procedure	Page
BIOS Setup	If the system does not have a diskette drive, or the drive is disabled or misconfigured, use Setup to enable it. 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. For the procedure to do this, see "CMOS Clear Jumper" on page 152. Then run the SSU to configure the system.	33
Server Setup Utility (SSU)	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. The SSU can be run from either the configuration software CD or from a set DOS-bootable diskettes. See the printed *Quick Start Guide* to make a set of SSU diskettes. Information entered via the SSU overrides information entered via Setup.	46
Emergency Management Port (EMP) Console	Use to access and monitor the server remotely.	57
FRUSDR Load Utility	Use to update the Field Replacement Unit (FRU), Sensor Data Record (SDR), and Desktop Management Interface (DMI) flash components.	69
BIOS Update Utility	Use to update the BIOS or recover from a corrupted BIOS update.	74
Firmware Update Utility	Use to update BMC flash ROM.	76
Symbios SCSI Utility	Use to configure or view the settings of the SCSI host adapters and onboard SCSI devices in the system.	77

Hot Keys

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

Table 7.   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, POST starts running. POST checks the baseboard, 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.

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
   ```

3. If you do not press <F2> and do NOT have a device with an OS loaded, the above message remains for a few seconds while the boot process continues, and the system beeps once. Then this message appears:

   ```
   Operating System not found
   ```

   (To create software installation diskettes, see the printed *Quick Start Guide*.)

   If you do not press <F2>, the boot process continues and this message appears:

   ```
   Press <Ctrl><C> to enter SCSI Utility
   ```

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. Also see "Using the Symbios SCSI Utility" on page 77. 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. For a listing of beep codes and error messages that POST can generate, see Chapter 7, "Solving Problems," beginning on page 123.

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.

Run Setup: you can run Setup to modify any standard PC-AT† 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

Run SSU, not Setup: you must run the SSU instead of Setup to do the following:

- Enter or change information about a board
- Alter system resources (e.g., 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. For a step-by-step procedure, see "CMOS Clear Jumper" on page 152.

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); for a step-by-step procedure, see "CMOS Clear Jumper" on page 152.

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

To:	Press:
Get general help	<F1> or <Alt+H>
Move between menus	← →
Go to the previous item	↑
Go to the next Item	↓
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>

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 Press Enter appears next to the option.	Press <Enter> to display a submenu that is either a separate full-screen menu or a pop-up menu with one or more choices.

The rest of this section lists the features that display onscreen after you press <F2> to enter Setup. Not all of the option choices are described, because (1) a few are not user-selectable but are displayed for your information, and (2) many of the choices are relatively self-explanatory.

Main Menu

Table 8 lists the selections you can make on the Main Menu itself. Use the submenus for other selections. Default values are in **bold**.

Table 8.   Main Menu

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 **1.44 MB** 2.88 MB	Selects the diskette type.
Legacy Diskette B:	Disabled 360 KB 720 KB **1.44 MB** 2.88 MB	Selects the diskette type.
Hard Disk Pre-delay	**Disabled** 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 powerup, before being accessed.
Primary Master	N/A	Enters submenu.
Primary Slave	N/A	Enters submenu.
Keyboard Features	N/A	Enters submenu.

Language	**English (US)**
	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 the following table, the features other than "Type" appear only for Type Auto if a drive is detected.

Table 9.   Primary IDE Master and Slave Submenu

Feature	Choices	Description
Type	**Auto** 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	**Disabled** 2, 4, 8, or 16 sectors	Determines the number of sectors per block for multisector transfers. This field is informational only for Type Auto.
LBA Mode Control	**Disabled** 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	**Disabled** Enabled	Enabling allows 32-bit IDE data transfers. This field is informational only for Type Auto.
Transfer Mode	**Standard** 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	**Disabled** Enabled	For use with Ultra DMA drives. This field is information only for Type Auto.

Keyboard Features Submenu

Table 10.   Keyboard Features Submenu

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

Advanced Menu

You can make the following selections on the Advanced Menu itself. Use the submenus for the three other selections that appear on the Advanced Menu.

Table 11.   Advanced Menu

Feature	Choices	Description
Plug and Play OS	**No** Yes	Select Yes if you are booting a Plug and Play-capable OS.
Reset Configuration Data	**No** Yes	Select Yes if you want to clear the system configuration data during next boot. System automatically resets to No in next boot.
PCI Configuration	N/A	Enters submenu.
I/O Device Configuration	N/A	Enters submenu.
Use Multiprocessor Specification	1.1 **1.4**	Selects the version of multiprocessor specification to use. Some operating systems require version 1.1 for compatibility reasons.
Large Disk Access Mode	**LBA** 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 correct method, consult OS documentation.
Pause Before Boot	**Enabled** 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 12.   PCI Device, Embedded SCSI Submenu

Feature	Choices	Description
Option ROM Scan	**Enabled** Disabled	Enables option ROM scan of the selected device.
Enable Master	**Disabled** Enabled	Enables selected device as a PCI bus master.
Latency Timer	Default 0020h 0040h 0060h 0080h 00A0h **00C0h** 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 13.   PCI Devices Submenu

Feature	Choices	Description
Option ROM Scan	**Enabled** Disabled	Enables option ROM scan of all devices other than the onboard SCSI controllers.
Enable Master	**Enabled** Disabled	Enables all devices, other than the onboard SCSI controllers, as a PCI bus master.
Latency Timer	Default 020h **040h** 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 14. I/O Device Configuration Submenu

Feature	Choices	Description
Serial Port A	Disabled **Enabled** Auto OS Controlled	Auto forces BIOS to configure the port. OS Controlled displays when OS controls the port.
Base I/O Address	**3F8** 2F8 3E8 2E8	Selects the base I/O address for COM port A.
Interrupt	**IRQ 4** IRQ 3	Selects the IRQ for COM port A.
Serial Port B	Disabled **Enabled** Auto OS Controlled	Auto forces BIOS to configure the port. OS Controlled displays when OS controls the port.
Mode	**Normal** **IrDA**† **ASK-IR**	Selects mode for COM port B.
Base I/O Address	3F8 **2F8** 3E8 2E8	Selects the base I/O address for COM port B.
Interrupt	IRQ 4 **IRQ 3**	Selects the interrupt for COM port B.
Parallel Port	Disabled **Enabled** Auto OS Controlled	Auto forces BIOS to configure the port. OS Controlled displays when OS controls the port.
Mode	**ECP** Output only Bidirectional EPP	Selects mode for parallel port.
Base I/O Address	**378** 278	Selects the base I/O address for parallel port.
Interrupt	IRQ 5 **IRQ 7**	Selects the interrupt for parallel port.
DMA channel	**DMA 1** DMA 3	Selects the DMA channel for parallel port.
Floppy disk controller	Disabled **Enabled**	Enables onboard diskette controller.
Base I/O Address	**Primary** Secondary	Sets the base I/O address for the diskette controller.
PS/2 Mouse	**Auto** 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 15.   Advanced Chipset Control Submenu

Feature	Option	Description
Address Bit Permuting	**Disabled** 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	**1 MB** 1 KB Every location	Tests base memory once per MB, once per KB, or every location.
Extended RAM Step	**1 MB** 1 KB Every location	Tests extended memory once per MB, once per KB, or every location.
L2 Cache	**Enabled** 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	**Enabled** 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	**Disabled** Enabled	When enabled, BIOS automatically detects and corrects SBEs.
Restreaming Buffer	**Enabled** 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.

Table 16.   Security Menu

Feature	Choices	Description
Administrator Password is	**Clear** Set	Status only; user cannot modify. Once set, this can be disabled by setting it to a null string or by clearing password jumper on baseboard (see "Baseboard Jumpers," page 151).
User Password is	**Clear** Set	Status only; user cannot modify. Once set, this can be disabled by setting it to a null string or by clearing password jumper on baseboard (see "Baseboard Jumpers," page 151).
Set Administrative Password	Press Enter	When the <Enter> key is pressed, the user is prompted for a password; press ESC key to abort. Once set, this can be disabled by setting it to a null string or by clearing password jumper on baseboard (see "Baseboard Jumpers," page 151).
Set User Password	Press Enter	When the <Enter> key is pressed, the user is prompted for a password; press ESC key to abort. Once set, this can be disabled by setting it to a null string or by clearing password jumper on baseboard (see "Baseboard Jumpers," page 151).
Password on Boot	**Disabled** 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	**Normal** Write Protect	Write-protects boot sector on hard disk to protect against viruses.
System Backup Reminder	**Disabled** Daily Weekly Monthly	Displays system-backup reminder message at boot.
Virus Check Reminder	**Disabled** Daily Weekly Monthly	Displays virus-check reminder message at boot.
Secure Mode Timer	**Disabled** 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	**Disabled** 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	**Disabled** 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	**Disabled** Enabled	When secure mode is activated, the diskette drive is write protected. The user must enter a password to reenable diskette writes. Cannot be enabled unless at least one password is enabled.

Server Menu

Table 17.   Server Menu

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

System Management Submenu

Table 18.   System Management Submenu

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

Console Redirection Submenu

Table 19.   Console Redirection Submenu

Feature	Choices	Description
COM Port Address	**Disabled** 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 **19.2k** 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 **CTS/RTS + CD**	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 selections on the Boot Menu itself.

Table 20.   Boot Menu

Feature	Choices	Description
Floppy Check	**Disabled** Enabled	If Enabled, system verifies diskette type on boot. Disabled results in a faster boot.
Multi-boot Support	**Disabled** Enabled	Enable this option only if the total number of hard drives is less than eight.
Boot Device Priority	N/A	Enters submenu.
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. Press the <+> or <-> keys to move the device higher or lower in the boot priority list.

Table 21.   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. Press the <+> or <-> keys to move the device higher or lower in the boot priority list.

Table 22.   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. Select an option using the up or down arrow keys. Press <Enter> to run the option. Pressing <Esc> does not exit this menu. You must select one of the items from the menu or menu bar to exit.

Table 23.   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. ⚠ **CAUTION** 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

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

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 an OS like Windows.

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:
   - **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> to reboot your server from the diskette.
   - **Directly from the Server Configuration Software CD:** Insert the configuration software CD into your 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. Select CD-ROM as your primary boot device. Save those settings and exit BIOS Setup. The server will boot from the CD-ROM and display a menu of options. Follow the instructions in the menu to start the SSU.

3. When the SSU title appears on the screen, press <Enter> to continue.
4. 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 UI before continuing. See "Customizing the SSU" on page 49.
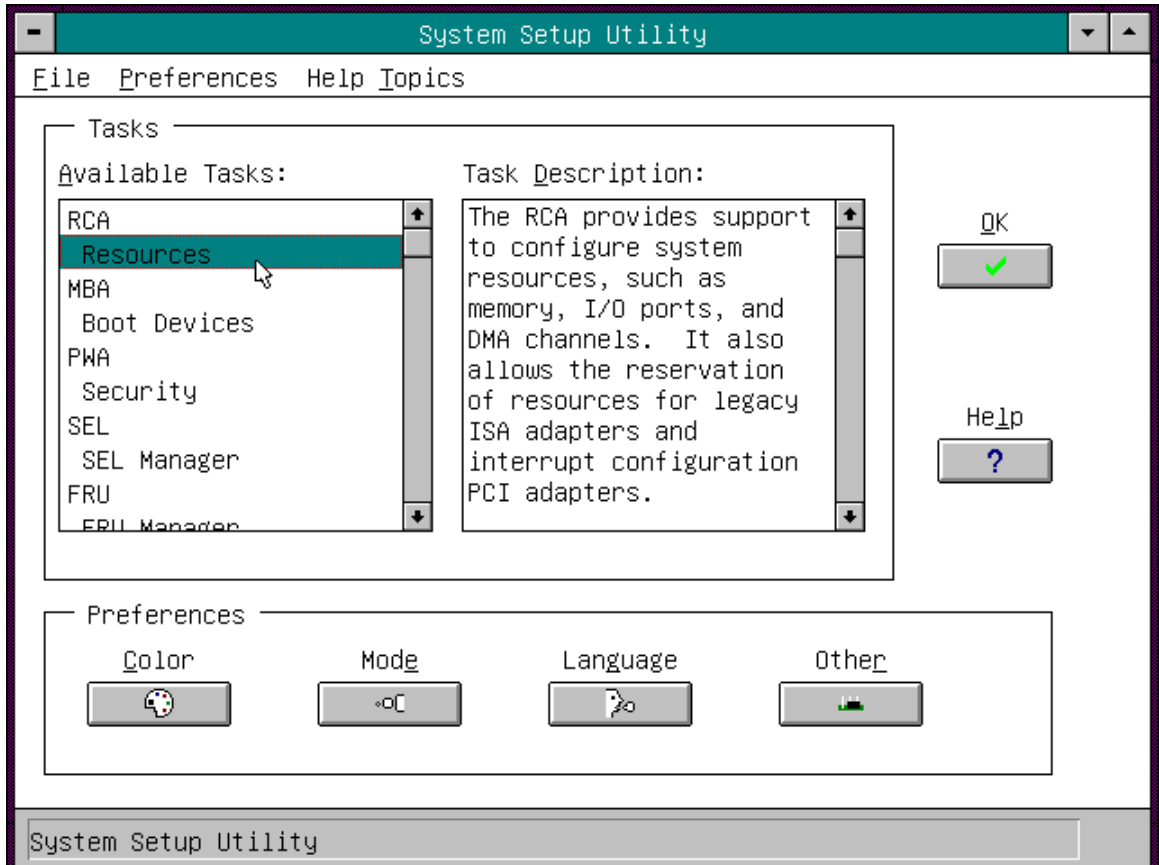

Figure 8. SSU Main Window

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:

- **Color**—lets you change the default colors associated with different items on the screen to predefined color combinations. The changes are instantaneous.
- **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.
- **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.
- **Other**—lets you change other miscellaneous options in the SSU. The changes are immediate.

To change the interface default values:

- Use the mouse to click on the proper button in the Preferences section of the SSU Main window.

  OR
- Use the tab and arrow keys to highlight the desired button, and press the spacebar or <Enter>.

  OR
- Access the menu bar with the mouse or hot keys (Alt + underlined letter).

⟹ **NOTE**

> If you run the SSU from nonwritable 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:

- In the SSU Main window, double-click on the task name under Available Tasks to display the main window for that task.

  OR
- Highlight the task name, and click <OK>.

  OR
- 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 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 <Remove ISA Board>.

Modifying Resources

Modifying the resources of a device may be necessary to accommodate certain OSs, 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 <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 <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 <User Password>.
2. Enter the old password in the first field.
3. Enter the new password in the second field (or leave blank to clear).
4. Confirm the password by entering it again in the second field (or leave blank to clear).

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

Security Options

In this 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.

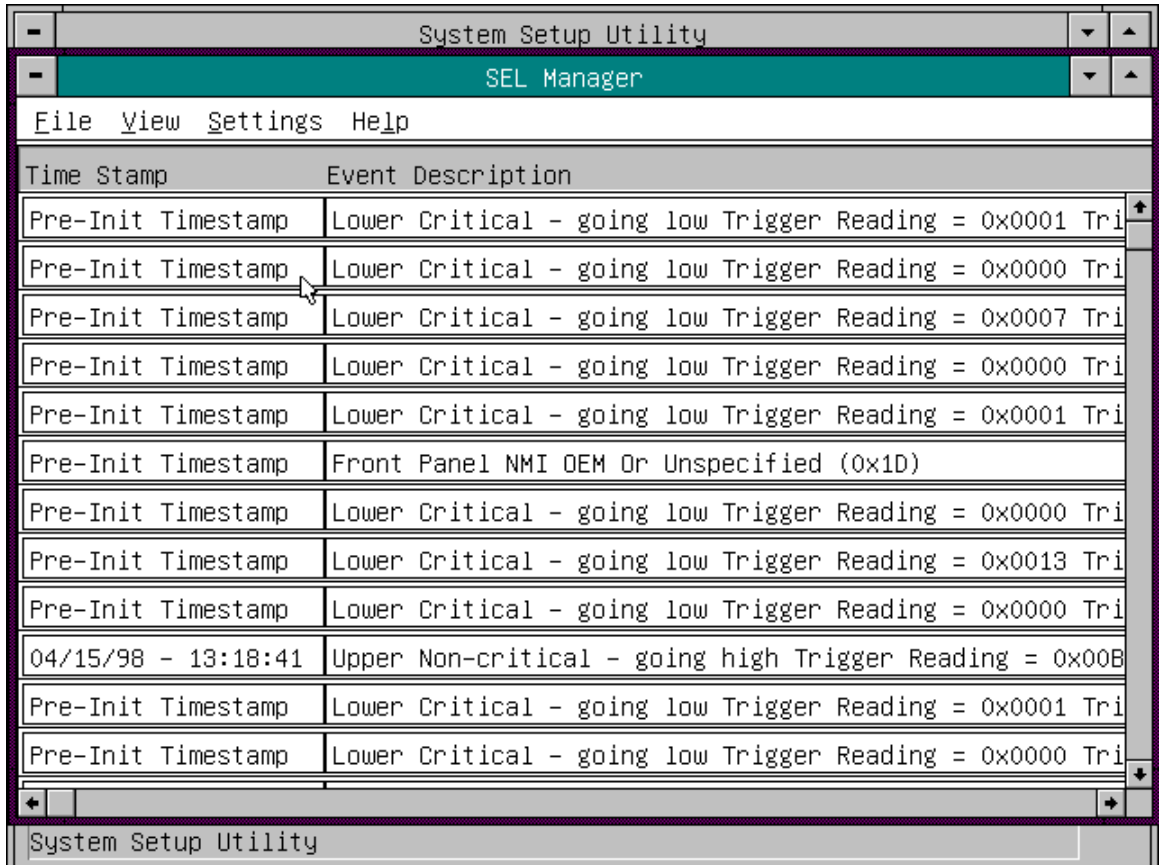Figure 9 shows the SEL viewer main window. Table 24 lists the window's menus and options.

Figure 9. SEL Viewer Add-in Main Window

Table 24. SEL Viewer Menus

Menu	Options
File	**Open SEL**: Views data from previously saved SEL file **Save SEL**: Saves the currently loaded SEL data to a file **Clear SEL**: Clears the SEL data from the BMC **Exit**: Quits the SEL Viewer
View	**SEL Info**: Displays information about the SEL (display only) **All Events**: Displays the current SEL data from the BMC **By Sensor**: Displays a pop-up menu allowing you to view the data from a certain sensor type **By Event**: Displays a pop-up menu allowing you to view the data from a certain event type
Settings	**Display Hex/Verbose**: Toggles between Hex/interpreted mode of displaying the SEL records **Output Text/Binary**: Determines whether SEL data will be saved to the file (and under File - Save) in binary format or verbose format
Help	**About**: 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.

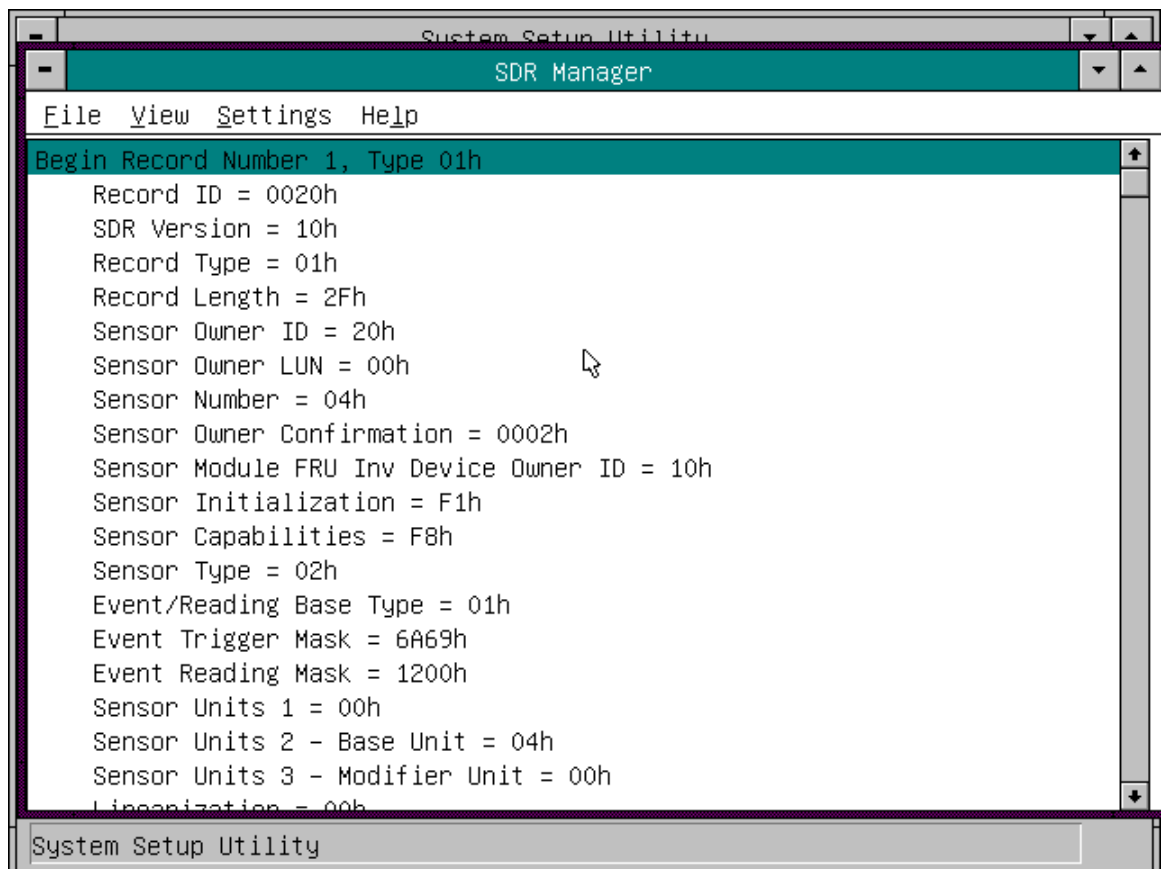Figure 10 shows the SDR Manager main window. Table 25 lists the window's menus and options.

Figure 10. SDR Manager Main Window

Table 25.   SDR Manager Menus

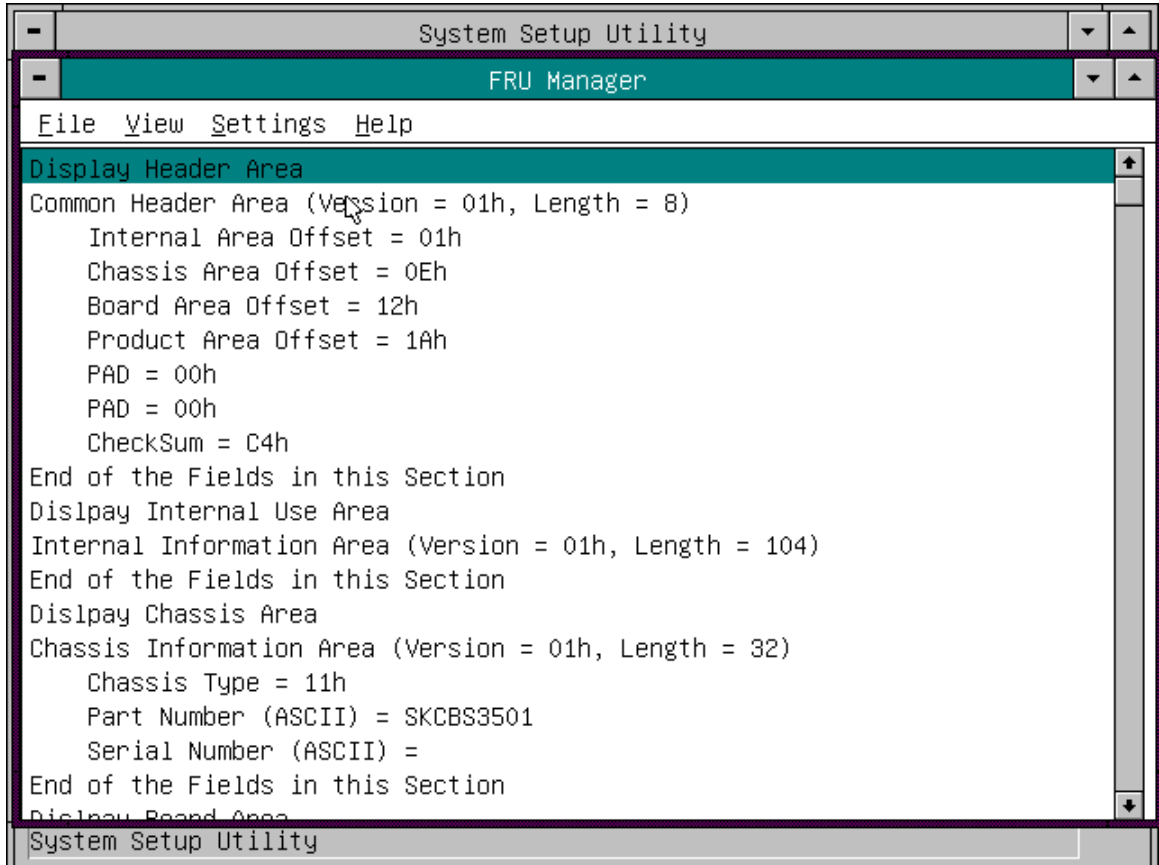| Menu	Options
File	**Open FRU**: Opens FRU data from a previously saved file **Save SDR**: Saves SDR data to a file in binary raw or verbose text format **Exit**: Quits the SDR Manager
View	**SDR Info**: Displays SDR information as returned by the GetSDRInfo interface of the BMC **All Records**: Displays all records in the SDR repository **By Record**: Displays all records in the SDR repository, sorted by record type
Settings	**Display HEX**: Displays SDR records in Hex format **Display Verbose**: Displays SDR records in verbose format **Output Text**: Saves SDR data in verbose format **Output Binary**: Saves SDR data in binary format
Help	**About**: 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 11 shows the FRU Manager main window. Table 26 lists the window's menus and options.


```
┌──────────────────────────────────────────────────────────────────────┐
│ ▬ │          System Setup Utility                          │ ▼ │ ▲ │
├────────────────────────────────────────────────────────────────────────┤
│ ▬ │                  FRU Manager                          │ ▼ │ ▲ │
├────────────────────────────────────────────────────────────────────────┤
│  File   View   Settings   Help                                         │
├────────────────────────────────────────────────────────────────────────┤
│ Display Header Area                                              │ ▲ │
│ Common Header Area (Version = 01h, Length = 8)                   │   │
│       Internal Area Offset = 01h                                │   │
│       Chassis Area Offset = 0Eh                                 │   │
│       Board Area Offset = 12h                                   │   │
│       Product Area Offset = 1Ah                                 │   │
│       PAD = 00h                                                 │   │
│       PAD = 00h                                                 │   │
│       CheckSum = C4h                                            │   │
│ End of the Fields in this Section                               │   │
│ Dislpay Internal Use Area                                       │   │
│ Internal Information Area (Version = 01h, Length = 104)         │   │
│ End of the Fields in this Section                               │   │
│ Dislpay Chassis Area                                            │   │
│ Chassis Information Area (Version = 01h, Length = 32)           │   │
│       Chassis Type = 11h                                       │   │
│       Part Number (ASCII) = SKCBS3501                          │   │
│       Serial Number (ASCII) =                                  │   │
│ End of the Fields in this Section                               │   │
│ Dislpay Board Area                                              │ ▼ │
├────────────────────────────────────────────────────────────────────────┤
│ System Setup Utility                                                   │
└────────────────────────────────────────────────────────────────────────┘
```

Figure 11. FRU Manager Main Window

Table 26.   FRU Manager Menus

Menu	Options
File	**Open FRU**: Opens FRU data from a previously saved file **Save FRU**: Saves FRU data to a file in binary raw or verbose text format **Exit**: Quits the FRU Manager
View	**FRU Info**: Displays FRU information of the selected device **All FRU Areas**: Displays FRU areas of all devices **By Device Type**: Displays FRU areas sorted by device type
Settings	**Display HEX**: Displays FRU areas in Hex format **Display Verbose**: Displays FRU areas in verbose format **Output Text**: Saves FRU data in verbose format **Output Binary**: Saves FRU data in binary format
Help	**About**: 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 File in the SSU Main window.
2. Click <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 via a modem or direct connection.

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.

- **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.
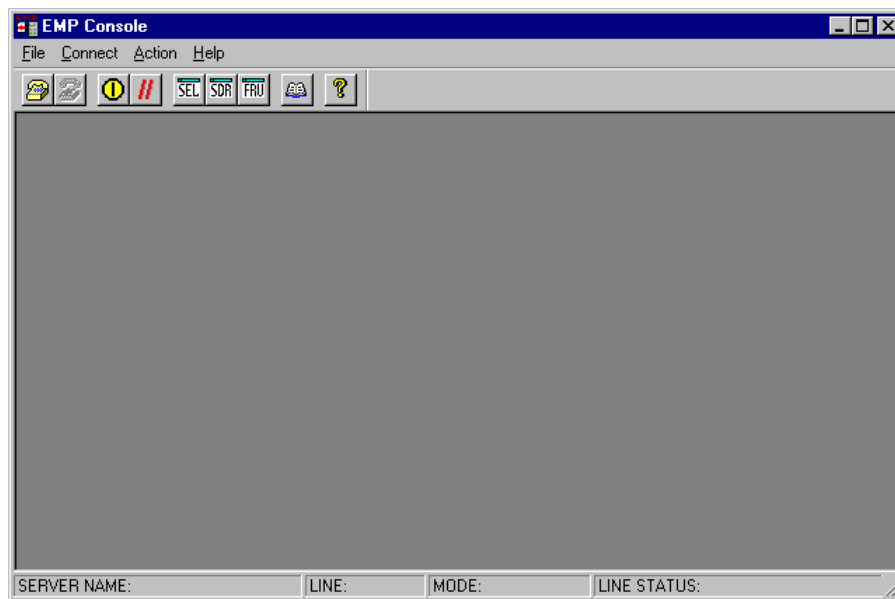
Figure 12. EMP Console in Command State
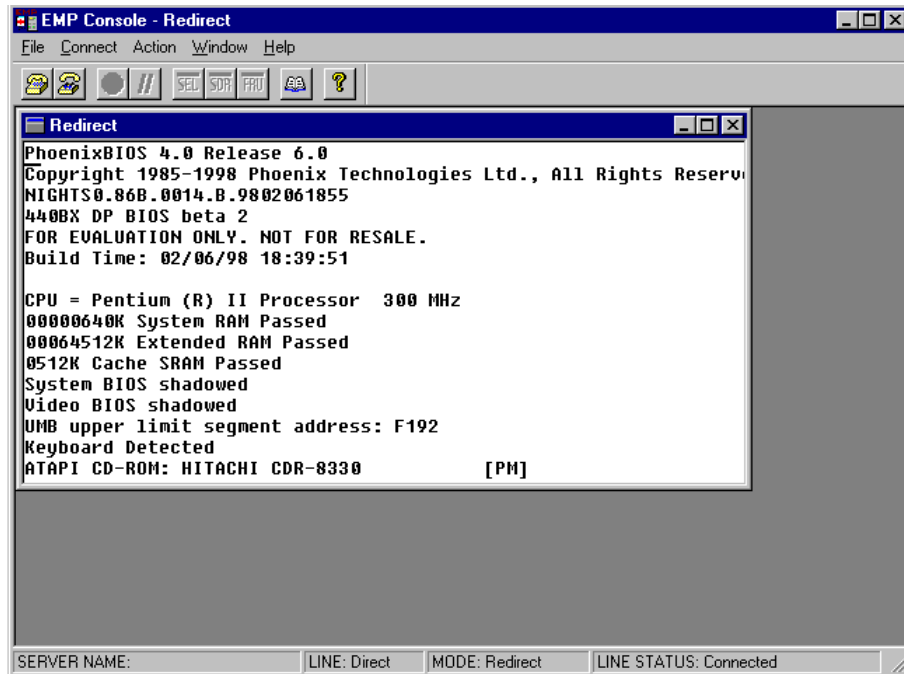
Figure 13. EMP Console in Redirect State

Figure 13 shows 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, and 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.

Table 27.   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*	Redirect window
Always Active	EMP commands available	Redirect window*	EMP commands available

*   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 28.   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 Systems:
- Windows† 95
    - — 16 MB of RAM, 32 MB recommended
    - — 20 MB disk space
- 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/95 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. Tables 27 (page 59) and 28 (page 59) 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 tool bar buttons combine server control and management plug-in options available from the Connect and Action Menus.

Icon	Description
	Connects to a selected server.
	Disconnects from the currently connected server.
	Powers the selected server on or off.
	Resets the selected server.
SEL	Opens the SEL viewer.
SDR	Opens the SDR viewer.
FRU	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 shown in Figure 14 allows you to connect to a selected server. 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.
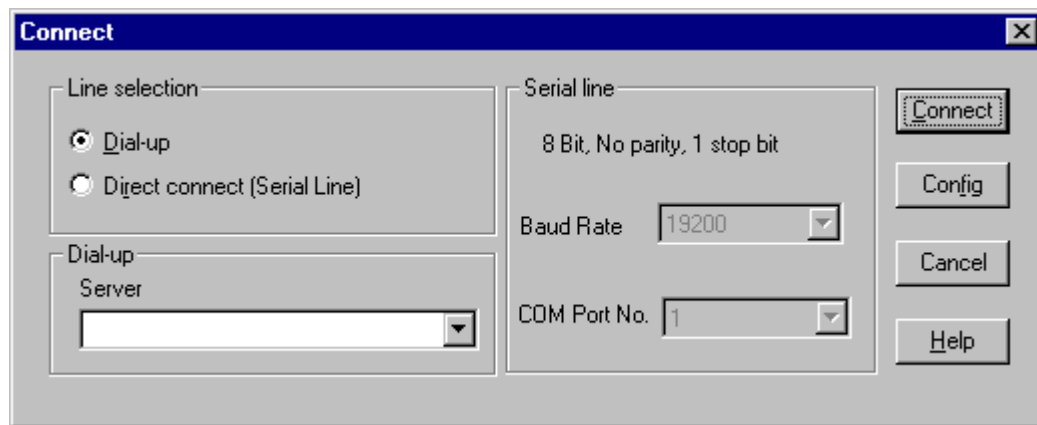
Figure 14. Connect Dialog

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 dropdown edit list box. You can select or enter a server name; a server must be selected wen 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 On/Off the Server Remotely

Selecting Power On/Off from the Action Menu allows you to power the server on or off, with POST power-up options. It generates the Power on/off dialog.
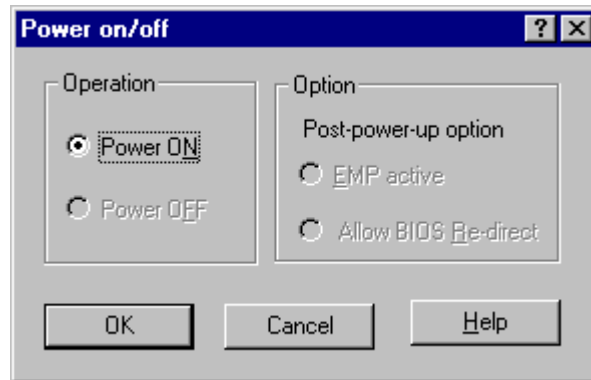
Figure 15. Power On/Off Dialog

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.
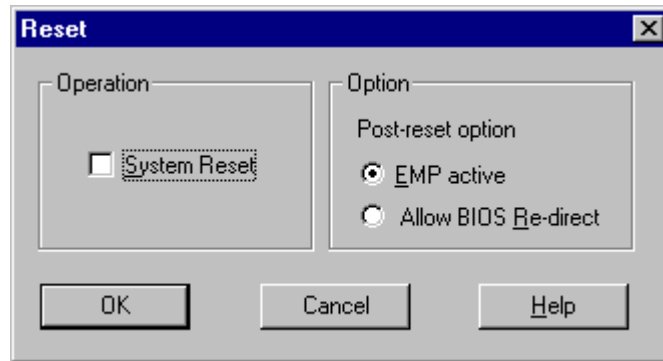
Figure 16. Reset Dialog

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.
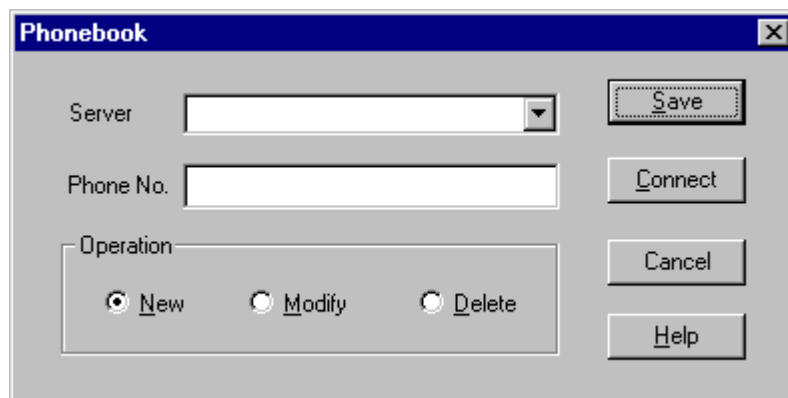
Figure 17. Phonebook Dialog

Options available in the dialog are:

- **Server:** Displays a dropdown 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 dropdown edit box and modify the existing phone number. Click <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 dropdown 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 dropdown edit box already populating the Connect dialog's Server dropdown edit box.
- **Cancel:** Exits the dialog with no action taken.
- **Help:** Displays dialog-level help information.

Management Plug-ins

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.
- **Connect**
- **View**
    — **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, e.g., voltage, temperature, etc.
    — **By Event:** Displays all events in the SEL of a particular type, e.g., 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

Command Line Format

The basic command line format is

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

Table 29.   Command Line Format

Command	Description
frusdr	Is the name of the utility
-? or -h	Displays usage information
-d {dmi, fru, sdr}	Displays requested area only
-cfg filename.cfg	Uses custom CFG file
-p	Pause between blocks of data
-v	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 in conjunction 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.
```

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This utility must be run from a system executing DOS. Running in a Window's 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; nonprintable characters (ch < 32 || ch > 126) 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 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; 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 chassis, board, and product FRU information to the DMI fields, if the DMI flag follows each FRUAREA command in the configuration file.

Cleaning Up and Exiting

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 exit code.

Upgrading the BIOS

Preparing for the Upgrade

Before you upgrade the BIOS, prepare for the upgrade by recording the current BIOS settings, obtaining the upgrade utility, and making a copy of the current BIOS.

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 computer supplier 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. 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. 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 nonerasable 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 detailed in "Recovery Boot Jumper" on page 153. After doing the procedure, leave the upgrade disk in drive A and turn on the server, then continue with the BIOS upgrade (see page 75).

Changing the BIOS Language

You can use the BIOS upgrade utility to change the language BIOS displays. Use a bootable diskette containing the Intel flash utility and language files (see page 75).

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 file name, 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 file name. 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 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

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...
```

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

4 Exchanging SCSI Hard Drives and Power Supplies

SCSI Hard Disk Drives

The system supports a variety of LVD and single-ended SCSI devices. As shipped from the supplier, the system might contain no hard disk drives. Contact your sales representative or dealer for a list of approved SCSI devices.

⚠ **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 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 Plastic Carrier

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 (page 163).
3. Orient the drive so the connector is near the top surface of the drive, then place the plastic carrier on top of the drive.
4. Using four screws of the correct size and length (not supplied), attach the carrier to the drive.
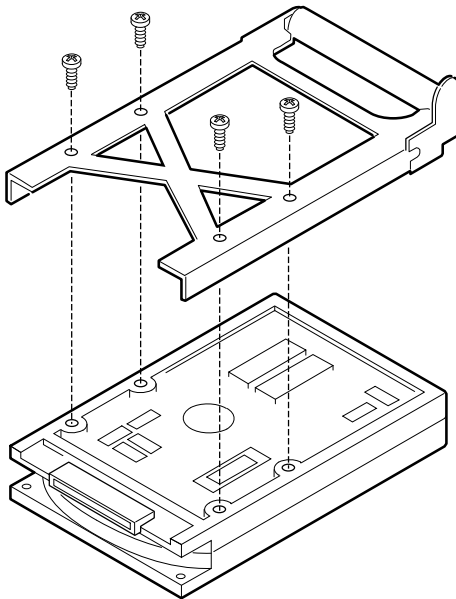
OM08043

Figure 18. Hard Disk Drive and Plastic Carrier

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 on the right of the carrier to the left (toward the center of the drive—B in Figure 19) while gently pulling straight down on the carrier handle (A in Figure 19). 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.
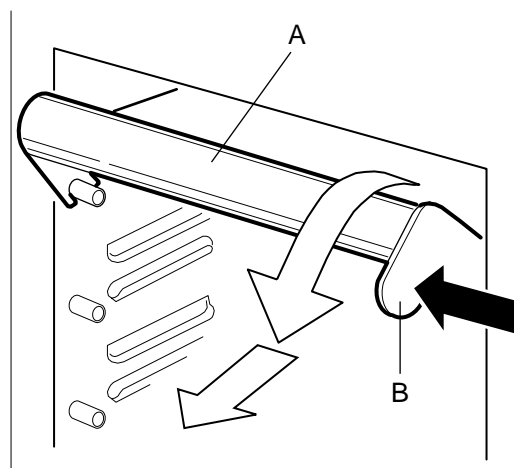
OM08041

Figure 19. Disengaging Drive Carrier from Chassis

    A.   Carrier handle (pull straight down to disengage carrier and bay from backplane connector)
    B.   Tab on carrier handle (push left to unlock carrier)

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 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 (B in Figure 20) slide onto the two round pegs inside the drive bay (A in Figure 20). When they engage, push the handle straight up (C in Figure 20) 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.
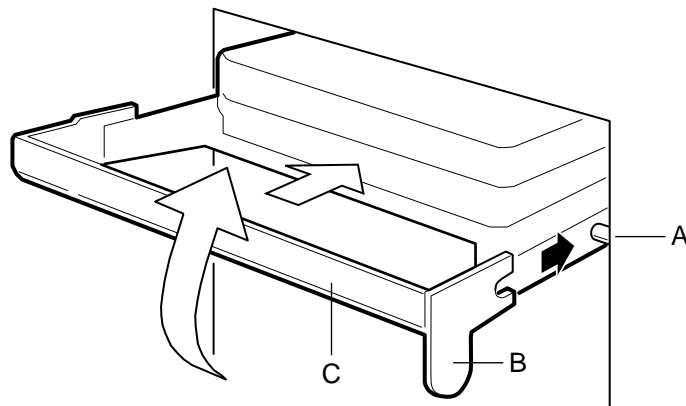
OM08042

Figure 20. Installing a New Drive

A.   Round peg inside drive bay
B.   Round notches on carrier handle (must fit over pegs in drive bay)
C.   Carrier handle

Installing Heatsinks on High-Power Drives

If you plan to use SCSI drives whose power exceeds 15 watts, you must install heatsinks on those drives.

⚠ CAUTION

If you install high-power drives, you must also install additional system fans. This requires that you work inside the chassis and that you are a technically qualified service technician. See "Installing Fans for High-Power Drives" (page 106) in part two of this document, "Service Technician's Guide."

1. Position each heatsink (B in Figure 21) so that the three screw holes in the heatsink align with their corresponding holes in the hard drive. The holes are spaced apart so that you can position the heatsink in only one way: with the fins extending along the side and the top of the hard drive. The "top" of the drive has the label (C in Figure 21); the "bottom" has the exposed circuit board (A).
2. Use three screws (D) to attach each heatsink to the drive.
3. To insert the drive into the hot-docking bay, you must attach a carrier to the drive. See "Mounting a SCSI Hard Disk Drive in a Plastic Carrier" on page 79.

OM07168
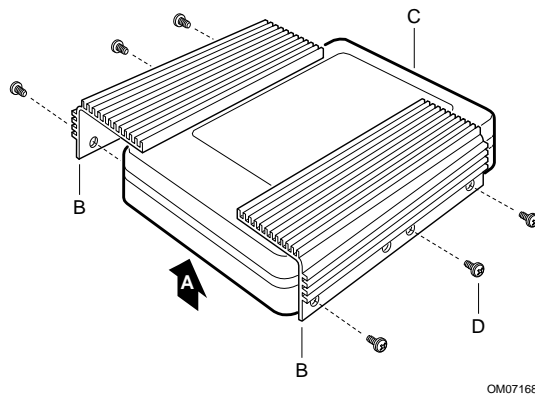
Figure 21. Installing Two Heatsinks

Power Supply

⚠ **WARNINGS**

> **Hazardous conditions, power supply: 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.**

Removing a Power Supply

1. Disconnect the AC power cable from the system.
2. Remove the four screws (B in Figure 22) 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 (C in Figure 22).

⚠ **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.
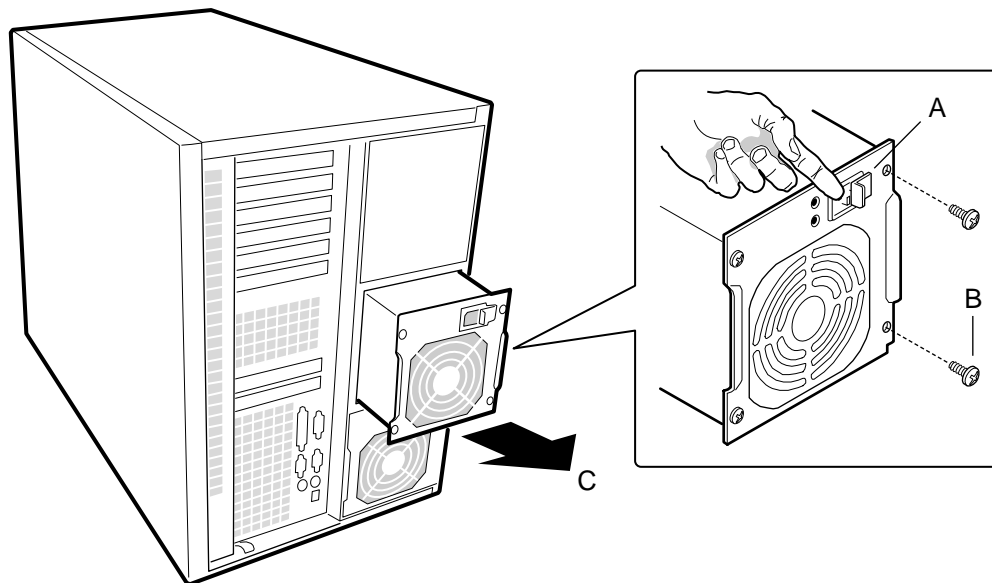
OM08020

Figure 22. Removing a Power Supply

Installing a Power Supply

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 (A in Figure 22).
6. Run the FRUSDR load utility to properly configure the system after adding new components. See "FRU and SDR Load Utility" on page 69.

Part II: Service Technician's Guide

5   Working Inside the System

6   Upgrading Baseboard Components

7   Solving Problems

8   Technical Reference

A   Equipment Log and Configuration Worksheets

B   Regulatory Specifications

C   Warnings

5 Working Inside the System

Tools and Supplies Needed

- Phillips (cross-head) screwdriver (#1 and #2 bit).
- Small flat-bladed screwdriver.
- Jumper removal tool or needle-nosed pliers.
- Antistatic wrist strap and conductive foam pad (recommended).
- Pen or pencil.
- Equipment log: as you integrate new parts into the system, add information about them to your equipment log (page 163). Record the model and serial number of the system, all installed options, and any other pertinent information specific to the system. You will need this information when running the SSU.

Safety: Before You Remove the Access Cover

Before removing the access cover at any time to work inside the system, observe these safety guidelines.

1. Turn off all peripheral devices connected to the system.
2. Turn off the system by using the push-button on/off power switch on the front of the system.
3. Unplug the AC power cords from the system or wall outlet.
4. Label and disconnect all peripheral cables and all telecommunication lines connected to I/O connectors or ports on the back of the system.
5. Provide some electrostatic discharge (ESD) protection by wearing an antistatic wrist strap attached to chassis ground of the system—any unpainted metal surface—when handling components.

Warnings and Cautions

These warnings and cautions apply whenever you remove the access cover of the system. Only a technically qualified person should integrate and configure the system.

⚠ **WARNINGS**

> **System power on/off: The on/off button (a convex button) on the front panel DOES NOT turn off the system AC power. To remove power from system, you must unplug the AC power cords from the wall outlet or the system.**
>
> **Hazardous conditions, power supply: 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.**
>
> **Hazardous conditions, devices, and cables: Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the system and disconnect the power cords, telecommunications systems, networks, and modems attached to the system before opening it. Otherwise, personal injury or equipment damage can result.**

⚠ **CAUTIONS**

> **Electrostatic discharge (ESD) and ESD protection:** ESD can damage disk drives, boards, and other parts. We recommend that you do all procedures in this chapter only at an ESD-protected workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground—any unpainted metal surface—on your system when handling parts.
>
> **ESD and handling boards:** Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the system, place it component-side UP on a grounded, static-free surface. If you place the baseboard on a conductive surface, the battery leads may short out. If they do, this will result in a loss of CMOS data and will drain the battery. Use a conductive foam pad if available but NOT the board wrapper. Do not slide board over any surface.
>
> **Cooling and airflow:** For proper cooling and airflow, always install the chassis access cover before turning on the system. Operating the system without the cover in place can damage system parts.

Access Cover

Removing the Access Cover

You need to remove the system access cover, and in some cases the front bezel, to reach components inside the system. Facing the front of the system, the access cover is on the right side for pedestal-mounted (tower) servers, and on the top for rack-mounted servers.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Turn off all peripheral devices connected to the system.
3. Turn off the system by using the power on/off switch on the front panel AND unplug all AC power cords.
4. Label and disconnect all peripheral cables attached to the I/O panel on the back of the system.
5. Remove and save the two screws from the back of the access cover; you will need them later to reattach the cover.
6. Place the fingertips of your right hand under the built-in handle on the back of the cover. A rounded, rectangular depression in the front middle of the access cover serves as another handle.
7. Using an even pull, slide the cover backward, about an inch, until it stops.
8. Pull the entire cover outward, straight away from the chassis, to disengage the rows of tabs from the notches in the top and bottom edges of the chassis. Set the cover aside.
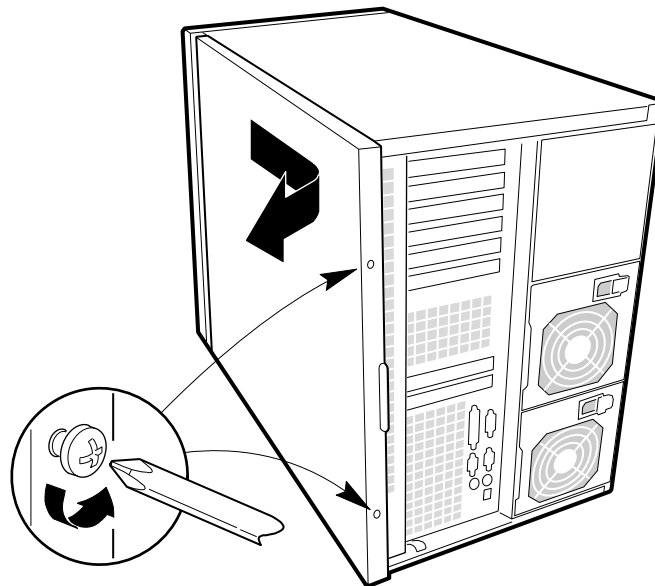
OM08018

Figure 23. Removing the Access cover

Installing the Access cover

1. Before replacing the access cover, check that you have not left loose tools or parts inside the system.
2. Check that cables, add-in boards, and other components are properly installed.
3. Position the cover over the chassis so that the rows of tabs align with slots in the chassis. Slide the cover toward the front of the system until the tabs on the cover firmly engage in the chassis.
4. Attach the cover to the chassis with the two screws you removed earlier, and tighten them firmly (6.0 inch-pounds).
5. Connect all external cables and the power cords to the system.

Subchassis and Electronics Bay

Opening the Subchassis and Electronics Bay

The chassis is comprised of three parts: the main chassis, a swing-out subchassis at the front, and a swing-out subchassis, called the electronics bay, at the rear. To access components in some instances, you must swing away and/or completely remove the subchassis and electronics bay.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Turn off all peripheral devices connected to the system.
3. Turn off the system power by using the power on/off switch on the front panel AND unplug all AC power cords.
4. Label and disconnect all peripheral cables attached to the I/O panel on the back of the system.
5. Remove and save the two screws from the back of the access cover; you will need them later to reattach the cover.
6. Remove the access cover.
7. Remove the two screws on the top and bottom edges of the chassis (A in Figure 24). These screws attach the front subchassis and the electronics bay to the main chassis.

⚠ **CAUTION**

You must disconnect all cabling to the electronics bay before rotating/removing the bay. Failure to do so can result in serious damage to system components. The location of the main connectors in the electronics bay is marked as D in Figure 24.

8. Rotate the front subchassis left, away from the main chassis, until it stops (B in Figure 24).
9. Disconnect all cabling to the electronics bay (D in Figure 24).
10. Using the vertical edge of the electronics bay as a handle, rotate the bay right, away from the main chassis, until it stops (C in Figure 24).
11. If necessary, completely remove the subchassis and electronics bay: rotate the bays outward until the two pins that function as hinges for the bays slide out of their slots. Set the bays aside.
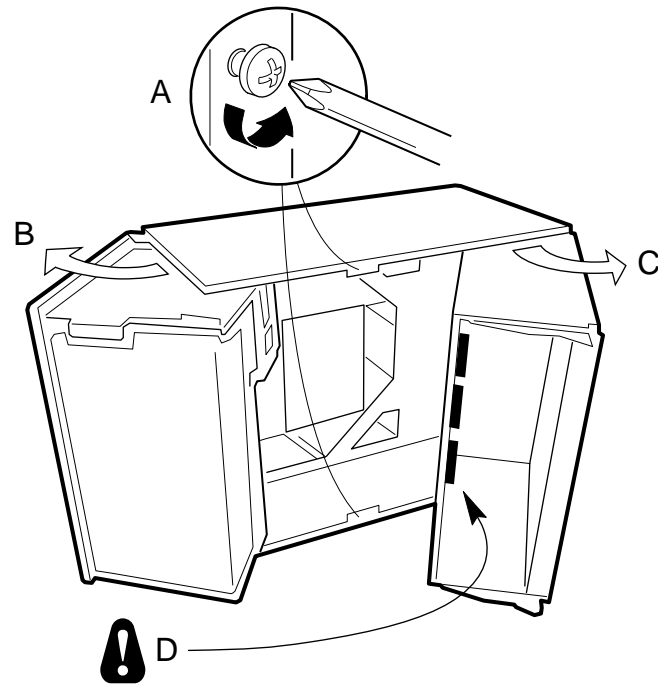
OM08024a

Figure 24. Opening the Subchassis and Electronics Bay

Add-in Boards

Installing an Add-in Board

⚠ **CAUTIONS**

> **Do not overload baseboard:** Do not overload the baseboard by installing add-in boards that draw excessive current.
>
> **ESD and handling boards:** Add-in boards can be extremely sensitive to ESD and always require careful handling. After removing the board from its protective wrapper or from the baseboard, place it component-side up on a grounded, static-free surface or conductive foam pad—if available. Do not slide the board over any surface.

1. Remove access cover.
2. Remove add-in board from its protective wrapper. Be careful not to touch the components or gold edge connectors. Place board component-side up on an antistatic surface.
3. Record the serial number of the add-in board in your equipment log.
4. Set jumpers or switches according to the manufacturer's instructions.
5. Remove and save the screw that attaches the existing board or expansion slot cover to the chassis.
6. Remove and save the expansion slot cover.
7. Hold the add-in board by its top edge or upper corners. Firmly press it into an expansion slot on the baseboard. The tapered foot of the board retaining bracket must fit into the mating slot in the expansion slot frame.
   - Install an ISA board component-side UP.
   - Install a PCI board component-side DOWN.
8. Use the screw removed earlier to fasten the new board retaining bracket to the chassis. Tighten the screw firmly (6.0 inch-pounds). Attach cables if necessary.
9. Reinstall the access cover using the original screws.
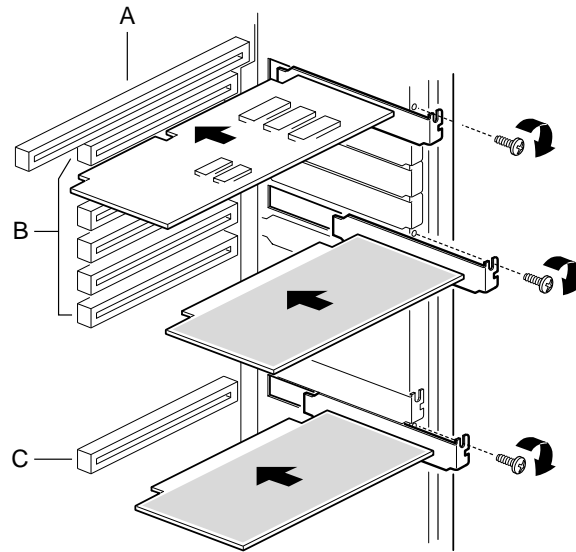
OM08019a

Figure 25. Installing an Add-in Board

A. ISA slot (USE HALF-LENGTH BOARD ONLY)
B. Six PCI slots (top to bottom in figure = PCI B3, B2, B1, B0, A3, and A2)
C. PCI slot A1

Removing an Add-in Board

⚠ CAUTION

Slot covers must be installed on all vacant expansion slots. This maintains the electromagnetic emissions characteristics of the system and ensures proper cooling of system components.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Disconnect any cables attached to the board you are removing.
3. Remove and save the screw that attaches the existing board retaining bracket to the chassis.
4. Holding the board by its top edge or upper corners, carefully pull it out. Do not scrape the board against other components.
5. Store board in an antistatic protective wrapper.
6. If you are not reinstalling a board in the same slot, install a slot cover over the vacant slot. The tapered foot of the cover must fit into the mating slot in the expansion slot frame.
7. Use the screw removed earlier to fasten the new board to the chassis. Tighten the screw firmly (6.0 inch-pounds).
8. Running the SSU is optional after you remove a PCI or ISA board.

Front Panel Board

Removing the Front Panel Board

The front panel board contains the system controls and indicators. It is mounted on a snap-on standoff and a threaded standoff inside the chassis.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove the access cover.
3. Disconnect the fan cables. Remove the fan housing assembly (see page 102).
4. Disconnect the 3.5-inch diskette drive cables. Remove the diskette drive carrier from the chassis (see page 95). Save the screw to use later.
5. On the front panel board, remove and save the screw from the threaded standoff to use later.
6. Grasp the front panel board. Carefully pull it toward the back of the system until it pops off the snap-on standoff.
7. Disconnect the front panel board signal cable from the front panel board.
8. Remove the front panel board from the system. Place it on an antistatic foam pad or a grounded workstation.
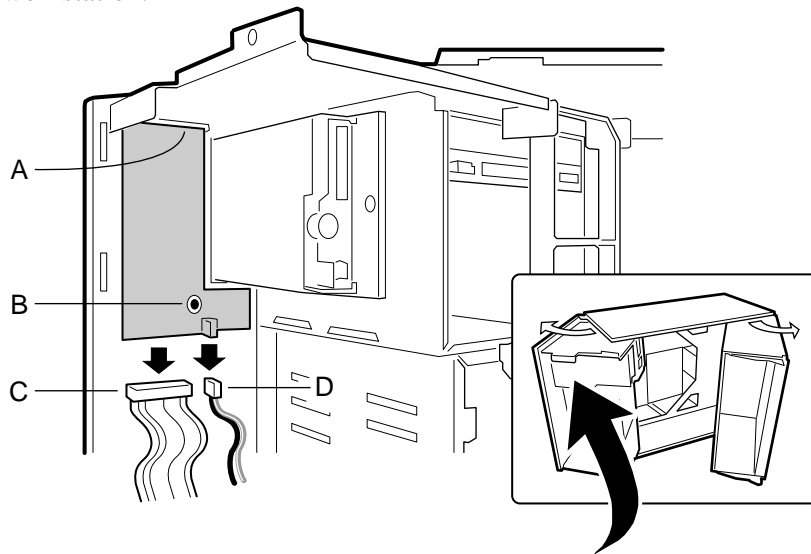
OM08004a

Figure 26. Removing the Front Panel Board

A. Chassis slot   C. Ribbon cable connector
B. Snap-on standoff   D. Wire connector

Installing the Front Panel Board

1. Reconnect the front panel board signal cable to the front panel board.
2. Position the front panel board over the snap-on standoff and the threaded standoff inside the chassis.
3. Carefully press the board onto the snap-on standoff until it snaps in place.
4. Reinstall and firmly tighten (6.0 inch-pounds) the screw that secures the board to the chassis.
5. Reinstall the 3.5-inch diskette drive carrier. Connect the drive cables.
6. Reinstall the access cover using the original screws.

Diskette Drive

Removing the Diskette Drive

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove the access cover (see page 89).
3. Disconnect the power and signal cables from the diskette drive. The connectors are keyed for ease in reconnecting them to the drive.
4. Remove and save the screw that secures the diskette drive carrier to the 5.25-inch drive bay.
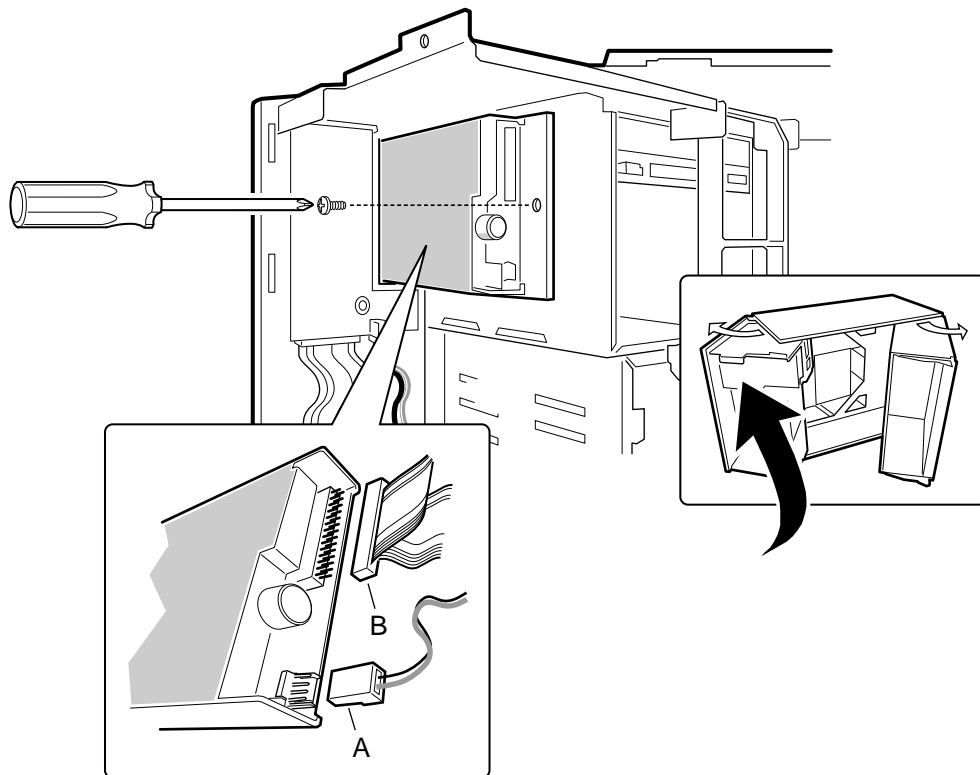
OM08011a

Figure 27. Removing the Diskette Drive from the Chassis

A   Power cable
B   Signal cable

5. Slide the carrier toward the back of the chassis to disengage the tabs from the slots in the bottom of the 5.25-inch drive bay.
6. Remove the carrier/drive from the chassis, and place it component-side up on an antistatic surface.
7. Remove the three screws that hold the carrier to the drive, and set them and the carrier aside.
8. Place the drive in an antistatic protective wrapper if you are not reinstalling the same drive.
9. Reinstall the access cover using the original screws.
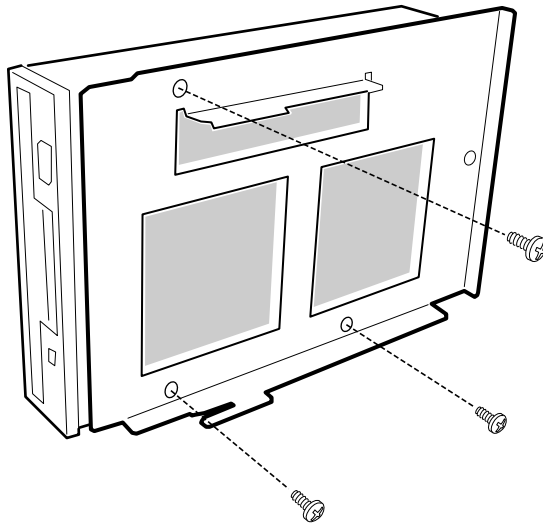
OM08044

Figure 28. Removing the Diskette Drive from the Carrier

Installing the Diskette Drive

1. Remove the new 3.5-inch diskette drive from its protective wrapper, and place it component-side up on an antistatic surface. Record the drive model and serial numbers in your equipment log (see page 163).
2. Set any jumpers or switches according to the drive manufacturer's instructions.
3. Place the drive carrier on the component-side of the drive, and align the three mounting holes.
4. Attach the carrier to the drive with three screws of the appropriate size and length (reuse the screws you removed before). Tighten the screws firmly (between 4.0 and 6.0 inch-pounds).
5. Position the carrier so that the two protruding notches fit into the corresponding slits in the frame. Slide the assembly toward the front of the system to engage the notches. Make sure the front of the drive fits correctly in the front opening of the system.
   When properly positioned, the carrier notches extend slightly into the interior of the 5.25-inch drive bays and the threaded hole in the carrier aligns with the threaded hole in the frame.
6. Secure the assembly to the 5.25-inch bay with the screw you removed earlier; tighten the screw firmly (6.0 inch-pounds).
7. Connect the signal and power cables to the drive. The red stripe on the signal cable must face toward the center of the drive.
8. Reinstall the access cover using the original screws.
9. Run the SSU to specify that the diskette drive is installed in the system.

Peripheral Drives

Drive Cabling Considerations

This section summarizes device cabling requirements and constraints. The number of devices you can install depends on:

- The number supported by the bus
- The number of physical drive bays available
- The height of drives in the internal bays (1-inch or 1.6-inch high)
- The combination of SCSI and IDE devices

IDE Requirements

An 18-inch long IDE cable that supports two drives is standard in the system. If you install an IDE hard drive, we recommend placing it in the lowest internal drive bay to make cabling easier, particularly if you also have an IDE device in the externally accessible bay.

For proper IDE operation, note the cable length specified in Figure 29. If no drives are present on an IDE channel, the cable must be removed. If only one drive is installed, it must be connected at the end of the cable.
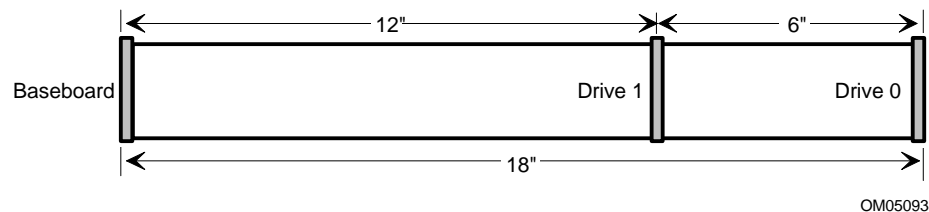
Figure 29. IDE Cable Dimensions

⟹ **NOTE**

> **To disable the IDE controller:** If you plan to disable the IDE controller to reuse the interrupt for that controller, you must physically unplug the IDE cable from the board connector if a cable is present. Simply disabling the drive by configuring the SSU option does not make the interrupt available.

SCSI Requirements

One narrow and two wide SCSI cables are standard in the system.

All SCSI devices must be unterminated except the peripheral at the end of the SCSI cable. Hard drives usually provide an active termination, while CD-ROM drives do not. Because we recommend putting hard drives only in the internal bays, this means that you should route the SCSI cable so that the last device on the cable is a hard drive in the internal bay.

Installing a 5.25-inch Peripheral in the Front Bay

Three 5.25-inch half-height bays provide space for tape backup, CD-ROM, or other removable media drives.

⚠ **CAUTIONS**

> **Only single-ended SCSI devices supported:** The internal SCSI interface in this system supports only single-ended SCSI devices on the narrow SCSI channel. Connecting differential SCSI drive types to this interface can result in electrical damage to the baseboard and peripherals.
>
> **Do not install hard drives in 5.25-inch bays:** We recommend that you do NOT install hard drives in the 5.25-inch bays: the drives cannot be properly cooled in this location; also, a hard drive generates EMI and is therefore more susceptible to ESD in this location.

⇒ **NOTES**

> **Save the filler panels and EMI shields:** System EMI integrity and cooling are both protected by having drives installed in the bays or filler panels and EMI shields covering the bays. When you install a drive, save the panel and shield to reinstall in case you should later remove the drive and not reinstall one in the same bay.
>
> **Bus termination when installing SCSI devices:** It is important that your cabling and connections meet the SCSI bus specification. Otherwise, the bus could be unreliable and data corruption could occur or devices might not work at all. The SCSI bus needs to be terminated at the end of the cable; this is usually provided by the last SCSI device on the cable. For more information on connecting the signal drive to a cable, see step 10 on page 100.

1. Observe the safety and ESD precautions at the beginning of this chapter. Also see the cabling considerations on page 97.
2. Open the front bezel by rotating its right side out and to the left.
3. Push the tab (A in Figure 30) on the left side of the EMI metal shield to the right to disengage it from the chassis. Save the shield.
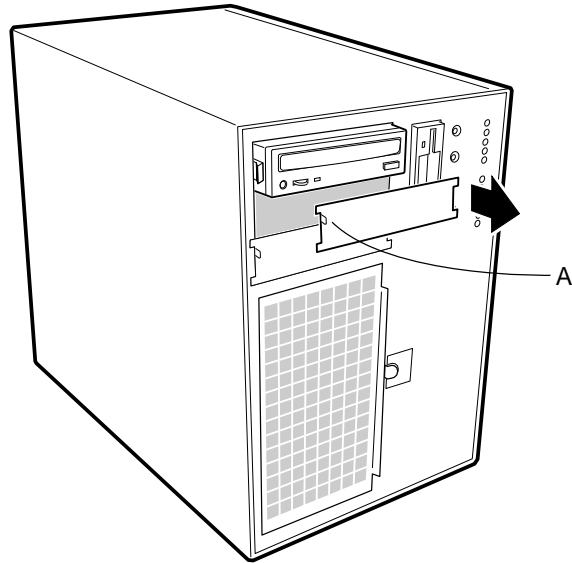
OM08016

Figure 30. Removing EMI Shields

4. Remove the drive from its protective wrapper, and place it on an antistatic surface.
5. Record the drive model and serial numbers in your equipment log (page 163).
6. Set any jumpers or switches on the drive according to the drive manufacturer's instructions.
7. Using two screws of the appropriate size and length (not supplied), attach each plastic slide rail with its metal grounding plate to the drive.
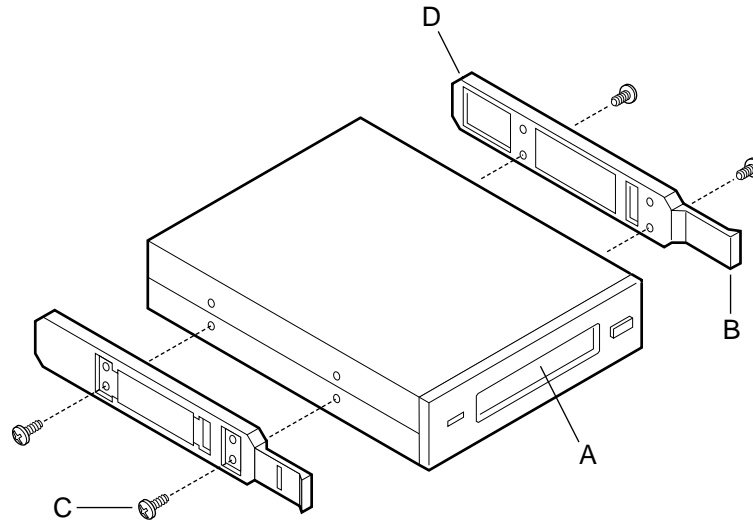
OM08013

Figure 31. Snap-in Plastic Slide Rails

A.   Tape drive or other removable media device
B.   Tab on slide rail
C.   Screws (4)
D.   Slide rails (2)

8. Position the drive so the plastic slide rails engage in the bay guide rails. Push the drive into the bay until the slide rails lock in place.
9. Connect a power cable to the drive. The connectors are keyed and can be inserted in only one way.
10. Connect a signal cable to the drive. The connectors are keyed and can be inserted in only one way.
   - **SCSI drive:** Attach connectors on the cable to the SCSI device or devices you are installing.
   - **IDE drive:** The baseboard has one IDE connector. It can support an IDE signal cable up to 18 inches long. See Figure 29 on page 97 for the cable dimensions.
11. Close the front bezel.

Removing a 5.25-inch Peripheral from the Front Bay

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Open the front bezel by rotating its right side out and to the left.
3. Disconnect the power and signal cables from the drive.
4. The drive has two protruding plastic, snap-in rails attached. Squeeze the rail tabs toward each other as you carefully slide the drive forward out of the bay, and place it on an antistatic surface.
5. Remove and save the four screws and two slide rails.
6. If you leave the bay empty, install a stainless steel EMI shield on the bay for proper cooling and airflow.
7. If you do not replace the device with another SCSI device, and it was installed at the end of the SCSI signal cable, modify the cable and termination arrangement so that a proper termination exists at the end of the cable (it can be a termination device only, not necessarily a SCSI peripheral).
8. Close the front bezel.
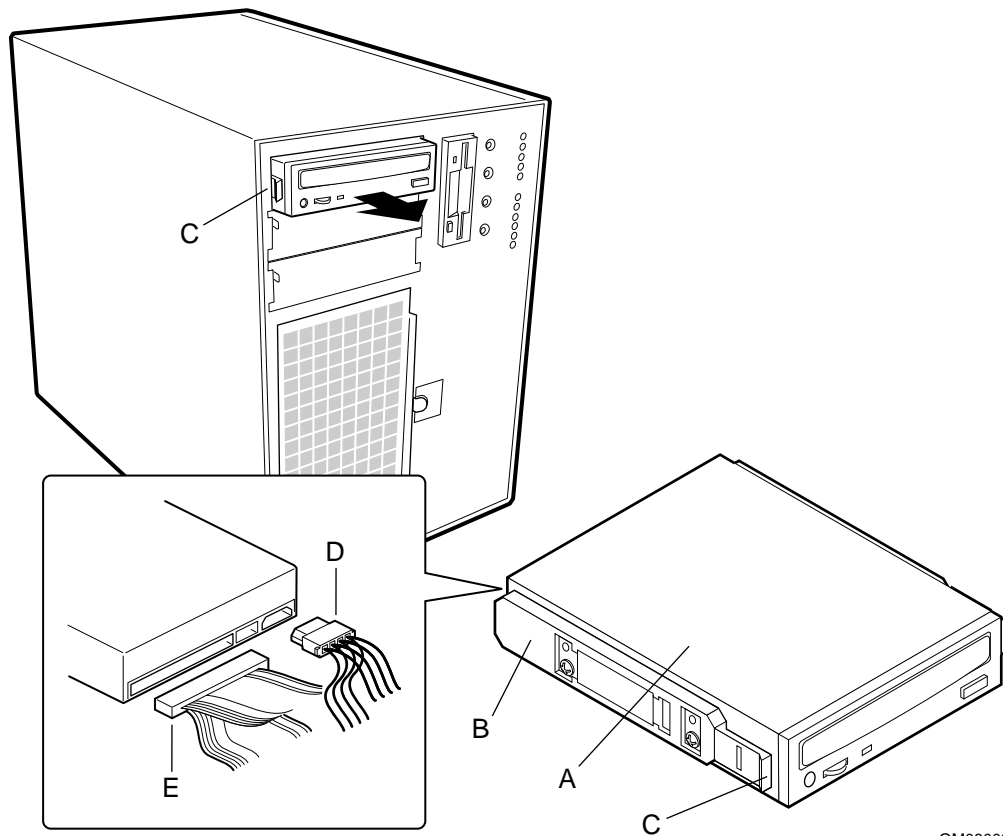
OM08003

Figure 32. Installing a Removable Media Device

A. Removable media device
B. Drive rail
C. Rail tab
D. Power cable
E. Typical SCSI signal cable

Fans

The SC450NX server contains five removable chassis fans (and can accept up to three more) to cool the boards and removable media drives. These chassis fans connect to the front panel board and are enclosed in a removable foam assembly. The integrated power supply fan(s) provides more cooling and airflow.

Removing the System Fan Assembly
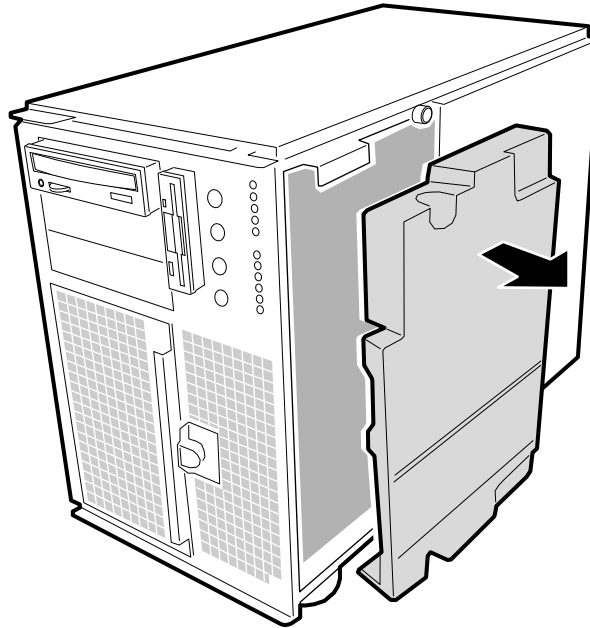
OM08012

Figure 33. Removing the Fan Assembly

1. Observe the safety and ESD precautions at the beginning this chapter.
2. Remove the access cover (see page 89).
3. Remove the foam cover from the front subchassis by pulling it straight out (Figure 33).
4. For better access to the individual fan cables on the front panel board, carefully rotate the right edge of the foam fan assembly outward into the opening where the foam cover was.
5. Label and disconnect the individual fan cables from the front panel board. For fan cabling considerations, see Figure 34 on page 104.
6. Remove the fan assembly from the chassis.

Installing the System Fan Assembly

1. Observe the safety and ESD precautions at the beginning this chapter.
2. Position the fan assembly inside the chassis so that the individual fan cables can easily reach their connectors on the front panel board.
3. Reconnect the individual fan cables, being careful to match each cable with its correct connector on the front panel board.
4. Position the fan assembly as it was inside the chassis prior to removal, so that it rests firmly against the diskette drive at the top and the 5.25-inch bays at the middle and bottom.
5. Reinstall the foam cover. It is molded to match the position of the fans and fits in only one way.
6. Reinstall the access cover using the original screws.

Removing an Individual System Fan

⟹ **NOTE**

> **Correct airflow direction:** The side of each fan is embossed with directional arrows indicating airflow direction. Always note the direction of the arrows on a fan before removing it. You will need this information later when you install a different fan.

1. Observe the safety and ESD precautions at the beginning this chapter.
2. Remove the access cover (see page 89).
3. Remove the foam cover from the front subchassis by pulling it straight out (see Figure 33 on page 102). Be careful not to break the foam.
4. For better access to the individual fan cables on the front panel board, carefully rotate the right edge of the foam fan assembly outward into the opening where the foam cover was.
5. Label and disconnect the desired fan cable from the front panel board. Be sure to note the position of the cable where it is held in place in the foam fan assembly.
6. Remove the fan cable from the foam assembly, being careful not to break the foam.
7. Remove the fan from the foam assembly. All systems fans sit differently in the assembly, but in general, each fan can slide in and out of the foam in only one way.

The two installed fans nearest the 5.25-inch drive bays (fans 6 and 7 in Figure 34) are separated by a square piece of foam (the piece with a crescent-shaped hole) that extends perpendicularly from the front of the fans (in Figure 34, it is the rectangle between the round faces of fans 6 and 7). You must remove this piece to access the two fans it separates (pull it straight out).
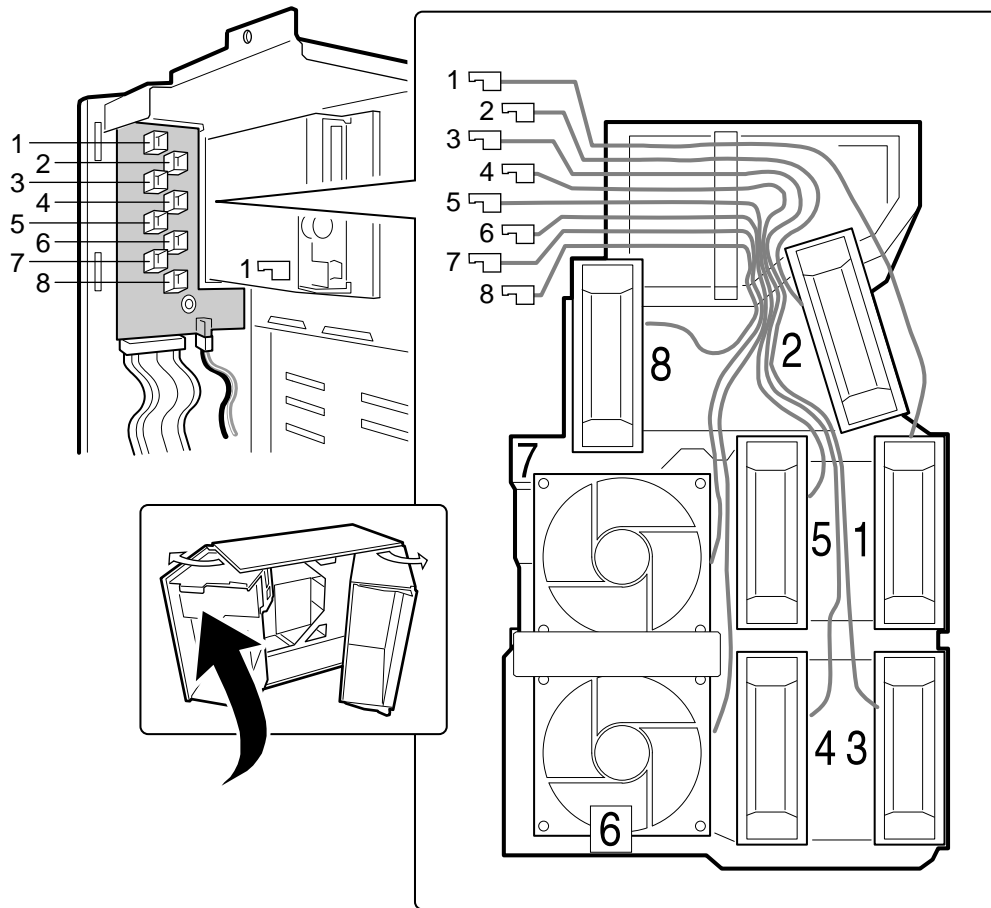
OM08021a

Figure 34. Fan Cabling

Installing an Individual System Fan

⇒ **NOTE**

> **A general rule about correct airflow direction:** The removable fan pulls air from in front of the chassis so that it flows across the boards and out the back. Thus, the fan must be oriented for the correct airflow direction. In general, the fan's label is on the side from which air EXITS the fan. You can confirm correct orientation by checking the embossed arrows on the side of the fan:
>
> ⇒ Arrow points horizontally toward back of chassis
>
> ⇑ Arrow points vertically up
>
> Always note the direction of the arrows on the existing fan before you remove it. Replace a failed fan with the same type as the one removed, with a tachometer signal, or an approved fan. For a list of approved fans, contact your customer service representative.

1. See "Removing an Individual System Fan" on page 103, as necessary.
2. Observe the safety and ESD precautions at the beginning this chapter.
3. Slide the fan into its correct receptacle in the foam fan assembly.
4. Attach the cable to the foam at the correct places (if you are REPLACING a bad fan, you should have recorded where each cable attaches to the foam; if you are ADDING a fan, see Figure 34 on page 104).
5. Position the fan assembly inside the chassis so that the individual fan cables can easily reach their connectors on the front panel board.
6. Attach the cable to the front panel at the correct connector (if you are REPLACING a bad fan, you should have recorded where each cable connects to the front panel; if you are ADDING a fan, see Figure 34 on page 104).
7. Position the fan assembly as it was inside the chassis prior to removal, so that it rests firmly against the diskette drive at the top and the 5.25-inch bays at the middle and bottom.
8. Reinstall the foam cover. It is molded to match the position of the fans and fits in only one way.
9. Reinstall the access cover using the original screws.

Installing Fans for High-Power Drives

If you plan to use SCSI drives whose power exceeds 15 watts, you must install three additional system fans: two in the front fan assembly and one in the upper power supply bay. To perform this task, you must purchase a kit.

1. Remove four screws, the grill plate, and fan from your kit.
2. Remove the plate (A in Figure 35) that covers the power supply bay closest to the PCI slots. It is the uppermost bay when the server is standing upright in pedestal mode.
3. Using four screws, attach the fan to the grill plate (E and F in Figure 35) so that the fan's label faces the plate.
4. Insert the fan/grill plate assembly into the power supply bay so that the cable points downward (D in Figure 35) from the fan toward the other two power supplies, and so the fan's label faces out the back of the chassis. This alignment is important to ensure correct airflow direction.

A   Plate covering power supply bay

B   Screws attaching plate to power supply bay (four)

C   Fan (label must face grill plate)

D   Cable (must point toward other power supplies)

E   Screws attaching grill plate to fan (four)

F   Grill plate

G   Screws attaching fan/grill plate assembly to chassis (four)

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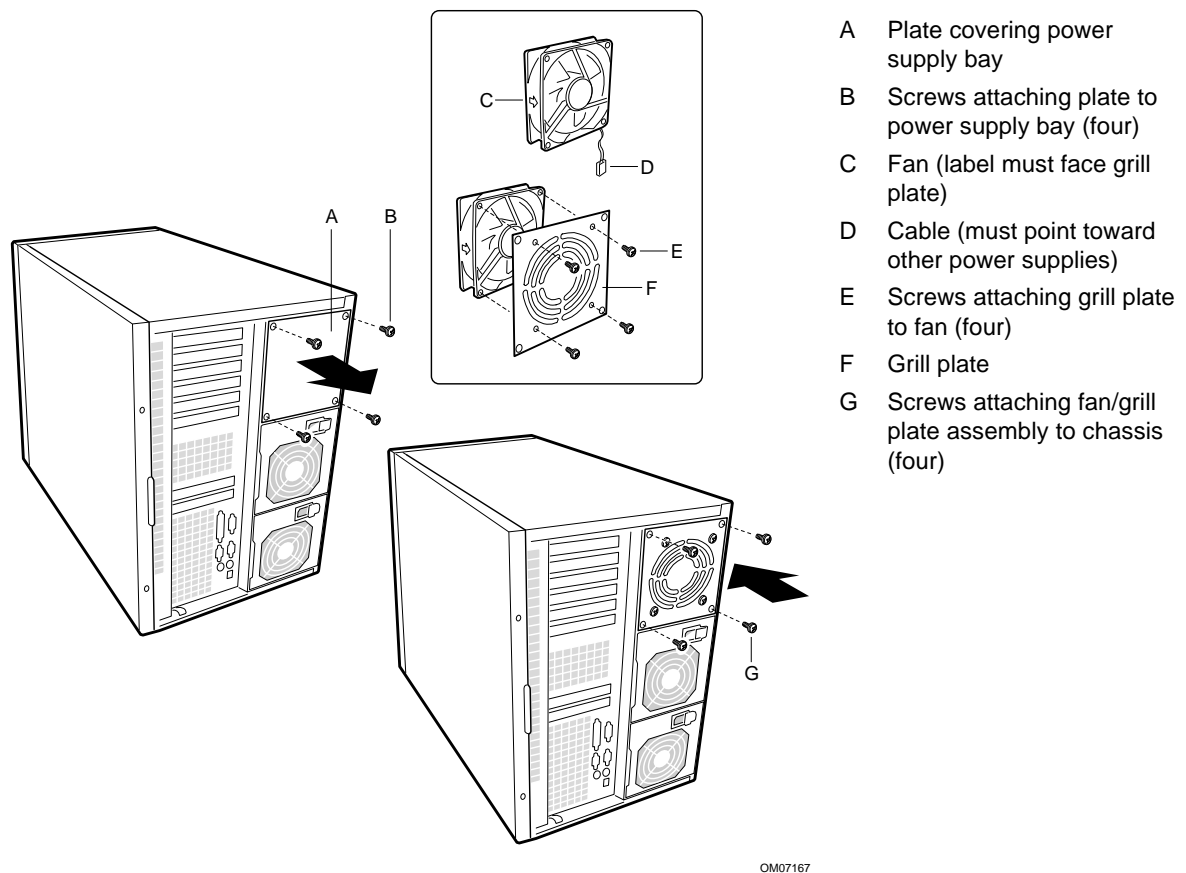
Figure 35. Installing a Fan in the Upper Power Supply Bay

5. Using four screws, attach the fan/grill plate assembly to the chassis (G in Figure 35).

6. Install two fans in the front fan assembly. See "Installing an Individual System Fan" on page 105.

⚠ **CAUTION**

The two fans you MUST install are numbered 6 and 7 in Figure 34 (page 104).

7. Connect the cable (D in Figure 35, page 106) from the fan you installed in the upper power supply bay to the connector on the power share board. The connector is next to the secondary main power connector and is labeled "AUX FAN."

6 Upgrading Baseboard Components

Tools and Supplies Needed

- Phillips (cross-head) screwdriver (#1 and #2 bit)
- Small flat-bladed screwdriver
- Jumper removal tool or needle-nosed pliers
- Antistatic wrist strap and conductive foam pad (recommended)
- Pen or pencil
- Equipment log: as you integrate new parts into the system, add information about them to your equipment log (page 163). Record the model and serial number of the system, all installed options, and any other pertinent information specific to the system. You will need this information when running the SSU.

Warnings and Cautions

These warnings and cautions apply throughout this manual to any procedure in which you access the inside of the server.

⚠ WARNINGS

System power on/off: The DC push-button on/off switch (a convex button) on the front panel DOES NOT turn off the system AC power. To remove power from system, you must unplug ALL AC power cords from the wall outlet.

Hazardous conditions, devices, and cables: Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the system and disconnect all power cords, telecommunications systems, networks, and modems attached to the system before opening it. Otherwise, personal injury or equipment damage can result.

⚠ CAUTIONS

Electrostatic discharge (ESD) & ESD protection: ESD can damage disk drives, boards, and other parts. We recommend that you do all procedures in this chapter only at an ESD-protected workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground—any unpainted metal surface—on your system when handling parts.

ESD and handling boards: Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the system, place it component-side UP on a grounded, static-free surface. Use a conductive foam pad if available, but NOT the board wrapper. Do not slide board over any surface.

Chassis covers, proper cooling, and airflow: For proper cooling and airflow, always install the chassis access cover before turning on the system. Operating the system without this cover in place can damage system parts.

Installing or removing jumpers: A jumper is a small, plastic-encased conductor that slips over two jumper pins. Newer jumpers have a small tab on top that you can grip with your fingertips or with a pair of fine, needle-nosed pliers. If your jumpers do not have such a tab, take care when using needle-nosed pliers to remove or install a jumper; grip the narrow sides of the jumper with the pliers, never the wide sides. Gripping the wide sides can damage the contacts inside the jumper, causing intermittent problems with the function controlled by that jumper. Take care to gently grip, but not squeeze, with the pliers or other tool you use to remove a jumper; you might bend or break the stake pins on the board.

Baseboard

Removing the Baseboard

⚠ **CAUTIONS**

The baseboard can be extremely sensitive to ESD and always requires careful handling. After removing it from the system, place it component-side UP on a nonconductive, static-free surface to prevent shorting out the battery leads. If you place the board on a conductive surface, the battery leads may short out. This will result in a loss of CMOS data and will drain the battery. Do not slide the baseboard over any surface.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove the access cover.
3. Remove the front and rear foam covers.
4. Label and disconnect all internal cables connected to add-in boards.
5. Remove all add-in boards.
6. Label and disconnect all internal cables connected to the baseboard.

⟹ **NOTE**

The baseboard is attached to the electronics bay. In general, the best method for removing the baseboard is to remove the electronics bay first, particularly in servers mounted in a pedestal (tower) orientation, though this is not a requirement.

7. Open the front subchassis and, if necessary, remove the electronics bay. See "Opening the Subchassis and Electronics Bay" on page 90.
8. Remove the baseboard retaining screws and set them aside.
9. Pull the board toward you slightly to disengage it from two snap-in standoffs, and then slide the board toward the front of the server until the board's I/O connectors clear the rear of the chassis.

10. Remove the baseboard and place it component-side up on a nonconductive, static-free surface or in an antistatic bag.
11. Remove and save the EMI gasket that covers the I/O connectors on the board.
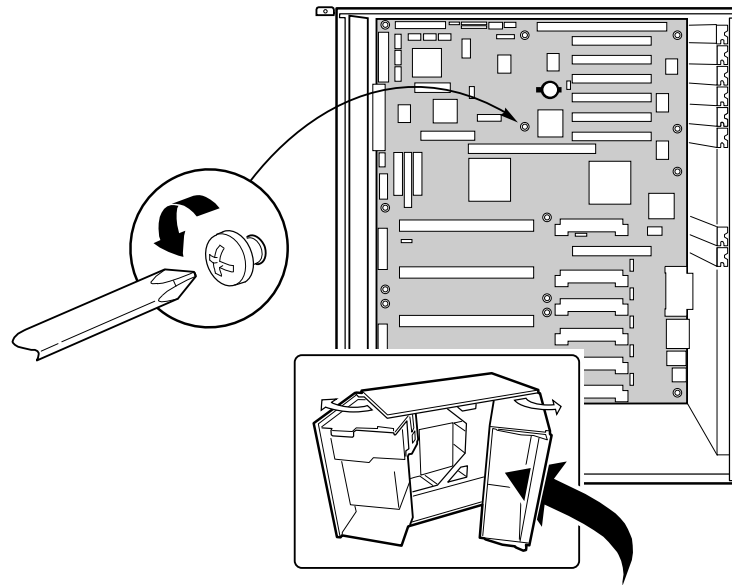
OM08007

Figure 36. Removing the Baseboard

Installing the Baseboard

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Place the EMI gasket over the I/O connectors on the baseboard.
3. Position the board over the two snap-in standoffs and threaded standoffs inside the chassis; slide it carefully toward the rear of the system until the I/O connectors protrude through the back panel.
4. Press the board onto the snap-in standoffs, then insert one screw through one of the mounting holes of the board and into a threaded standoff. Do not tighten the screw until the next step.
5. Insert the remaining screws through the mounting holes and into the threaded standoffs. Make sure the board is properly seated, then tighten all the screws firmly (6.0 inch-pounds).
6. Connect all internal cables to the baseboard.
7. Reinstall add-in boards.
8. Connect all internal cables to add-in boards.
9. Reinstall the electronics bay if you removed it and close the front subchassis.
10. Reinstall the front and rear foam covers.
11. Reinstall the access cover using the original screws.
12. Connect all peripheral device cables to the I/O panel on the rear of the system.
13. Run the SSU to configure the system.

Memory

Removing the Memory Module

⇒ **NOTE**

> Make sure you run the SSU to configure ECC memory. Failure to do so
> might degrade the performance of the server.

See "Memory" on page 22 for memory size and requirements.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove the access cover (see page 89).
3. Remove the rear foam cover over the electronics bay. It might be easier to do this if you also remove the front foam cover over the front subchassis.
4. Remove the memory module from the baseboard:
   - Pull the module toward you slightly to disengage it from the baseboard connector.
   - Slide the module straight away from the baseboard until it clears the guide rails.
   - Place the module component-side up on a nonconductive, static-free surface.
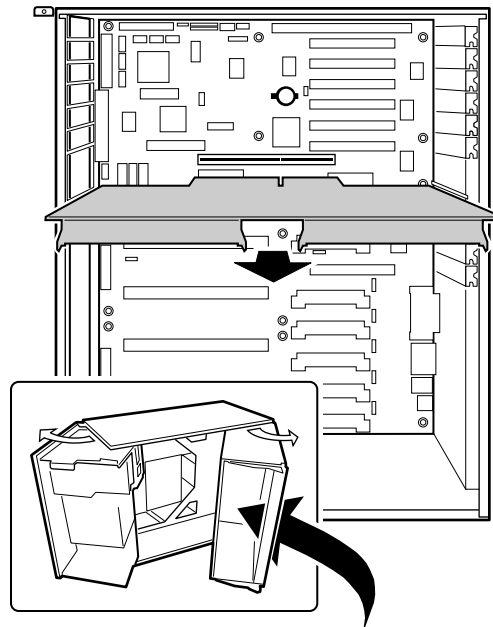
OM08008

Figure 37. Removing the Memory Module

Installing the Memory Module

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Holding the memory module by its edges, align the module so its edge engages in the guide rail at the back of the electronics bay.

⚠ **CAUTION**

> The memory module is held in place by the 242-pin connector on the baseboard, the guide rail at the back of the electronics bay, and a plastic guide at the front of the electronics bay. You must support the module until it is fully seated in the connector.

3. Push the memory module toward the baseboard until it fully engages its connector.

Removing DIMMs

⚠ **CAUTION**

> Use extreme care when removing a DIMM. Too much pressure can damage the socket slot. Apply only enough pressure on the plastic ejector levers to release the DIMM.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove the memory module and place it component-side up on a nonconductive, static-free surface (see "Removing the Memory Module" on page 112).
3. Gently push the plastic ejector levers out and down to eject a DIMM from its socket.
4. Hold the DIMM only by its edges, being careful not to touch its components or gold edge connectors. Carefully lift it away from the socket and store it in an antistatic package.
5. Repeat to remove other DIMMs as necessary.

   If you are REPLACING DIMMs, proceed to "Installing DIMMs" on page 114.

   If you are simply REMOVING DIMMs, continue the procedure with the following steps.
6. Reinstall the memory module.
7. Reinstall the foam cover(s).
8. Connect all external cables and power cords to the system.
9. Reinstall the access cover using the original screws.
10. Turn on the monitor and then the system.
11. Run the SSU/BIOS Setup to configure the system and to properly set up advanced memory attributes as required.

Installing DIMMs

⚠ CAUTIONS

Use extreme care when installing a DIMM. Applying too much pressure can damage the socket. DIMMs are keyed and can be inserted in only one way.

Mixing dissimilar metals might cause memory failures later, resulting in data corruption. Install DIMMs with gold-plated edge connectors only in gold-plated sockets.

⇒ NOTE

DIMM slots on the memory module must be installed only in certain configurations. See "Memory" on page 22 for requirements.
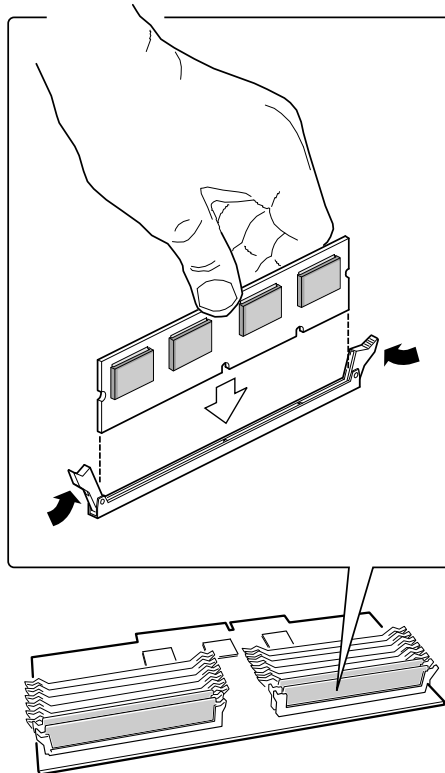
OM08010

Figure 38. Installing DIMMs

1. Holding the DIMM only by its edges, remove it from its antistatic package.
2. Orient the DIMM so that the two notches in the bottom edge of the DIMM align with the keyed socket on the memory module.
3. Insert the bottom edge of the DIMM into the socket, then press down firmly on the DIMM until it seats correctly.
4. Gently push the plastic ejector levers on the socket ends to the upright position.
5. Repeat the steps to install each DIMM.
6. Reinstall the memory module.
7. Reinstall the foam cover(s).
8. Reinstall the access cover using the original screws.
9. Connect all external cables and the power cords to the system.
10. Turn on the monitor and then the system.
11. Run the SSU to configure the system and to properly attribute ECC memory.

Processors

⚠ **CAUTIONS**

Processor must be appropriate: You might damage the system if you install a processor that is inappropriate for your system. Make sure your system can handle a newer, faster processor (thermal and power considerations). For exact information about processor interchangeability, contact your customer service representative.

ESD and handling processors: Reduce the risk of electrostatic discharge (ESD) damage to the processor by doing the following: (1) Touch the metal chassis before touching the processor or baseboard. Keep part of your body in contact with the metal chassis to dissipate the static charge while handling the processor. (2) Avoid moving around unnecessarily.

Removing a Processor

1. Observe the safety and ESD precautions at the beginning of this chapter and the additional cautions given here.
2. Remove the access cover (see page 89) and the rear foam cover over the electronics bay.
3. As you work, place processors on a grounded, static-free surface or conductive foam pad.
4. With your right thumb on the face of the retention module bracket (A in Figure 39), wrap your right index finger around the tab (B in Figure 39) protruding from the right edge of the bracket.
5. Use your index finger to slightly pull the tab outward and to the left. You should not try to pull the entire bracket; rather, the back of the tab has a latch (C in Figure 39) that releases when the TAB is pulled slightly.
6. When you have released the right edge of the bracket, rotate it 90° to the left until it is perpendicular to the front of the retention module. The left edge of the bracket has an open hinge that can release from the module when you rotate the bracket to the left.
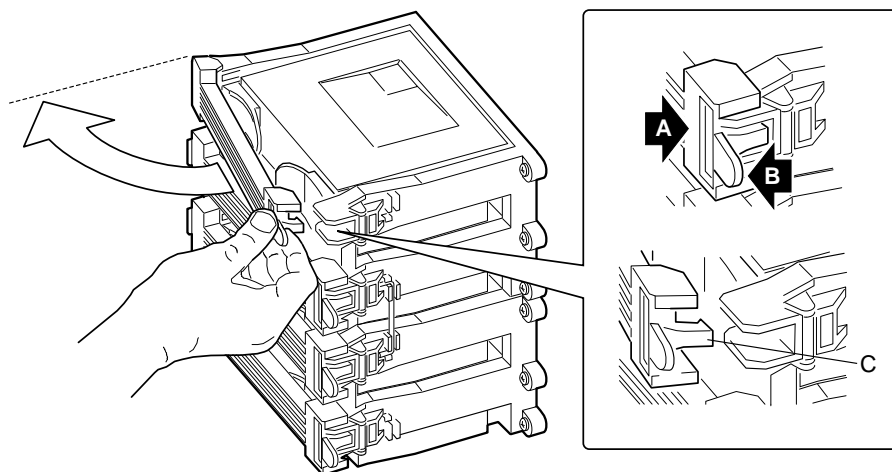
OM08038

Figure 39. Releasing the Retention Module Bracket

    A. Retention module bracket
    B. Tab of bracket
    C. Latch

7. Disengage the open hinge by moving (not rotating) the entire bracket to the right. Remove the bracket and set it aside.
8. Pull the two tabs attached to the S.E.C. cartridge (visible after you remove the bracket—C in Figure 40) straight away from the baseboard. As you do, the cartridge disengages from its connector on the baseboard.
9. Slide the S.E.C. cartridge straight away from the baseboard, out of the retention module. Put it on a piece of conductive foam and store it in an antistatic package.
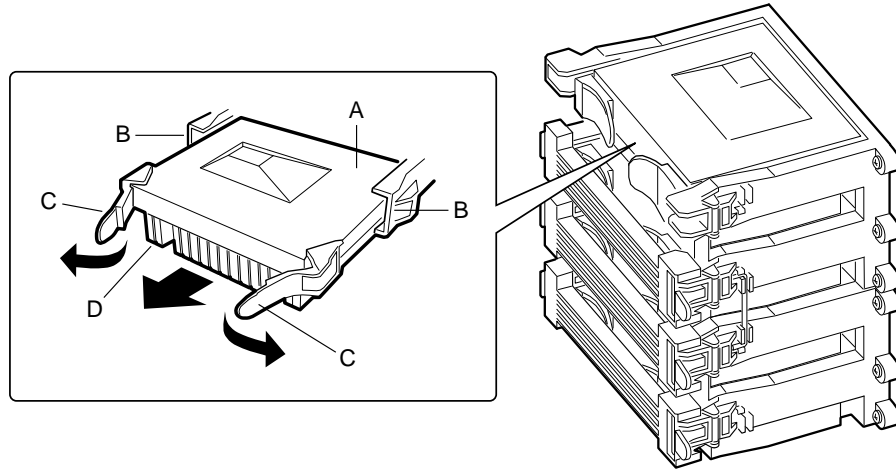
OM08039

Figure 40. Removing a Processor

    A. S.E.C. cartridge
    B. Retention module guide rails
    C. Tabs on S.E.C. cartridge
    D. Processor heat sink

Installing a Processor
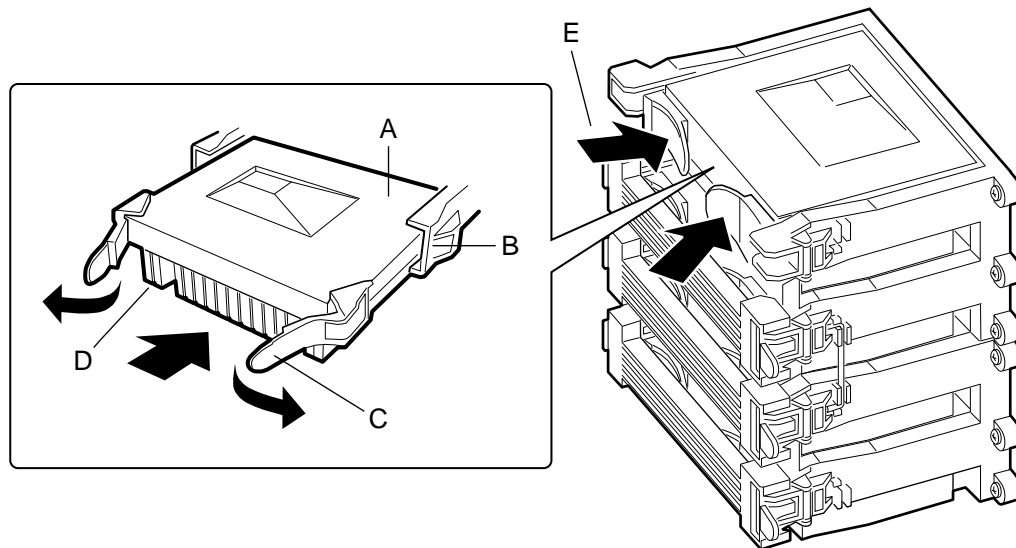
OM08040

Figure 41. Installing a Processor

A. S.E.C cartridge
B. Retention module guide rails
C. Tabs on S.E.C. cartridge
D. Processor heat sink (must face away from center of
    baseboard)
E. Push tabs on S.E.C. cartridge inward to seat processor

⇒ **NOTE**

> If your system has less than four processors and you are ADDING one, then
> you must remove the termination board in the empty Slot 2 connector. The
> procedure for removing a termination board is the same as for removing a
> processor. See "Removing a Processor" on page 116.

> If you plan to reduce the number of processors in your system, then you
> must replace a processor with a termination board. The procedure for
> installing a termination board is the same for installing a processor.

1. Observe the safety and ESD precautions at the beginning of this chapter and the additional
   cautions on page 116.
2. Remove the new processor from its antistatic package and place it on a grounded, static-free
   surface or conductive foam pad.
3. Orient the S.E.C. cartridge so that the heat sink faces away from the center of the baseboard.

   If you are installing a termination board, orient it so that the side with the white bar-code label
   faces away from the center of the baseboard.

4. With the tabs at the top of the S.E.C. cartridge completely open (pulled outward, away from the center of the cartridge—C in Figure 41), slide the cartridge into the guide rails of the retention module (B in Figure 41). When done properly, the triangular ends of the tabs (with two round pegs on each) fit into the entrance to the guide rails.
5. When the cartridge meets resistance, push the two tabs toward each other (E in Figure 41) until the processor is fully seated.
6. Reattach the retention module bracket:
    - With the bracket in an open position (perpendicular to the front of the retention module), slide the open hinge at the left of the bracket into its receptacle at the left of the retention module.
    - Rotate the bracket to the right until it reaches the retention module. With your right thumb on the face of the bracket and your right index finger around the tab at the right of the bracket, slightly pull the tab outward and to the left to open the latch at the back of the tab.
    - As you open the latch on the back of the tab, slide the right edge of the bracket onto the retention module and release the tab. If done correctly, the bracket will be securely latched.
7. Reinstall the foam cover.
8. Reinstall the access cover using the original screws.

Installing Processor Tabs

Depending on your configuration, the tabs on the processor's S.E.C. cartridge (C in Figure 41, page 118) might not be attached to the cartridge. In this case, you must attach two tabs to each S.E.C. cartridge.

To install tabs on an S.E.C. cartridge:

1. Orient the tab so that its triangular end (with two round pegs) points away from the center of the S.E.C. cartridge, and so the rounded end points to toward the center.   See Figure 41 on page 118.
2. Two round pegs at the center of the tab correspond with two round holes at each corner of the S.E.C. cartridge. Spread the tab open slightly to get the pegs into the holes, being careful not to use too much force and break the tab.

    If done properly, the tab will rotate freely with its axis near the center of the tab, at the base of the triangular section.
3. Repeat to install the second tab to the S.E.C. cartridge.

Replacing the Backup Battery

The lithium battery on the baseboard powers the real-time clock (RTC) for three to four years in the absence of power. When the battery weakens, it loses voltage and the system settings stored in CMOS RAM in the RTC (e.g.,, the date and time) may be wrong. Contact your customer service representative or dealer for a list of approved devices.

⚠ **WARNING**

> **If the system has been running, any installed processor and heat sink on the processor board(s) will be hot. To avoid the possibility of a burn, be careful when removing or installing baseboard components that are located near processors.**

The following warning and translations are required by specific certifying agencies to be printed immediately adjacent to the procedure for removing the RTC.

⚠ **WARNING**

> **Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.**

⚠ **ADVARSEL**!

> **Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.**

⚠ **ADVARSEL**

> **Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.**

⚠ **VARNING**

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

⚠ **VAROITUS**

> **Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.**
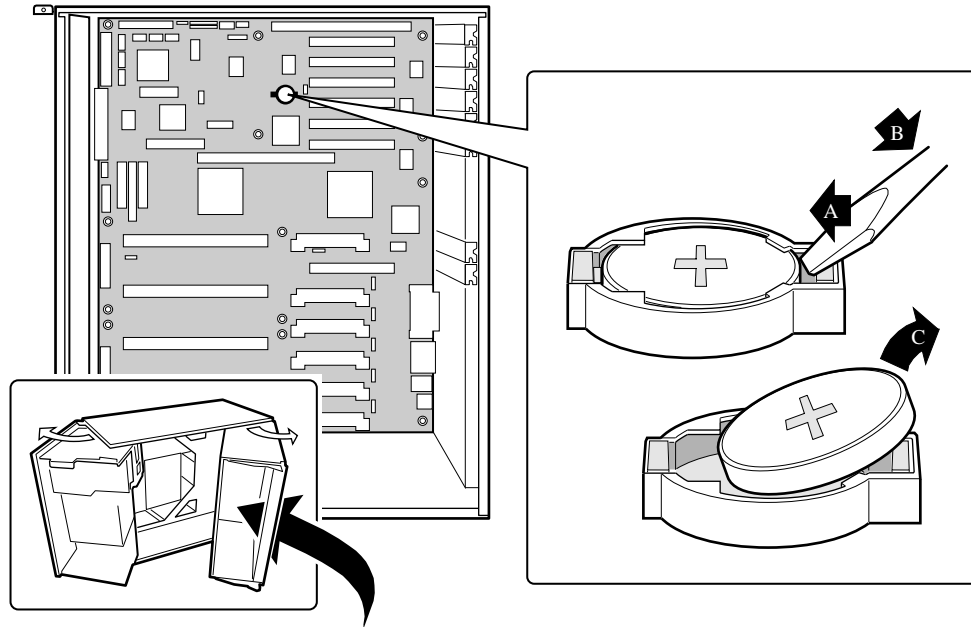
OM08005

Figure 42. Replacing the Lithium Battery

1. Observe the safety and ESD precautions at the beginning of this chapter and the additional warning given on page 120.
2. Remove the access cover.
3. Insert the tip of a small flat-bladed screwdriver or equivalent under the plastic tab on the snap-on plastic retainer.
4. Gently push down on the screwdriver to lift the battery.
5. Remove the battery from its socket.
6. Dispose of the battery according to local ordinance.
7. Remove the new lithium battery from its package and, being careful to observe the correct polarity, insert it in the battery socket.
8. Reinstall the plastic retainer on the lithium battery socket.
9. Reinstall the access cover using the original screws.
10. Run the SSU to restore the configuration settings to the RTC.

7 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.

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 125.

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

This section provides 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 127.

Using PCDiagnostics

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.
- not for Windows or DOS; you can access it at the command line prompt without having a hard drive installed.
- 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

See Chapter 3, "Configuration Software and Utilities," beginning on page 31.

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 128.

❑ 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 128.

❑ 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 129.

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 123.

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 or authorized dealer 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 130.

No Characters Appear on 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. See "POST Codes and Countdown Codes" on page 130.
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 or authorized dealer 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 or authorized dealer 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 Chapter 3, starting on page 31.

If the problem persists, there may be a problem with the diskette drive, baseboard, or drive signal cable. Contact your service representative or authorized dealer 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. See "Baseboard Jumpers" on page 151.
❑ 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.

Table 30.   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

continued

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Table 30.   Port-80 Codes (continued)

Normal Port 80 Codes	Beeps	Error
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
22	1-3-1-3	Test 8742 Keyboard Controller
24		Set ES segment register to 4GB
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
49		Initialize PCI bus and devices
4A		Initialize all video adapters in system
4B		Display QuietBoot screen
4C		Shadow video BIOS ROM

Table 30.   Port-80 Codes (continued)

Normal Port 80 Codes	Beeps	Error
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 "Press F2 to enter SETUP"
5C		Test RAM between 512 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
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 RS232 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

Table 30.   Port-80 Codes (continued)

Normal Port 80 Codes	Beeps	Error
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
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
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 31.   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
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

Table 31. POST Error Codes and Messages (continued)

Code	Error message
8100	Processor 0 failed BIST
8101	Processor 1 failed BIST
8104	Processor 0 Internal Error (IERR) failure
8105	Processor 1 Internal Error (IERR) failure
8106	Processor 0 Thermal Trip failure
8107	Processor 1 Thermal Trip failure
8108	Watchdog Timer failed on last boot, BSP switched
810A	Processor 1 failed initialization on last boot
810B	Processor 0 failed initialization on last boot
810C	Processor 0 disabled, system in uniprocessor mode
810D	Processor 1 disabled, system in uniprocessor mode
810E	Processor 0 failed FRB Level 3 timer
810F	Processor 1 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

8 Technical Reference

This section includes:

- Connectors' pinouts and baseboard locations
- Information on baseboard jumpers
- System I/O Addresses
- System memory map addresses
- Baseboard interrupts
- Video modes

Connectors

Figure 43 shows connector locations on the baseboard. This section provides pin information about the connectors.

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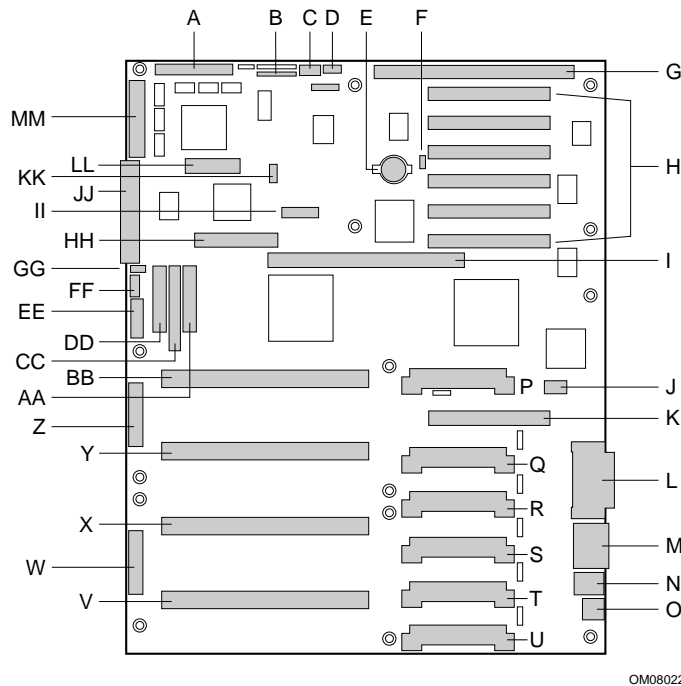
Figure 43. Baseboard Layout

A. Wide SCSI B connector (J9J1)
B. System jumpers (J6J1)
C. Hard drive input LED connector (J6J3)
D. System speaker connector (J6J2)
E. Lithium battery (B4H1)
F. Wake on LAN connector (J4H1)
G. ISA slot (J1J1)
H. PCI slots B4 (closest to ISA), B3, B2, B1, A3, and A2 (farthest from ISA)
I. Memory module connector (J3G1)
J. ICMB connector (J1E1)
K. PCI slot A1 (J2D1)
L. Video and parallel port connectors (J1C1)
M. Serial port connector (J1B2)
N. Keyboard and mouse connectors (J1B1)
O. USB external connector (J1A1)
P. VRM connector for processor 4 (J4E1)
Q. VRM connector for processors 4 and 3 (J4C2)
R. VRM connector for processors 3 (J4C1)
S. VRM connector for processors 2 (J4B1)
T. VRM connector for processor 2 and 1 (J4A2)

U. VRM connector for processor 1 (J4A1)
V. Processor 1 Slot 2 connector (J9A1)
W. Main power connector, primary (J9B1)
X. Processor 2 Slot 2 connector (J9B2)
Y. Processor 3 Slot 2 connector (J9D1)
Z. Main power connector, secondary (J9D2)
AA. Front panel connector (J8E1)
BB. Processor 4 Slot 2 connector (J9E1)

CC. IDE connector (J9E2)
DD. Diskette drive connector (J9E3)
EE. Auxiliary power connector (J9E4)
FF. USB internal header (JC9F14)
GG. SMBus connector (J9F2)
HH. F16 expansion connector (J7G1)
II. ITP connector (J6G1)
JJ. Narrow SCSI connector (J9H1)
KK. External IPMB connector (J7H1)

LL. SMM connector (J8H1)
MM. Wide SCSI A connector (J9H2)

Main Power Connector

OM08034

Table 32.   Main Power Connector Pinout

Pin	Signal	Wire Color	Pin	Signal	Wire Color
1	+3.3 VDC	Orange	11	+3.3 VDC	Orange
2	+3.3 VDC	Orange	12	+3.3 VDC	Orange
3	+3.3 VDC	Orange	13	+3.3 VDC	Orange
4	COM	Black	14	COM	Black
5	COM	Black	15	COM	Black
6	COM	Black	16	COM	Black
7	COM	Black	17	+5V Standby	Purple
8	+12 VDC	Yellow	18	+5 VDC	Red
9	+12 VDC	Yellow	19	+5 VDC	Red
10	+12 VDC	Yellow	20	+5 VDC	Red

Auxiliary Power

OM08033
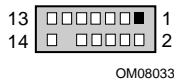
Table 33.   Auxiliary Power Connector Pinout

Pin	Signal
1	RTN_RS
2	5V_RS
3	3.3V_RS
4	FAN_SPEED
5	I2CSCL
6	I2CSDA
7	GND
8	SYS_PGOOD
9	PS_ON
10	GND
11	-12VCC
12	Key
13	12V_RS
14	GND

Diskette Drive

33 ▢▢▢▢▢▢▢▢▢▢▢▢ ▢■ 1
34 ▢▢▢▢▢▢▢▢▢▢▢▢▢▢ 2

OM08030
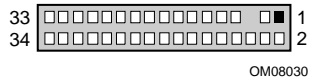
Table 34.   Diskette Drive Connector Pinout

Pin	Signal	Pin	Signal
1	GND	18	FD_DIR_L
2	FD_DENSEL	19	GND
3	GND	20	FD_STEP_L
4	N/C	21	GND
5	Key	22	FD_WDATA_L
6	FD_DRATE0	23	GND
7	GND	24	FD_WGATE_L
8	FD_INDEX_L	25	GND
9	GND	26	FD_TRK0_L
10	FD_MTR0_L	27	FD_MSEN0
11	GND	28	FD_WPROT_L
12	FD_DR1_L	29	GND
13	GND	30	FD_RDATA_L
14	FD_DR0_L	31	GND
15	GND	32	FD_HDSEL_L
16	FD_MTR1_L	33	GND
17	FD_MSEN1	34	FD_DSKCHG_L

Front Panel Connector

A 30-pin connector attaches to the chassis front panel containing reset, NMI, sleep, and power control switches, LED indicators, and IPMB connection.

OM08031
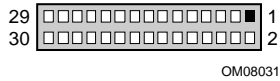
Table 35.   Front Panel Connector Pinout

Pin	Signal	Pin	Signal
1	SPEAKER_OUT	16	PWR_CNTRL_FP_L
2	GND	17	FP_ISOL
3	CHASSIS_INTRUSION	18	GND
4	FP_HD_ACT_L	19	FAN_TACH(0)
5	+5V	20	FAN_TACH(1)
6	SLEEP_CNTRL_I	21	FAN_TACH(2)
7	FAN_FAILED_L	22	FAN_TACH(3)
8	POWER_LED_L	23	FAN_TACH(4)
9	POWER_FAULT_L	24	FAN_TACH(5)
10	GND	25	FAN_TACH(6)
11	I2C_SDA	26	FAN_TACH(7)
12	NMI_FP_L	27	CLUSTER_LED
13	I2C_SCL	28	reserved
14	RST_FP_L	29	reserved
15	+5V standby	30	reserved

SMM Connector

OM08032
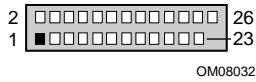
Table 36.   Server Management Module Connector Pinout

Pin	Signal	Description
1	CPU_SMI_L	System Management Interrupt
2	LOCAL_I2C_SCL	IPMB clock line
3	GND	Ground
4	Reserved	N/A
5	PWR_CNTRL_SFC_L	Host power supply on/off control
6	LOCAL_I2C_SDA	IPMB serial data line
7	5VSTNDBY	+5V standby indication (power OK)
8	KEYLOCK_SFC_L	Keyboard lock signal
9	CPU_NMI	Nonmaskable interrupt indication
10	VCC3	3.3V power supply status input
11	RST_SFC_L	Baseboard reset signal from Server Monitor Module
12	GND	Ground
13	GND	Ground
14	Reserved	N/A
15	SECURE_MODE_BMC	Secure mode indication
16	GND	Ground
17	SFC_CHASSIS_INSTRUSION_L	Chassis intrusion indication
18	Reserved	N/A
19	Reserved	N/A
20	GND	Ground
21	Reserved	N/A
22	Reserved	N/A
23	Reserved	Not used
24	Reserved	N/A
25	Key pin (N/C)	Connector key
26	Reserved	N/A

IPMB
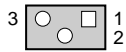
OM08035

Table 37. IPMB Connector Pinout

Pin	Signal
1	LOCAL_I2C_SCL
2	GND
3	LOCAL_I2C_SDA

VGA Video Port
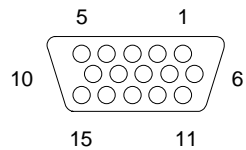
OM04417

Table 38. Video Port Connector Pinout

Pin	Signal	Pin	Signal
1	Red	9	N/C
2	Green	10	GND
3	Blue	11	NC
4	N/C	12	DDCDAT
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	DDCCLK
8	GND		

Keyboard and Mouse
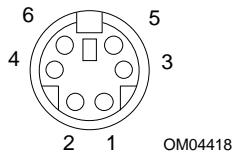
The PS/2-compatible connectors share a common housing; they are functionally equivalent.

Table 39.   Keyboard and Mouse Connector Pinouts

Pin	Keyboard signal	Pin	Mouse signal
1	KEYDAT	1	MSEDAT
2	NC	2	NC
3	GND	3	GND
4	FUSED_VCC (+5 V)	4	FUSED_VCC (+5 V)
5	KEYCLK	5	MSECLK
6	NC	6	NC

Parallel Port
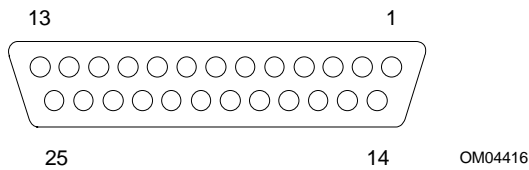
Table 40.   Parallel Port Connector Pinout

Pin	Signal	Pin	Signal
1	STROBE_L	10	ACK_L
2	Data bit 0	11	Busy
3	Data bit 1	12	PE
4	Data bit 2	13	SLCT
5	Data bit 3	14	AUFDXT_L
6	Data bit 4	15	ERROR_L
7	Data bit 5	16	INIT_L
8	Data bit 6	17	SLCTIN_L
9	Data bit 7	18–25	GND

Serial Ports A and B

OM04415
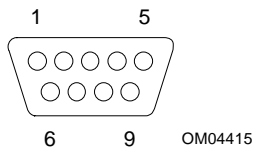
Table 41. Serial Port A (External) Connector Pinout

Pin	Signal	Description
1	DCD	Data carrier detected
2	RXD	Receive data
3	TXD	Transmit data
4	DTR	Data terminal ready
5	GND	Ground
6	DSR	Data set ready
7	RTS	Request to send
8	CTS	Clear to send
9	RIA	Ring indication active

Universal Serial Bus

The SC450NX MP server provides a single, external Universal Serial Bus (USB) connector at the back panel and an internal header to be used with device bay expansion. Table 42 lists the pinout for the external USB connector. Table 43 lists the pinout for the internal USB header.

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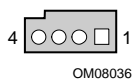
Table 42. USB External Connector Pinout

Pin	Signal	Notes
1	VCC	Cable power
2	Data -	Data (differential pair negative)
3	Data +	Data (differential pair positive)
4	GND	Cable ground

Table 43. USB Internal Header Pinout

Pin	Signal	Notes
1		N/C
2	Data -	Data (differential pair negative)
3	Data +	Data (differential pair positive)
4	GND	Cable ground

Narrow SCSI

OM08028
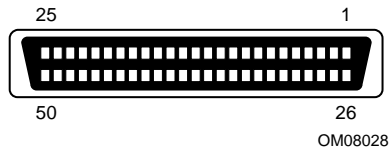
Table 44. Narrow SCSI Connector Pinout

Pin	Signal	Pin	Signal
1	GND	26	TERMPWR
2	SCD0_L	27	RESERVED
3	GND	28	RESERVED
4	SCD1_L	29	GND
5	GND	30	GND
6	SCD2_L	31	GND
7	GND	32	SATN_L
8	SCD3_L	33	GND
9	GND	34	GND
10	SCD4_L	35	GND
11	GND	36	SBSY_L
12	SCD5_L	37	GND
13	GND	38	SACK_L
14	SCD6_L	39	GND
15	GND	40	SRESET_L
16	SCD7_L	41	GND
17	GND	42	SMSG_L
18	SCDP_L	43	GND
19	GND	44	SSEL_L
20	GND	45	GND
21	GND	46	SCD_L
22	GND	47	GND
23	RESERVED	48	SREQ_L
24	RESERVED	49	GND
25	NC	50	SIO_L

Wide SCSI

OM08027
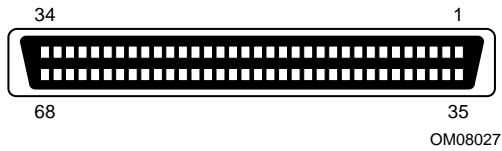
Table 45.   Wide SCSI Connector Pinout

Pin	Signal	Pin	Signal
1-16	GND	49-50	GND
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	Reserved	53	Reserved
20-34	GND	54	GND
35	DB12_L	55	ATN_L
36	DB13_L	56	GND
37	DB14_L	57	BSY_L
38	DB15_L	58	ACK_L
39	DBP1_L	59	RST_L
40	DB0_L	60	MSG_L
41	DB1_L	61	SEL_L
42	DB2_L	62	C/D_L
43	DB3_L	63	REQ_L
44	DB4_L	64	I/O_L
45	DB5_L	65	DB8_L
46	DB6_L	66	DB9_L
47	DB7_L	67	DB10_L
48	DBP _L	68	DB11_L

IDE

OM08029
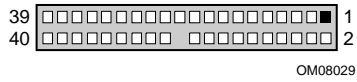
Table 46. IDE Connector Pinout

Pin	Signal	Pin	Signal
1	RESET_L	21	IDEDRQ
2	GND	22	GND
3	DD7	23	DIOW_L
4	DD8	24	GND
5	DD6	25	DIOR_L
6	DD9	26	GND
7	DD5	27	IORDY
8	DD10	28	CSEL (1 KΩ p/d)
9	DD4	29	IDEDAK_L
10	DD11	30	GND
11	DD3	31	IDEIRQ
12	DD12	32	Reserved (N/C)
13	DD2	33	IDESA1
14	DD13	34	PDIAG_L (tied to GND)
15	DD1	35	IDESA0
16	DD14	36	IDESA2
17	DD0	37	IDECS1_L
18	DD15	38	IDECS3_L
19	GND	39	IDEHDACT_L
20	Keyed	40	GND

If no IDE drives are present, no IDE cable should be connected. If only one IDE drive is installed, it must be connected at the end of the cable.

Hard Drive LED

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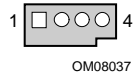
Table 47. Hard Drive LED connector Pinout

Pin	Signal
1	N/C
2	HD_LED_HDR_L
3	HD_LED_HDR_L
4	N/C

ISA

Table 48.   ISA Connector Pinout

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	IOCHK_L	B1	GND	A26	SA5	B26	DACK2_L
A2	SD7	B2	RESET	A27	SA4	B27	TC
A3	SD6	B3	+5V	A28	SA3	B28	BALE
A4	SD5	B4	IRQ9	A29	SA2	B29	+5V
A5	SD4	B5	-5V	A30	SA1	B30	OSC
A6	SD3	B6	DRQ2	A31	SA0	B31	GND
A7	SD2	B7	-12V	Connector key		Connector key	
A8	SD1	B8	SRDY_L	C1	SBHE_L	D1	MEMCS16_L
A9	SD0	B9	+12V	C2	LA23	D2	IOCS16_L
A10	IOCHRDY	B10	GND	C3	LA22	D3	IRQ10
A11	AEN	B11	SMEMW_L	C4	LA21	D4	IRQ11
A12	SA19	B12	SMEMR_L	C5	LA20	D5	IRQ12
A13	SA18	B13	IOW_L	C6	LA19	D6	IRQ15
A14	SA17	B14	IOR_L	C7	LA18	D7	IRQ14
A15	SA16	B15	DACK3_L	C8	LA17	D8	DACK0_L
A16	SA15	B16	DRQ3	C9	MEMR_L	D9	DRQ0
A17	SA14	B17	DACK1_L	C10	MEMW_L	D10	DACK5_L
A18	SA13	B18	DRQ1	C11	SD8	D11	DRQ5
A19	SA12	B19	REFRESH_L	C12	SD9	D12	DACK6_L
A20	SA11	B20	BCLK	C13	SD10	D13	DRQ6
A21	SA10	B21	IRQ7	C14	SD11	D14	DACK7_L
A22	SA9	B22	IRQ6	C15	SD12	D15	DRQ7
A23	SA8	B23	IRQ5	C16	SD13	D16	+5V
A24	SA7	B24	IRQ4	C17	SD14	D17	MASTER16_L
A25	SA6	B25	IRQ3	C18	SD15	D18	GND

PCI

Table 49. PCI Connector Pinout

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	TRST_L	B1	-12 V	A32	AD16	B32	AD17
A2	+12 V	B2	TCK	A33	+3.3 V *	B33	C/BE2_L
A3	TMS	B3	GND	A34	FRAME_L	B34	GND
A4	TDI	B4	TD0 (NC)	A35	GND	B35	IRDY_L
A5	+5 V	B5	+5 V	A36	TRDY_L	B36	+3.3 V *
A6	INTA_L	B6	+5 V	A37	GND	B37	DEVSEL_L
A7	INTC_L	B7	INTB_L	A38	STOP_L	B38	GND
A8	+5 V	B8	INTD_L	A39	+3.3 V *	B39	LOCK_L
A9	Reserved	B9	PRSNT1_L	A40	SDONE	B40	PERR_L
A10	+5 V	B10	Reserved	A41	SBO_L	B41	+3.3 V *
A11	Reserved	B11	PRSNT2_L	A42	GND	B42	SERR_L
A12	GND	B12	GND	A43	PAR	B43	+3.3 V *
A13	GND	B13	GND	A44	AD15	B44	C/BE1_L
A14	Reserved	B14	Reserved	A45	+3.3 V *	B45	AD14
A15	RST_L	B15	GND	A46	AD13	B46	GND
A16	+5 V	B16	PCICLK	A47	AD11	B47	AD12
A17	GNT_L	B17	GND	A48	GND	B48	AD10
A18	GND	B18	REQ_L	A49	AD9	B49	GND
A19	Reserved	B19	+5 V	A50	KEY	B50	KEY
A20	AD30	B20	AD31	A51	KEY	B51	KEY
A21	+3.3 V *	B21	AD29	A52	C/BE0_L	B52	AD8
A22	AD28	B22	GND	A53	+3.3 V *	B53	AD7
A23	AD26	B23	AD27	A54	AD6	B54	+3.3 V *
A24	GND	B24	AD25	A55	AD4	B55	AD5
A25	AD24	B25	+3.3 V *	A56	GND	B56	AD3
A26	IDSEL	B26	C/BE3_L	A57	AD2	B57	GND
A27	+3.3 V *	B27	AD23	A58	AD0	B58	AD1
A28	AD22	B28	GND	A59	+5 V	B59	+5 V
A29	AD20	B29	AD21	A60	REQ64_L	B60	ACK64_L
A30	GND	B30	AD19	A61	+5 V	B61	+5 V
A31	AD18	B31	+3.3 V *	A62	+5 V	B62	+5 V

* The baseboard does not provide a PCI 3.3 V power connector. Only the 5 V PCI signaling environment is supported, and no power is available at the 3.3 V signal pins in expansion slots.

Baseboard Jumpers

One 11-pin single inline header provides three 3-pin jumper blocks that control various configuration options. Figure 44 shows the location. Items in **bold** in Table 50 show default placement for each configurable option.

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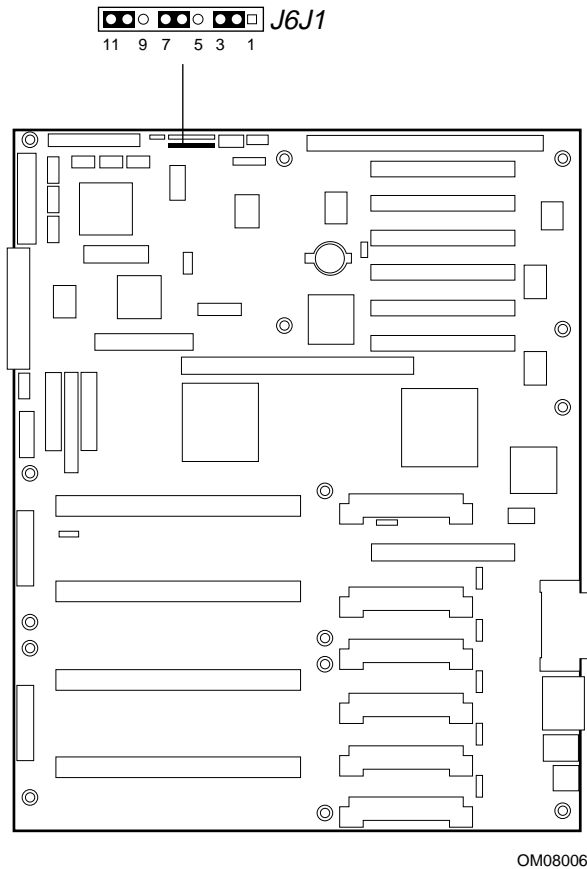
Figure 44. Baseboard Jumpers

Table 50.   Baseboard Jumper Summary

Function	Pins (default in bold)	What it does at system reset
CMOS clear	**1-2, BMC Control**	Preserves the contents of NVRAM.
	2-3, Force Erase	Replaces the contents of NVRAM with the manufacturing default settings.
Password clear	**5-6, Protect**	Maintains the current system password.
	6-7, Erase	Clears the password.
Recovery Boot	**9-10, Normal**	System attempts to boot using the BIOS stored in flash memory.
	10-11, Recovery	BIOS attempts a recovery boot, loading BIOS code from a diskette into the flash device. This is typically used when the BIOS code has been corrupted.

General Procedure to Change Jumper Setting

The short general procedure for changing a configuration setting is the same for most of the jumper functions, so we will describe it here.

1. Observe the safety and ESD precautions at the beginning of Chapter 5 (page 87).
2. Turn off all connected peripherals, turn off system power, and disconnect all AC power cords.
3. Remove the access cover. You do not need to remove the baseboard from the chassis, and you probably do not need to remove any add-in boards.
4. Locate the configuration jumpers at the edge of the baseboard toward the front of the system, near the narrow SCSI connector.
5. Move jumper to pins specified for the desired setting.
6. Reinstall the access cover using the original screws, connect the power cords, and turn on the system for the change to take effect.
7. You may need to repeat these steps to move the jumper back to its original setting, depending on the jumper function.

CMOS Clear Jumper

The jumper at pins 1, 2, and 3 controls whether settings stored in CMOS nonvolatile memory (NVRAM) are retained during a system reset.

Procedure to restore the system's CMOS and RTC to default values:

1. See "General Procedure to Change Jumper Setting" on page 152.
2. Move the CMOS jumper from pins 1 and 2 to pins 2 and 3 (the Clear CMOS memory position).
3. Reinstall the access cover for your safety (using the original screws), and connect the power cords to the system.
4. Turn the system on. Wait for POST to complete and for the messages "NVRAM cleared by jumper" and "Press F2 to enter Setup" to appear. This automatically reprograms CMOS and RTC to their default settings, except for the password.
5. Enter Setup and make any changes necessary (for example, changing the boot device). Press F10 to save the new Setup configuration and exit Setup.
6. Turn off the system, and disconnect all AC power cords from the system.
7. Again remove the access cover.
8. Move the jumper from pins 2 and 3 back to pins 1 and 2 (the Protect CMOS memory position).
9. Reinstall the access cover using the original screws, and connect the power cords to the system.
10. Run BIOS Setup or the SSU to verify the correct settings. See Chapter 3.

Password Clear Jumper

The jumper at pins 5, 6, and 7 controls whether a stored password is retained or cleared during a system reset.

Procedure to clear the current password and then enter a new one:

1. See "General Procedure to Change Jumper Setting" on page 152.
2. Move the Password jumper from pins 5 and 6 to pins 6 and 7.
3. Reinstall the access cover for your safety (using the original screws), and connect the power cords to the system.
4. Turn the system on, and wait for POST to complete. This automatically clears the password.
5. Turn off the system, and disconnect all AC power cords.
6. Again remove the access cover.
7. Move the jumper from pins 6 and 7 back to pins 5 and 6.
8. Reinstall the access cover using the original screws, and connect the power cords to the system.
9. Run the SSU to specify a new password. See Chapter 3.

Recovery Boot Jumper

The jumper at pins 9, 10, and 11 controls whether the system attempts to boot using the BIOS programmed in flash memory.

Procedure to disable recovery booting:

1. See "General Procedure to Change Jumper Setting" on page 152.
2. Move the recovery boot jumper from pins 9 and 10 to pins 10 and 11.
3. Reinstall the access cover for your safety (using the original screws), then connect the power cords to the system.
4. Turn the system on, and insert the Flash Memory Update Utility diskette in drive A. After the system boots, the speaker emits a single beep and the recovery process starts. This takes about three minutes. When the recovery process completes, the speaker emits two beeps.

While in the recovery mode, there is no screen display on the monitor. The keyboard is disabled as the system automatically recovers the BIOS. The following beep codes describe the recovery status.

Beep Code	Message
2	Successful completion, no errors.
4	The system could not boot from the diskette. The diskette may not be bootable.
Continuous series of low beeps	The wrong BIOS recovery files are being used and/or the flash memory jumper is in the wrong position.

5. Turn the system off, disconnect all AC power cords from the system, and remove the access cover.
6. Move the jumper from pins 10 and 11 back to pins 9 and 10 to enable the normal boot mode.
7. Replace the access cover, remove the diskette from drive A, and connect the power cords to the system.
8. After running the special recovery mode, run the SSU to specify a new password. See Chapter 3.

System I/O Addresses

The following table shows the location in I/O space of all directly I/O-accessible registers.

Table 51.   System I/O Addresses

Address(es)	Resource	Device	Notes
0000h - 000Fh	DMA Controller 1	PIIX4E	
0010h - 001Fh	DMA Controller 1	PIIX4E	Aliased from 0000h - 000Fh
0020h - 0021h	Interrupt Controller 1	PIIX4E	
0022h - 0023h			
0024h - 0025h	Interrupt Controller 1	PIIX4E	Aliased from 0020h - 0021h
0026h - 0027h			
0028h - 0029h	Interrupt Controller 1	PIIX4E	Aliased from 0020h - 0021h
002Ah - 002Bh			
002Ch - 002Dh	Interrupt Controller 1	PIIX4E	Aliased from 0020h - 0021h
002Eh - 002Fh	Super I/O Index and Data Ports		
0030h - 0031h	Interrupt Controller 1	PIIX4E	Aliased from 0020h - 0021h
0032h - 0033h			
0034h - 0035h	Interrupt Controller 1	PIIX4E	Aliased from 0020h - 0021h
0036h - 0037h			
0038h - 0039h	Interrupt Controller 1	PIIX4E	Aliased from 0020h - 0021h
003Ah - 003Bh			
003Ch - 003Dh	Interrupt Controller 1	PIIX4E	Aliased from 0020h - 0021h
003Eh - 003Fh			
0040h - 0043h	Programmable Timers	PIIX4E	
0044h - 004Fh			
0050h - 0053h	Programmable Timers	PIIX4E	Aliased from 0040h - 0043h
0054h - 005Fh			
0060h, 0064h	Keyboard Controller		Keyboard chip select from 87307
0061h	NMI Status & Control Register	PIIX4E	
0063h	NMI Status & Control Register	PIIX4E	Aliased
0065h	NMI Status & Control Register	PIIX4E	Aliased
0067h	NMI Status & Control Register	PIIX4E	Aliased
0070h	NMI Mask (bit 7) & RTC Address (bits 6::0)	PIIX4E	
0072h	NMI Mask (bit 7) & RTC Address (bits 6::0)	PIIX4E	Aliased from 0070h
0074h	NMI Mask (bit 7) & RTC Address (bits 6::0)	PIIX4E	Aliased from 0070h
0076h	NMI Mask (bit 7) & RTC Address (bits 6::0)	PIIX4E	Aliased from 0070h
0071h	RTC Data	PIIX4E	
0073h	RTC Data	PIIX4E	Aliased from 0071h
0075h	RTC Data	PIIX4E	Aliased from 0071h

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Table 51.　System I/O Addresses (continued)

Address(es)	Resource	Device	Notes
0077h	RTC Data	PIIX4E	Aliased from 0071h
0080h - 008Fh	DMA Low Page Register	PIIX4E	
0090h - 0091h	DMA Low Page Register (aliased)	PIIX4E	
0092h	System Control Port A (PC-AT control Port) (this port not aliased in DMA range)	PIIX4E	
0093h - 009Fh	DMA Low Page Register (aliased)	PIIX4E	
0094h	Video Display Controller		
00A0h - 00A1h	Interrupt Controller 2	PIIX4E	
00A4h - 00A15	Interrupt Controller 2 (aliased)	PIIX4E	
00A8h - 00A19	Interrupt Controller 2 (aliased)	PIIX4E	
00Ach - 00Adh	Interrupt Controller 2 (aliased)	PIIX4E	
00B0h - 00B1h	Interrupt Controller 2 (aliased)	PIIX4E	
00B2h	Advanced Power Management Control	PIIX4E	
00B3h	Advanced Power Management Status	PIIX4E	
00B4h - 00B5h	Interrupt Controller 2 (aliased)	PIIX4E	
00B8h - 00B9h	Interrupt Controller 2 (aliased)	PIIX4E	
00BCh - 00BDh	Interrupt Controller 2 (aliased)	PIIX4E	
00C0h - 00DFh	DMA Controller 2	PIIX4E	
00F0h	Clear NPX error		Resets IRQ13
00F8h - 00FFh	x87 Numeric Coprocessor		
0102h	Video Display Controller		
0170h - 0177h	Secondary Fixed Disk Controller (IDE)	PIIX4E	Not used
01F0h - 01F7h	Primary Fixed Disk Controller (IDE)	PIIX4E	
0200h - 0207h	Game I/O Port		Not used
0220h - 022Fh	Serial Port A		
0238h - 023Fh	Serial Port B		
0278h - 027Fh	Parallel Port 3		
02E8h - 02Efh	Serial Port B		
02F8h - 02FFh	Serial Port B		
0338h - 033Fh	Serial Port B		
0370h - 0375h	Secondary Diskette		
0376h	Secondary IDE		
0377h	Secondary IDE/Diskette		
0378h - 037Fh	Parallel Port 2		
03B4h - 03Bah	Monochrome Display Port		
03BCh - 03BFh	Parallel Port 1 (Primary)		

Table 51. System I/O Addresses (continued)

Address(es)	Resource	Device	Notes
03C0h - 03CFh	Video Display Controller		
03D4h - 03DAh	Color Graphics Controller		
03E8h - 03EFh	Serial Port A		
03F0h - 03F5h	Diskette Controller		
03F6h - 03F7h	Primary IDE - Sec. Diskette		
03F8h - 03FFh	Serial Port A (Primary)		
0400h - 043Fh	DMA Controller 1, Extended Mode Registers	PIIX4E	
04D0h - 04D1h	Interrupt Controllers 1 and 2 Control Register		
0678h - 067Ah	Parallel Port (ECP)		
0778h - 077Ah	Parallel Port (ECP)		
07BCh - 07BEh	Parallel Port (ECP)		
0CA0 - CA3h	BMC Registers		
0CF8h	PCI CONFIG_ADDRESS Register		Located in 450NX
0CF9h	NBX Turbo and Reset control	PIIX4E	
0CFCh	PCI CONFIG_DATA Register		Located in 450NX
46E8h	Video Display Controller		

Memory Map

Table 52. Memory Map

Address Range (hex)	Amount	Function
0 to 07FFFFh	640 KB	DOS region, base system memory
0A0000h to 0BFFFFh	128 KB	Video or SMM memory
0C0000h and 0DFFFFh	128 KB	Add-in board BIOS and buffer area
0E0000h to 0FFFFFh	128 KB	System BIOS
0E0000h to 0EFFFFh	2 MB	Extended system BIOS
FC000000h to FFFFFFFFh	64 MB	PCI memory space

Interrupts

The table below recommends the logical interrupt mapping of interrupt sources; it reflects a typical configuration, but these interrupts can be changed by the user. Use the information to determine how to program each interrupt. The actual interrupt map is defined using configuration registers in the PIIX4E and the I/O controller. I/O Redirection Registers in the I/O APIC are provided for each interrupt signal; the signals define hardware interrupt signal characteristics for APIC messages sent to local APIC(s).

⟹ **NOTE**

To disable either IDE controller and reuse the interrupt: if you plan to disable either IDE controller to reuse the interrupt for that controller, you must physically unplug the IDE cable from the board connector (IDE0) if a cable is present. Simply disabling the drive by configuring the SSU option does not make the interrupt available.

Table 53.   Interrupts

Interrupt	I/O APIC level	Description
INTR	INT0	Processor interrupt
NMI	N/A	NMI from PIC to processor
IRQ1	INT1	Keyboard interrupt
Cascade	INT2	Interrupt signal from second 8259 in PIIX4E
IRQ3	INT3	Serial port A or B interrupt from SIO device (user can configure)
IRQ4	INT4	Serial port A or B interrupt from SIO device (user can configure)
IRQ5	INT5	Parallel port II
IRQ6	INT6	Diskette port
IRQ7	INT7	Parallel port
IRQ8_L	INT8	RTC interrupt
IRQ9	INT9	Signal control interrupt (SCI) used by ACPI-compliant OS
IRQ10	INT10	
IRQ11	INT11	
IRQ12	INT12	Mouse interrupt
	INT13	
IRQ14	INT14	Compatibility IDE interrupt from primary channel IDE devices 0 and 1
IRQ15	INT15	
SMI_L		System management interrupt—general purpose indicator sourced by the PIIX4E and BMC through the PID to the processors

Video Modes

The CL-GD5480 integrated video controller provides all standard IBM VGA modes. With 2 MB of SGRAM standard, the system supports special Cirrus Logic extended modes. Table 54 and Table 55 list the standard and extended modes that this implementation supports, including the number of colors and palette size (e.g., 16 colors out of 256 K colors), resolution, pixel frequency, and scan frequencies.

Table 54.   Standard VGA Modes

Mode(s) in Hex	Bits per pixel	Colors (no per palette size)	Resolution	Pixel Freq. (MHz)	Horizontal Freq. (kHz)	Vertical Freq. (Hz)
0, 1	4	16/256K	360 X 400	14	31.5	70
2, 3	4	16/256K	720 X 400	28	31.5	70
4, 5	4	4/256K	320 X 200	12.5	31.5	70
6	4	2/256K	640 X 200	25	31.5	70
7	4	Mono	720 X 400	28	31.5	70
D	4	16/256K	320 X 200	12.5	31.5	70
E	4	16/256K	640 X 200	25	31.5	70
F	4	Mono	640 X 350	25	31.5	70
10	4	16/256K	640 X 350	25	31.5	70
11	4	2/256K	640 X 480	25	31.5	60
12	4	16/256K	640 X 480	25	31.5	60
12+	4	16/256K	640 X 480	31.5	37.5	75
13	8	256/256K	320 X 200	12.5	31.5	70

Table 55.   Extended VGA Modes

Mode(s) in Hex	Bits per pixel	Colors	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (KHz)	Vert. Freq. (Hz)	Memory
58, 6A	8	16/256K	800 X 600	36	35.2	56	1MB
58, 6A	8	16/256K	800 X 600	40	37.8	60	1MB
58, 6A	8	16/256K	800 X 600	50	48.1	72	1MB
58, 6A	8	16/256K	800 X 600	49.5	46.9	75	1MB
5C	8	256/256K	800 X 600	36	35.2	56	1MB
5C	8	256/256K	800 X 600	40	37.9	60	1MB
5C	8	256/256K	800 X 600	50	48.1	72	1MB
5C	8	256/256K	800 X 600	49.5	46.9	75	1MB
5C	8	256/256K	800 X 600	56.25	53.7	85	1MB
5C	8	256/256K	800 X 600	68.2	63.6	100	1MB
5D	8	16/256K (interlaced)	1024 X 768	44.9	35.5	43	1MB
5D	8	16/256K	1024 X 768	65	48.3	60	1MB
5D	8	16/256K	1024 X 768	75	56	70	1MB
5D	8	16/256K	1024 X 768	78.7	60	75	1MB
5E	8	256/256K	640 X 400	25	31.5	70	1MB
5F	8	256/256K	640 X 480	25	31.5	60	1MB
5F	8	256/256K	640 X 480	31.5	37.9	72	1MB
5F	8	256/256K	640 X 480	31.5	37.5	75	1MB
5F	8	256/256K	640 X 480	36	43.3	85	1MB
5F	8	256/256K	640 X 480	43.2	50.9	100	1MB
60	8	256/256K (interlaced)	1024 X 768	44.9	35.5	43	1MB
60	8	256/256K	1024 X 768	65	48.3	60	1MB
60	8	256/256K	1024 X 768	75	56	70	1MB
60	8	256/256K	1024 X 768	78.7	60	75	1MB
60	8	256/256K	1024 X 768	94.5	68.3	85	1MB
60	8	256/256K	1024 X 768	113.3	81.4	100	1MB
64	16	64K	640 X 480	25	31.5	60	1MB
64	16	64K	640 X 480	31.5	37.9	72	1MB
64	16	64K	640 X 480	31.5	37.5	75	1MB
64	16	64K	640 X 480	36	43.3	85	1MB
64	16	64K	640 X 480	43.2	50.9	100	1MB
65	16	64K	800 X 600	36	35.2	56	1MB
65	16	64K	800 X 600	40	37.8	60	1MB
65	16	64K	800 X 600	50	48.1	72	1MB
65	16	64K	800 X 600	49.5	46.9	75	1MB
65	16	64K	800 X 600	56.25	53.7	85	1MB

Table 55.   Extended VGA Modes (continued)

Mode(s) in Hex	Bits per pixel	Colors	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (KHz)	Vert. Freq. (Hz)	Memory
65	16	64K	800 X 600	68.2	63.6	100	1MB
66	16	32K	640 X 480	25	31.5	60	1MB
66	16	32K	640 X 480	31.5	37.9	72	1MB
66	16	32K	640 X 480	31.5	37.5	75	1MB
66	16	32K	640 X 480	36	43.3	85	1MB
66	16	32K	640 X 480	43.2	50.9	100	1MB
67	16	32K	800 X 600	36	35.2	56	1MB
67	16	32K	800 X 600	40	37.8	60	1MB
67	16	32K	800 X 600	50	48.1	72	1MB
67	16	32K	800 X 600	49.5	46.9	75	1MB
67	16	32K	800 X 600	56.25	53.7	85	1MB
67	16	32K	800 X 600	68.2	63.6	100	1MB
68	16	32K (interlaced)	1024 X 768	44.9	35.5	43	2MB
68	16	32K	1024 X 768	65	48.3	60	2MB
68	16	32K	1024 X 768	75	56	70	2MB
68	16	32K	1024 X 768	78.7	60	75	2MB
68	16	32K	1024 X 768	94.5	68.3	85	2MB
68	16	32K	1024 X 768	113.3	81.4	100	2MB
6C	8	16/256K (interlaced)	1280 X 1024	75	48	43	1MB
6D	8	256/256K (interlaced)	1280 X 1024	75	48	43	2MB
6D	8	256/256K	1280 X 1024	108	65	60	2MB
6D	8	256/256K	1280 X 1024	135	80	75	2MB
6D	8	256/256K	1280 X 1024	157.5	91	85	2MB
6E	16	32K	1152 X 864	94.5	63.9	70	2MB
6E	16	32K	1152 X 864	108	67.5	75	2MB
6E	16	32K	1152 X 864	121.5	76.7	85	2MB
6E	16	32K	1152 X 864	143.5	91.5	100	2MB
71	24	16M	640 X 480	25	31.5	60	1MB
71	24	16M	640 X 480	31.5	37.9	72	1MB
71	24	16M	640 X 480	31.5	37.5	75	1MB
71	24	16M	640 X 480	36	43.3	85	1MB
71	24	16M	640 X 480	43.2	50.9	100	1MB

Table 55. Extended VGA Modes (continued)

Mode(s) in Hex	Bits per pixel	Colors	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (KHz)	Vert. Freq. (Hz)	Memory
74	16	64K (interlaced)	1024 X 768	44.9	35.5	43	2MB
74	16	64K	1024 X 768	65	48.3	60	2MB
74	16	64K	1024 X 768	75	56	70	2MB
74	16	64K	1024 X 768	78.7	60	75	2MB
74	16	64K	1024 X 768	94.5	68.3	85	2MB
74	16	64K	1024 X 768	113.3	81.4	100	2MB
78	16	32K	800 X 600	36	35.2	56	1MB
78	24	16M	800 X 600	40	37.8	60	2MB
78	24	16M	800 X 600	50	48.1	72	2MB
78	24	16M	800 X 600	49.5	46.9	75	2MB
78	24	16M	800 X 600	56.25	53.7	85	2MB
78	24	16M	800 X 600	68.2	63.6	100	2MB
7B	8	256/256K (interlaced)	1600 X 1200	135	62.5	48	2MB
7B	8	256/256K	1600 X 1200	162	75	60	2MB
7C	8	256/256K	1152 X 864	94.5	63.9	70	1MB
7C	8	256/256K	1152 X 864	108	67.5	75	1MB
7C	8	256/256K	1152 X 864	121.5	76.7	85	1MB
7C	8	256/256K	1152 X 864	143.5	91.5	100	1MB
7D	16	64K	1152 X 864	94.5	63.9	70	2MB
7D	16	64K	1152 X 864	108	67.5	75	2MB
7D	16	64K	1152 X 864	121.5	76.7	85	2MB
7D	16	64K	1152 X 864	143.5	91.5	100	2MB

A Equipment Log and Configuration Worksheets

Equipment Log

Use the blank equipment log provided here to record information about your system. You will need some of this information when you run the SSU.

Item	Manufacturer Name and Model Number	Serial Number	Date Installed
System			
Baseboard			
Processor speed and cache			
Video display			
Keyboard			
Mouse			
Diskette drive A			
Diskette drive B			
Tape drive			
CD-ROMdrive			
Hard disk drive 1			
Hard disk drive 2			
Hard disk drive 3			
Hard disk drive 4			
Hard disk drive 5			
SCSI host adapter board 1			

continued

Equipment Log (continued)

Item	Manufacturer Name and Model Number	Serial Number	Date Installed

Configuration Worksheets

The rest of this chapter consists of worksheets to record the settings you make when configuring the system using the SSU, BIOS Setup, and the Symbios SCSI Utility. If default values ever need to be restored to CMOS (e.g., after a CMOS-clear), you must reconfigure the system. Referring to the filled-in worksheets could make your task easier.

Circle or write in your selections or the values that are displayed onscreen.

Current Usage

As an overall current usage limitation on the power supply, do not exceed a combined power output of 195 watts for the +5 and +3.3 volt outputs.

Calculating Power Usage

The total combined wattage for the system configuration **must be less than 400 watts.** Use the two worksheets in this section to calculate the total used by your system. For current and voltage requirements of add-in boards and peripherals, see your vendor documents.

Worksheet, Calculating DC Power Usage

1. List the current for each board and device in the appropriate voltage level column.
2. Add the currents in each column. Then go to the next worksheet.

Worksheet 1. Power Usage Worksheet 1

Device	Current (maximum) at voltage level:				
	+3.3 V	+5 V	−5 V	+12 V	−12 V
Boards, processors, and memory (get totals from your board manual)					
SCSI backplane					
Front panel board					
3.5-inch diskette drive		0.3 A			
CD-ROM drive		0.4 A		1.0 A	
Second 5.25-inch device					
1st hot-swap hard drive					
2nd hot-swap hard drive					
3rd hot-swap hard drive					
4th hot-swap hard drive					
5th hot-swap hard drive					
Cooling fan 1, 120 mm				0.6 A	
Cooling fan 2, 120 mm				0.6 A	
Cooling fan 3, 120 mm				0.6 A	
Total Current					

Worksheet, Total Combined Power Used by the System

1. From the previous worksheet, enter the total current for each column.
2. Multiply the voltage by the total current to get the total wattage for each voltage level.
3. Add the total wattage for each voltage level to arrive at a total combined power usage on the power supply.

Worksheet 2. Power Usage Worksheet 2

Voltage level and total current (V X A = W)	Total Watts for each voltage level
(+3.3 V) X (_____ A)	_____ W
(+5 V) X (_____ A)	_____ W
(–5 V) X (_____ A)	_____ W
(+12 V) X (_____ A)	_____ W
(–12 V) X (_____ A)	_____ W
Total Combined Wattage	_____ **W**

SSU Worksheets

Add and Remove Boards

Worksheet 3. Add/Remove Boards

Baseboard	
PCI Host Bridge Device	Bus 0 Dev 0
PCI SCSI Device	Bus 0 Dev B
PCI Ethernet Device	Bus 0 Dev 10
PCI VGA Device	Bus 0 Dev 12
PCI Multifunction Device	Bus 0 Dev 14

ISA Board Definition

If you have an ISA board with no .CFG file, you can define the board by using the SSU. It is necessary to define an ISA board only when you want to prevent other boards in the system from using the same IRQ levels, DMA channels, I/O Port addresses, or Memory addresses that your ISA board uses.

Worksheet 4. ISA Board Definition

(ISA) Board Name	
Manufacturer	
Board Type	Video Board Memory Board Multifunction Board Keyboard Mass Storage Device Numeric Coprocessor Network Board Operating System Communications Board CPU Board Parallel Port Joystick Board Pointing Device Other
Board Slot	16 Bit / 8 Bit / 8 or 16 Bit
DMA	Channel: Size: Byte / Word Timing: Default / Type A / Type B
IRQ	Level: Trigger: Edge / Level
Ports ISA Port Definition	Start: End: Size: Byte / Word
Memory ISA Memory Definition	Size: KB Address:h RAM / ROM Don't Cache / Cache Use: System / Expanded / Virtual / Other Width: Byte / Word Decode: 24 Bit / 20 Bit

Baseboard (SSU, Change Configuration Settings)

Worksheet 5. Systems Group

System Identification and Version Information	
SSU Configuration File Version	
MP Spec. Version	1.1 / 1.4
Processor Speed Setting	

Worksheet 6. Memory Subsystem Group

Onboard Disk Controllers	
Onboard Communication Devices	Enable / Disable

Worksheet 7. Onboard Disk Controllers

Onboard Diskette Controller	Enable / Disable
Primary Onboard IDE Controller	Enable / Disable
Secondary Onboard IDE Controller	Enable / Disable

Worksheet 8. Onboard Communications Devices

Serial Port 1 Configuration	
Serial Port 2 Configuration	
Serial Port 2 Mode	
Parallel Port Configuration	
Parallel Port Mode	

Worksheet 9. Diskette Drive Subsystems Group

Diskette drive A Options	
Diskette drive B Options	

Worksheet 10. IDE Subsystem Group

IDE Configuration **Primary Master**	(drive name) None / User / Auto / CD
IDE Drive Options **Primary Master**	2 Sector/Block / 4 Sector/Block 8 Sector/Block / 16 Sector/Block / Disable
Transfer Mode **Primary Master**	PIO 1 / PIO 2 / PIO 3 / PIO 4
IDE Configuration **Primary Slave**	(drive name) None / User / Auto / CD
IDE Drive Options **Primary Slave**	2 Sector/Block / 4 Sector/Block / 8 Sector/Block / 16 Sector/Block / Disable
Translation Mode **Primary Slave**	Standard CHS Logical Block Addressing
Transfer Mode **Primary Slave**	PIO 1 / PIO 2 / PIO 3 / PIO 4

Worksheet 11. Multiboot Group

Boot Device Priority	Diskette Drive Removable Devices Hard Drive ATAPI CD-ROM Drive Diagnostic Boot

Worksheet 12. Keyboard and Mouse Subsystem Group

Typematic Delay	250 ms delay / 500 ms delay 750 ms delay / 1000 ms delay
Typematic Speed	30 CPS / (other)
Mouse Control option	Mouse Enabled / Disabled

Worksheet 13. Console Redirection

COM Port for Redirection	Port 3F8/IRQ4 / Port 2F8/IRQ3 Port 3E8h/IRQ 3 / Disable
Serial Port baud rate	9600 / 19.2k / 38.4k / 115.2k
Hardware Flow Control	None / CTS/RTS / CTS/RTS + CD / Xoff/Xon
Terminal Type	PC - ANSI / VT 100

Worksheet 14. Security Subsystems

Administrative Password	Disable / Enable
User Password	Disable / Enable
Secure Mode Hot-Key	None / Ctrl-Alt-{ }
Lockout Timer	Disable / { } minutes
Secure Boot Mode	Disable / Enable
Video Blanking	Disable / Enable
Diskette Writes	Disable / Enable
Reset/Power Switch Locking	Disable / Enable

Worksheet 15. SCSI ROM BIOS Options Group

Onboard SCSI ROM BIOS scan	Enable / Disable

Worksheet 16. Management Subsystem Group

System Sensor Control	Write your selections on the separate "Management Subsystem, System Sensor Control Worksheet" on page 171.
SMM Enable	Enable / Disable
Event Logging	Enable / Disable
PCI System Error Detection	Enable / Disable

Management Subsystem, System Sensor Control Worksheet

For each sensor control, the display includes the choices shown below, with blanks for entering values. Write in both the sensor control and the values you select. This worksheet (two pages) provides space for a number of sensor controls; if you need more space, copy these pages to extend your worksheet.

Item:	**Item:**
Disable / Enable	Disable / Enable
Upper Fatal:	Upper Fatal:
Upper Warning:	Upper Warning:
Lower Warning:	Lower Warning:
Lower Fatal:	Lower Fatal:

Item:	**Item:**
Disable / Enable	Disable / Enable
Upper Fatal:	Upper Fatal:
Upper Warning:	Upper Warning:
Lower Warning:	Lower Warning:
Lower Fatal:	Lower Fatal:

Item:	**Item:**
Disable / Enable	Disable / Enable
Upper Fatal:	Upper Fatal:
Upper Warning:	Upper Warning:
Lower Warning:	Lower Warning:
Lower Fatal:	Lower Fatal:

Item:	**Item:**
Disable / Enable	Disable / Enable
Upper Fatal:	Upper Fatal:
Upper Warning:	Upper Warning:
Lower Warning:	Lower Warning:
Lower Fatal:	Lower Fatal:

Item:	
Disable / Enable	
Upper Fatal:	
Upper Warning:	
Lower Warning:	
Lower Fatal:	

Item:	
Disable / Enable	
Upper Fatal:	
Upper Warning:	
Lower Warning:	
Lower Fatal:	

Item:	
Disable / Enable	
Upper Fatal:	
Upper Warning:	
Lower Warning:	
Lower Fatal:	

Item:	
Disable / Enable	
Upper Fatal:	
Upper Warning:	
Lower Warning:	
Lower Fatal:	

BIOS Setup Worksheets

Worksheet 17. Main Menu

System Date	
System Time	
Legacy Diskette A	Disabled 360 KB 720 KB 1.44 MB 2.88 MB
Legacy Diskette B	Disabled 360 KB 720 KB 1.44 MB 2.88 MB
Hard Disk Pre-delay	Disabled / 3 / 6 / 9 / 12 / 15 / 21 / 30
Language	English Spanish Italian French German

Worksheet 18. Primary Master and Slave Submenu

Type	Auto / None / CD-ROM / IDE Removable ATAPI Removable / User
Cylinders	
Heads	
Sectors	
Maximum Capacity	
Multi-Sector Transfer	Disabled / 2 / 4 / 8 / 16
LBA Mode Control	Disabled / Enabled
32 Bit I/O	Disabled / Enabled
Transfer Mode	Standard / Fast PIO 1 / Fast PIO 2 / Fast PIO 3 Fast PIO 4
Ultra DMA	Disabled / Enabled

Worksheet 19. Keyboard Features Submenu

Num Lock	Auto / On / Off
Key Click	Disabled / Enabled
Keyboard auto-repeat rate	30 / 26.7 / 21.8 / 18.5 / 13.3 / 10 / 6 / 2
Keyboard auto-repeat delay	¼ / ½ / ¾ / 1

Worksheet 20. Advanced Menu

Plug and Play OS	Yes / No
Reset Configuration Data	Yes / No
Use Multiprocessor Specification	1.1 / 1.4
Large Disk Access Mode	LBA / CHS
Pause Before Boot	Enabled / Disabled

Worksheet 21. PCI Device, Embedded SCSI Submenu

Option ROM Scan	Disabled / Enabled
Enable Master	Disabled / Enabled
Latency Timer	Default / <time>

Worksheet 22. PCI Devices Submenu

Option ROM Scan	Disabled / Enabled
Enable Master	Enabled / Disabled
Latency Timer	Default / <time>

Worksheet 23. I/O Device Configuration Submenu

Serial Port A	Disabled / Enabled / Auto / OS Controlled
Base I/O Address	3F8h / 2F8h / 3E8h / 2E8h
Interrupt	4 / 3
Serial Port B	Disabled / Enabled / Auto / OS Controlled
Mode	Normal / IrDA / ASK-IR
Base I/O Address	3F8h / 2F8h / 3E8h / 2E8h
Interrupt	4 / 3
Parallel Port	Disabled / Enabled / Auto / OS Controlled
Mode	Output only / Bidirectional / EPP / ECP
Base I/O Address	378 / 278
Interrupt	5 / 7
DMA channel	1 / 3
Floppy disk controller	Disabled / Enabled
Base I/O Address	Primary / Secondary
PS/2 Mouse	Disabled / Enabled

Worksheet 24. Advanced Chipset Control Submenu

Address Bit Permuting	Disabled / Auto
Base RAM Step	1 MB / 1 KB / Every location
Extended RAM Step	1 MB / 1 KB / Every location
L2 Cache	Enabled / Disabled
ISA Expansion Aliasing	Enabled / Disabled
Memory Scrubbing	Enabled / Disabled
Restreaming Buffer	Enabled / Disabled

Worksheet 25. Security Menu

Administrator Password is	Clear / Set
User Password is	Clear / Set
Password on Boot	Disabled / Enabled
Fixed Disk Boot Sector	Normal / Write Protect
System Backup Reminder	Disabled / Daily / Weekly / Monthly
Virus Check Reminder	Disabled / Daily / Weekly / Monthly
Secure Mode Timer	Disabled / <time>
Secure Mode Hot Key	<key stroke>
Secure Mode Boot	Disabled / Enabled
Video Blanking	Disabled / Enabled
Floppy Write Protect	Disabled / Enabled

Worksheet 26. Server Menu.

Processor Retest	No / Yes

Worksheet 27. System Management Submenu.

Server Management Mode	Disabled / Enabled
System Event Logging	Disabled / Enabled
Clear Event Log	Disabled / Enabled
Assert NMI on AERR	Disabled / Enabled
Assert NMI on BERR Interrupt Routing	Disabled / Enabled
Assert NMI on PERR Interrupt Routing	Disabled / Enabled
Assert NMI on SERR Interrupt Routing	Disabled / Enabled
Enabled Host Bus Error	Disabled / Enabled

Worksheet 28. Console Redirection Submenu.

COM Port Address	Disabled / 3F8 / 2F8 / 3E8
IRQ#	None / 3 / 4
Baud Rate	9600 / 19.2k / 38.4k / 115.2k
Flow Control	None / CTS/RTS / XON/XOFF / CTS/RTS + CD

Worksheet 29. Boot Menu

Floppy Check	Disabled / Enabled
Multi-boot Support	Disabled / Enabled
Maximum No. of I2O Drives	1 / 4
Message Timeout Multiplier	1 / 2 / 8 / 10 / 50 / 100 / 1000

Worksheet 30. Boot Device Priority Submenu

Boot Priority 1	Diskette Drive / <other>
Boot Priority 2	Removable Devices / <other>
Boot Priority 3	Hard Drive / <other>
Boot Priority 4	I2O Block Storage Device / <other>
Boot Priority 5	ATAPI CD-ROM Drive / <other>
Boot Priority 6	(any SCSI CD-ROM Drive / <other>

Worksheet 31. Hard Drive Submenu

Drive 1	
Other Bootable Cards	
Additional Entries	

B Regulatory Specifications

Regulatory and Environmental Specifications

Environmental Specifications

Table 56. Environmental Specifications

Temperature
        Nonoperating
        Operating
	–40° to 70 °C (–55° to 150 °F)
	10° to 35 °C (41° 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
        Operating wet
bulb
	95% relative humidity (noncondensing) at 30 °C (86 °F)
	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 free fall (cosmetic damage might occur)

Acoustic noise	< 47 dBA with one power supply at 28 °C +/- 2 °C < 50 dBA with two power supplies at 28 °C +/- 2 °C < 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~
        200-240 V~
	100-120 V~, 7.6 A, 50/60 Hz
	200-240 V~, 3.8 A, 50/60 Hz

Declaration of the Manufacturer or Importer

We hereby certify that this product is in compliance with European Union EMC Directive
89/336/EEC, using standards EN55022 (Class B) and EN50082-1 and Low Voltage Directive
73/23/EEC, Standard EN60950.

Safety Compliance

USA:	UL 1950 - CSA 950-95, 3rd Edition
Canada:	UL certified to CSA 950-95 for Canada (product bears the single UL mark for U.S. and Canada)
Europe:	German GS Mark - ERG to EN60950 2nd Edition, with amendments
International:	NEMKO to IEC950 2nd Edition + Amd 1-4 NEMKO - EN60 950 2nd Edition + Amd 1-4 NEMKO - EMKO-TSE (74-SEC) 207/94
Australian / New Zealand	AS/NZ 3548, Class B limits (CISPR 22) AS/NZ 3260 (IEC 950 including national AU deviations)

Electromagnetic Compatibility (EMC)

USA:	FCC CFR 47 Part 15, Class B
Canada:	IC ICES-003 Class B

Europe:	EN55022, Class B
	EN50082-1
	      IEC 801-2 ESD Susceptibility
	      IEC 801-3 Radiated Immunity
	      IEC 801-4 Electrical Fast Transient
	EN61000-3-2 Limit for Harmonic Current Emissions

International:	CISPR 22, Class B
Japan:	VCCI Class B (CISPR 22 B limit)

Electromagnetic Compatibility Notice (USA)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. 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 the 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.

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment. The customer is responsible for ensuring compliance of the modified product.

Only peripherals (computer input/output devices, terminals, printers, etc.) that comply with FCC Class B limits may be attached to this computer product. Operation with noncompliant peripherals is likely to result in interference to radio and TV reception.

All cables used to connect to peripherals must be shielded and grounded. Operation with cables, connected to peripherals, that are not shielded and grounded may result in interference to radio and TV reception.

⇒ **NOTE**

> **Class A device definition:** If a Class A device is installed within this system, then the system is to be considered a Class A system. In this configuration, operation of this equipment in a residential area is likely to cause harmful interference.

FCC Declaration of Conformity

Product Type: CABSIT

This device 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.

For questions related to the EMC performance of this product, contact:

Intel Corporation
5200 N.E. Elam Young Parkway
Hillsboro, OR 97124-6497

Phone: 1 (800)-INTEL4U or 1 (800) 628-8686

Electromagnetic Compatibility Notices (International)

　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Ｂ情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
　取扱説明書に従って正しい取り扱いをして下さい。

English translation of the notice above:

This is a Class B product based on the standard of the Voluntary Control Council For Interference (VCCI) from Information Technology Equipment. If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

This equipment has been tested for radio frequency emissions and has been verified to meet CISPR 22/EN55022 Class B.

Cet appareil numérique respecte les limites bruits radioélectriques applicables aux appareils numériques de Classe B prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques", NMB-003 édictée par le Ministre Canadian des Communications.

English translation of the notice above:

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Canadian Department of Communications.

C Warnings

WARNING: English (US)
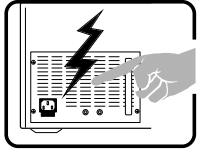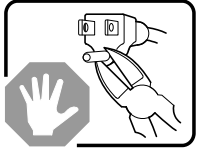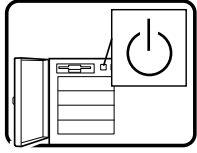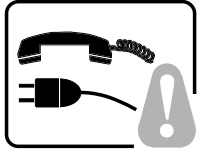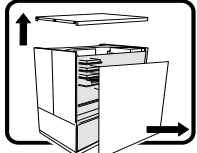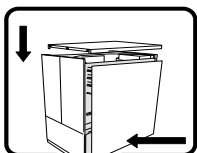
AVERTISSEMENT: Français

WARNUNG: Deutsch

AVVERTENZA: Italiano

ADVERTENCIAS: Español

WARNING: English (US)

	The power supply in this product contains no user-serviceable parts. There may be more than one supply in this product. Refer servicing only to qualified personnel.
	Do not attempt to modify or use the supplied AC power cord if it is not the exact type required. A product with more than one power supply will have a separate AC power cord for each supply.
	The DC push-button on/off switch on the system does not turn off system AC power. To remove AC power from the system, you must unplug each AC power cord from the wall outlet or power supply.
	SAFETY STEPS: Whenever you remove the chassis covers to access the inside of the system, follow these steps: 1. Turn off all peripheral devices connected to the system. 2. Turn off the system by using the push-button on/off power switch on the system. 3. Unplug all AC power cords from the system or from wall outlets. 4. Label and disconnect all cables connected to I/O connectors or ports on the back of the system. 5. Provide some electrostatic discharge (ESD) protection by wearing an antistatic wrist strap attached to chassis ground of the system—any unpainted metal surface—when handling components. 6. Do not operate the system with the chassis covers removed.
	After you have completed the six SAFETY steps above, you can remove the system covers. To do this: 1. Unlock and remove the padlock from the back of the system if a padlock has been installed. 2. Remove and save all screws from the covers. 3. Remove the covers.
	For proper cooling and airflow, always reinstall the chassis covers before turning on the system. Operating the system without the covers in place can damage system parts. To install the covers: 1. Check first to make sure you have not left loose tools or parts inside the system. 2. Check that cables, add-in boards, and other components are properly installed. 3. Attach the covers to the chassis with the screws removed earlier, and tighten them firmly. 4. Insert and lock the padlock to the system to prevent unauthorized access inside the system. 5. Connect all external cables and the AC power cord(s) to the system.

WARNING: **English** (continued)
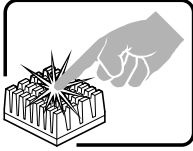
	A microprocessor and heat sink may be hot if the system has been running. Also, there may be sharp pins and edges on some board and chassis parts. Contact should be made with care. Consider wearing protective gloves.
	Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.
	The system is designed to operate in a typical office environment. Choose a site that is: • Clean and free of airborne particles (other than normal room dust). • Well ventilated and away from sources of heat including direct sunlight. • Away from sources of vibration or physical shock. • Isolated from strong electromagnetic fields produced by electrical devices. • In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppresser and disconnect telecommunication lines to your modem during an electrical storm. • Provided with a properly grounded wall outlet. • Provided with sufficient space to access the power supply cords, because they serve as the product's main power disconnect.
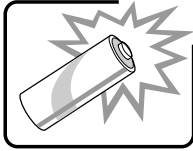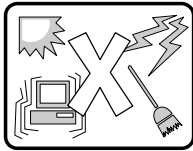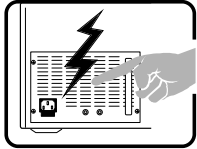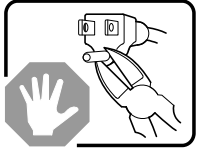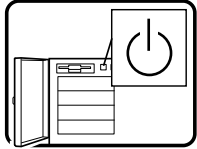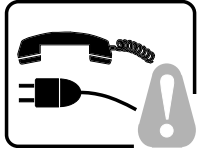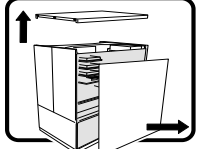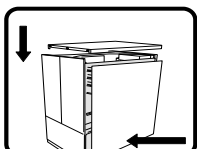
AVERTISSEMENT: Français

	Le bloc d'alimentation de ce produit ne contient aucune pièce pouvant être réparée par l'utilisateur. Ce produit peut contenir plus d'un bloc d'alimentation. Veuillez contacter un technicien qualifié en cas de problème.
	Ne pas essayer d'utiliser ni modifier le câble d'alimentation CA fourni, s'il ne correspond pas exactement au type requis. Le nombre de câbles d'alimentation CA fournis correspond au nombre de blocs d'alimentation du produit.
	Notez que le commutateur CC de mise sous tension /hors tension du panneau avant n'éteint pas l'alimentation CA du système. Pour mettre le système hors tension, vous devez débrancher chaque câble d'alimentation de sa prise.
	CONSIGNES DE SÉCURITÉ - Lorsque vous ouvrez le boîtier pour accéder à l'intérieur du système, suivez les consignes suivantes : 1. Mettez hors tension tous les périphériques connectés au système. 2. Mettez le système hors tension en mettant l'interrupteur général en position OFF (bouton-poussoir). 3. Débranchez tous les cordons d'alimentation c.a. du système et des prises murales. 4. Identifiez et débranchez tous les câbles reliés aux connecteurs d'E-S ou aux accès derrière le système. 5. Pour prévenir les décharges électrostatiques lorsque vous touchez aux composants, portez une bande antistatique pour poignet et reliez-la à la masse du système (toute surface métallique non peinte du boîtier). 6. Ne faites pas fonctionner le système tandis que le boîtier est ouvert.
	Une fois TOUTES les étapes précédentes accomplies, vous pouvez retirer les panneaux du système. Procédez comme suit : 1. Si un cadenas a été installé sur à l'arrière du système, déverrouillez-le et retirez-le. 2. Retirez toutes les vis des panneaux et mettez-les dans un endroit sûr. 3. Retirez les panneaux.
	Afin de permettre le refroidissement et l'aération du système, réinstallez toujours les panneaux du boîtier avant de mettre le système sous tension. Le fonctionnement du système en l'absence des panneaux risque d'endommager ses pièces. Pour installer les panneaux, procédez comme suit : 1. Assurez-vous de ne pas avoir oublié d'outils ou de pièces démontées dans le système. 2. Assurez-vous que les câbles, les cartes d'extension et les autres composants sont bien installés. 3. Revissez solidement les panneaux du boîtier avec les vis retirées plus tôt. 4. Remettez le cadenas en place et verrouillez-le afin de prévenir tout accès non autorisé à l'intérieur du système. 5. Rebranchez tous les cordons d'alimentation c. a. et câbles externes au système.

AVERTISSEMENT: **Français** (suite)
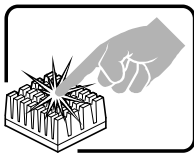
	Le microprocesseur et le dissipateur de chaleur peuvent être chauds si le système a été sous tension. Faites également attention aux broches aiguës des cartes et aux bords tranchants du capot. Nous vous recommandons l'usage de gants de protection.
	Danger d'explosion si la batterie n'est pas remontée correctement. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le fabricant. Disposez des piles usées selon les instructions du fabricant.
	Le système a été conçu pour fonctionner dans un cadre de travail normal. L'emplacement choisi doit être : • Propre et dépourvu de poussière en suspension (sauf la poussière normale). • Bien aéré et loin des sources de chaleur, y compris du soleil direct. • A l'abri des chocs et des sources de vibrations. • Isolé de forts champs électromagnétiques géenérés par des appareils électriques. • Dans les régions sujettes aux orages magnétiques il est recomandé de brancher votre système à un supresseur de surtension, et de débrancher toutes les lignes de télécommunications de votre modem durant un orage. • Muni d'une prise murale correctement mise à la terre. • Suffisamment spacieux pour vous permettre d'accéder aux câbles d'alimentation (ceux-ci étant le seul moyen de mettre le système hors tension).
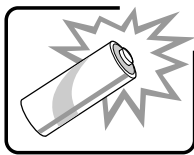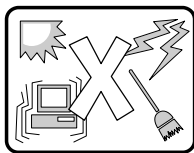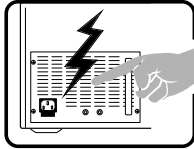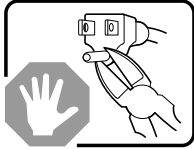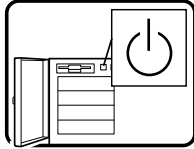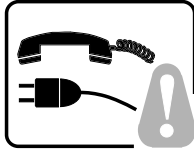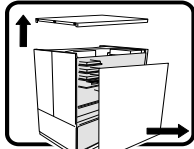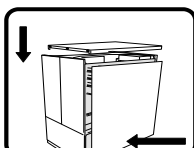
WARNUNG: Deutsch

Benutzer können am Netzgerät dieses Produkts keine Reparaturen vornehmen. Das Produkt enthält möglicherweise mehrere Netzgeräte. Wartungsarbeiten müssen von qualifizierten Technikern ausgeführt werden.

Versuchen Sie nicht, das mitgelieferte Netzkabel zu ändern oder zu verwenden, wenn es sich nicht genau um den erforderlichen Typ handelt. Ein Produkt mit mehreren Netzgeräten hat für jedes Netzgerät ein eigenes Netzkabel.

Der Wechselstrom des Systems wird durch den Ein-/Aus-Schalter für Gleichstrom nicht ausgeschaltet. Ziehen Sie jedes Wechselstrom-Netzkabel aus der Steckdose bzw. dem Netzgerät, um den Stromanschluß des Systems zu unterbrechen.

SICHERHEISMASSNAHMEN: Immer wenn Sie die Gehäuseabdeckung abnehmen um an das Systeminnere zu gelangen, sollten Sie folgende Schritte beachten:

1. Schalten Sie alle an Ihr System angeschlossenen Peripheriegeräte aus.
2. Schalten Sie das System mit dem Hauptschalter aus.
3. Ziehen Sie den Stromanschlußstecker Ihres Systems aus der Steckdose.
4. Auf der Rückseite des Systems beschriften und ziehen Sie alle Anschlußkabel von den I/O Anschlüssen oder Ports ab.
5. Tragen Sie ein geerdetes Antistatik Gelenkband, um elektrostatische Ladungen (ESD) über blanke Metallstellen bei der Handhabung der Komponenten zu vermeiden.
6. Schalten Sie das System niemals ohne ordnungsgemäß montiertes Gehäuse ein.

Nachdem Sie die oben erwähnten ersten sechs SICHERHEITSSCHRITTE durchgeführt haben, können Sie die Abdeckung abnehmen, indem Sie:

1. Öffnen und entfernen Sie die Verschlußeinrichtung (Padlock) auf der Rückseite des Systems, falls eine Verschlußeinrichtung installiert ist.
2. Entfernen Sie alle Schrauben der Gehäuseabdeckung.
3. Nehmen Sie die Abdeckung ab.

Zur ordnungsgemäßen Kühlung und Lüftung muß die Gehäuseabdeckung immer wieder vor dem Einschalten installiert werden. Ein Betrieb des Systems ohne angebrachte Abdeckung kann Ihrem System oder Teile darin beschädigen. Um die Abdeckung wieder anzubringen:

1. Vergewissern Sie sich, daß Sie keine Werkzeuge oder Teile im Innern des Systems zurückgelassen haben.
2. Überprüfen Sie alle Kabel, Zusatzkarten und andere Komponenten auf ordnungsgemäßen Sitz und Installation.
3. Bringen Sie die Abdeckungen wieder am Gehäuse an, indem Sie die zuvor gelösten Schrauben wieder anbringen. Ziehen Sie diese gut an.
4. Bringen Sie die Verschlußeinrichtung (Padlock) wieder an und schließen Sie diese, um ein unerlaubtes Öffnen des Systems zu verhindern.
5. Schließen Sie alle externen Kabel und den AC Stromanschlußstecker Ihres Systems wieder an.

WARNUNG: **Deutsch** (fortsetzung)
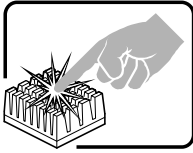
	Der Mikroprozessor und der Kühler sind möglicherweise erhitzt, wenn das System in Betrieb ist. Außerdem können einige Platinen und Gehäuseteile scharfe Spitzen und Kanten aufweisen. Arbeiten an Platinen und Gehäuse sollten vorsichtig ausgeführt werden. Sie sollten Schutzhandschuhe tragen.
	Bei falschem Einsetzen einer neuen Batterie besteht Explosionsgefahr. Die Batterie darf nur durch denselben oder einen entsprechenden, vom Hersteller empfohlenen Batterietyp ersetzt werden. Entsorgen Sie verbrauchte Batterien den Anweisungen des Herstellers entsprechend.
	Das System wurde für den Betrieb in einer normalen Büroumgebung entwickelt. Der Standort sollte: • sauber und staubfrei sein (Hausstaub ausgenommen); • gut gelüftet und keinen Heizquellen ausgesetzt sein (einschließlich direkter Sonneneinstrahlung); • keinen Erschütterungen ausgesetzt sein; • keine starken, von elektrischen Geräten erzeugten elektromagnetischen Felder aufweisen; • in Regionen, in denen elektrische Stürme auftreten, mit einem Überspannungsschutzgerät verbunden sein; während eines elektrischen Sturms sollte keine Verbindung der Telekommunikationsleitungen mit dem Modem bestehen; • mit einer geerdeten Wechselstromsteckdose ausgerüstet sein; • über ausreichend Platz verfügen, um Zugang zu den Netzkabeln zu gewährleisten, da der Stromanschluß des Produkts hauptsächlich über die Kabel unterbrochen wird.
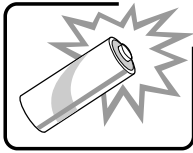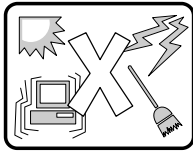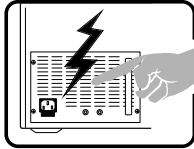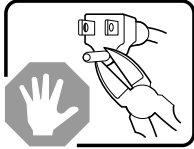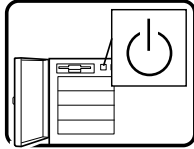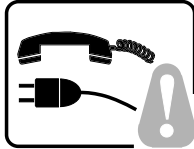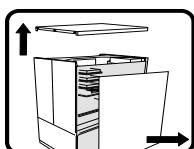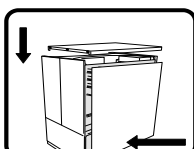
AVVERTENZA: Italiano

	Rivolgersi ad un tecnico specializzato per la riparazione dei componenti dell'alimentazione di questo prodotto. È possibile che il prodotto disponga di più fonti di alimentazione.
	Non modificare o utilizzare il cavo di alimentazione in c.a. fornito dal produttore, se non corrisponde esattamente al tipo richiesto. Ad ogni fonte di alimentazione corrisponde un cavo di alimentazione in c.a. separato.
	L'interruttore attivato/disattivato nel pannello anteriore non interrompe l'alimentazione in c.a. del sistema. Per interromperla, è necessario scollegare tutti i cavi di alimentazione in c.a. dalle prese a muro o dall'alimentazione di corrente.
	PASSI DI SICUREZZA: Qualora si rimuovano le coperture del telaio per accedere all'interno del sistema, seguire i seguenti passi: 1. Spegnere tutti i dispositivi periferici collegati al sistema. 2. Spegnere il sistema, usando il pulsante spento/acceso dell'interruttore del sistema. 3. Togliere tutte le spine dei cavi del sistema dalle prese elettriche. 4. Identificare e sconnettere tutti i cavi attaccati ai collegamenti I/O od alle prese installate sul retro del sistema. 5. Qualora si tocchino i componenti, proteggersi dallo scarico elettrostatico (SES), portando un cinghia anti-statica da polso che è attaccata alla presa a terra del telaio del sistema – qualsiasi superficie non dipinta – . 6. Non far operare il sistema quando il telaio è senza le coperture.
	Dopo aver seguito i sei passi di SICUREZZA sopracitati, togliere le coperture del telaio del sistema come seque: 1. Aprire e rimuovere il lucchetto dal retro del sistema qualora ve ne fosse uno installato. 2. Togliere e mettere in un posto sicuro tutte le viti delle coperture. 3. Togliere le coperture.
	Per il giusto flusso dell'aria e raffreddamento del sistema, rimettere sempre le coperture del telaio prima di riaccendere il sistema. Operare il sistema senza le coperture al loro proprio posto potrebbe danneggiare i componenti del sistema. Per rimettere le coperture del telaio: 1. Controllare prima che non si siano lasciati degli attrezzi o dei componenti dentro il sistema. 2. Controllare che i cavi, dei supporti aggiuntivi ed altri componenti siano stati installati appropriatamente. 3. Attaccare le coperture al telaio con le viti tolte in precedenza e avvitarle strettamente. 4. Inserire e chiudere a chiave il lucchetto sul retro del sistema per impedire l'accesso non autorizzato al sistema. 5. Ricollegare tutti i cavi esterni e le prolunghe AC del sistema.

AVVERTENZA: **Italiano** (continua)
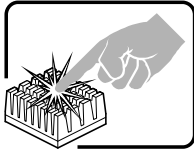
	Se il sistema è stato a lungo in funzione, il microprocessore e il dissipatore di calore potrebbero essere surriscaldati. Fare attenzione alla presenza di piedini appuntiti e parti taglienti sulle schede e sul telaio. È consigliabile l'uso di guanti di protezione.
	Esiste il pericolo di un esplosione se la pila non viene sostituita in modo corretto. Utilizzare solo pile uguali o di tipo equivalente a quelle consigliate dal produttore. Per disfarsi delle pile usate, seguire le istruzioni del produttore.
	Il sistema è progettato per funzionare in un ambiente di lavoro tipo. Scegliere una postazione che sia: • Pulita e libera da particelle in sospensione (a parte la normale polvere presente nell'ambiente). • Ben ventilata e lontana da fonti di calore, compresa la luce solare diretta. • Al riparo da urti e lontana da fonti di vibrazione. • Isolata dai forti campi magnetici prodotti da dispositivi elettrici. • In aree soggette a temporali, è consigliabile collegare il sistema ad un limitatore di corrente. In caso di temporali, scollegare le linee di comunicazione dal modem. • Dotata di una presa a muro correttamente installata. • Dotata di spazio sufficiente ad accedere ai cavi di alimentazione, i quali rappresentano il mezzo principale di scollegamento del sistema.
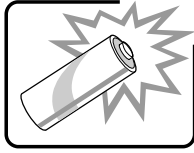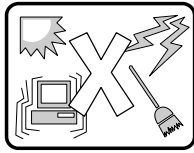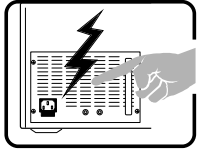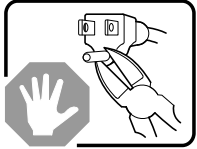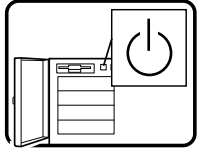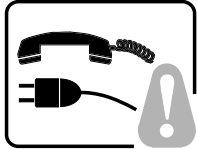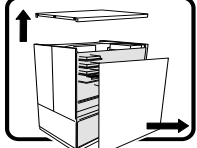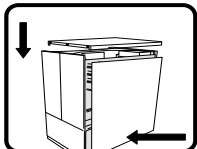
ADVERTENCIAS: Español

	El usuario debe abstenerse de manipular los componentes de la fuente de alimentación de este producto, cuya reparación debe dejarse exclusivamente en manos de personal técnico especializado. Puede que este producto disponga de más de una fuente de alimentación.
	No intente modificar ni usar el cable de alimentación de corriente alterna, si no corresponde exactamente con el tipo requerido. El número de cables suministrados se corresponden con el número de fuentes de alimentación de corriente alterna que tenga el producto.
	Nótese que el interruptor activado/desactivado en el panel frontal no desconecta la corriente alterna del sistema. Para desconectarla, deberá desenchufar todos los cables de corriente alterna de la pared o desconectar la fuente de alimentación.
	INSTRUCCIONES DE SEGURIDAD: Cuando extraiga la tapa del chasis para acceder al interior del sistema, siga las siguientes instrucciones: 1. Apague todos los dispositivos periféricos conectados al sistema. 2. Apague el sistema presionando el interruptor encendido/apagado. 3. Desconecte todos los cables de alimentación CA del sistema o de las tomas de corriente alterna. 4. Identifique y desconecte todos los cables enchufados a los conectores E/S o a los puertos situados en la parte posterior del sistema. 5. Cuando manipule los componentes, es importante protegerse contra la descarga electrostática (ESD). Puede hacerlo si utiliza una muñequera antiestática sujetada a la toma de tierra del chasis — o a cualquier tipo de superficie de metal sin pintar. 6. No ponga en marcha el sistema si se han extraído las tapas del chasis.
	Después de completar las seis instrucciones de SEGURIDAD mencionadas, ya puede extraer las tapas del sistema. Para ello: 1. Desbloquee y extraiga el bloqueo de seguridad de la parte posterior del sistema, si se ha instalado uno. 2. Extraiga y guarde todos los tornillos de las tapas. 3. Extraiga las tapas.
	Para obtener un enfriamiento y un flujo de aire adecuados, reinstale siempre las tapas del chasis antes de poner en marcha el sistema. Si pone en funcionamiento el sistema sin las tapas bien colocadas puede dañar los componentes del sistema. Para instalar las tapas: 1. Asegúrese primero de no haber dejado herramientas o componentes sueltos dentro del sistema. 2. Compruebe que los cables, las placas adicionales y otros componentes se hayan instalado correctamente. 3. Incorpore las tapas al chasis mediante los tornillos extraídos anteriormente, tensándolos firmemente. 4. Inserte el bloqueo de seguridad en el sistema y bloquéelo para impedir que pueda accederse al mismo sin autorización. 5. Conecte todos los cables externos y los cables de alimentación CA al sistema.

ADVERTENCIAS: **Español** (continúa)
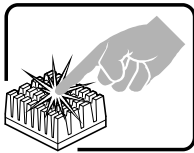
	Si el sistema ha estado en funcionamiento, el microprocesador y el disipador de calor pueden estar aún calientes. También conviene tener en cuenta que en el chasis o en el tablero puede haber piezas cortantes o punzantes. Por ello, se recomienda precaución y el uso de guantes protectores.
	Existe peligro de explosión si la pila no se cambia de forma adecuada. Utilice solamente pilas iguales o del mismo tipo que las recomendadas por el fabricante del equipo. Para deshacerse de las pilas usadas, siga igualmente las instrucciones del fabricante.
	El sistema está diseñado para funcionar en un entorno de trabajo normal. Escoja un lugar: • Limpio y libre de partículas en suspensión (salvo el polvo normal). • Bien ventilado y alejado de fuentes de calor, incluida la luz solar directa. • Alejado de fuentes de vibración. • Aislado de campos electromagnéticos fuertes producidos por dispositivos eléctricos. • En regiones con frecuentes tormentas eléctricas, se recomienda conectar su sistema a un eliminador de sobrevoltage y desconectar el módem de las líneas de telecomunicación durante las tormentas. • Provisto de una toma de tierra correctamente instalada. • Provisto de espacio suficiente como para acceder a los cables de alimentación, ya que éstos hacen de medio principal de desconexión del sistema.
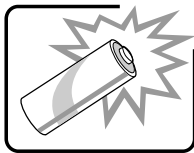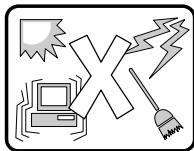
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