Intel MB440LX
System Installation Guide

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Safety Guidelines

BEFORE YOU REMOVE A SERVER COVER, OBSERVE THESE GUIDELINES:

1. Turn off all peripheral devices connected to the server.

2. Turn off the server using the power button on the front panel of the server, and unplug the alternating current (AC) power cord from each power supply.

3. Label and disconnect all peripheral cables attached to the I/O panel on the back of the server.

4. Provide some electrostatic discharge (ESD) protection by wearing an antistatic wrist strap attached to chassis ground of the server—any unpainted metal surface—when handling components.

Warnings and Cautions

These warnings and cautions apply whenever you remove the side cover of the server to access components inside the server. Integration of the server should be done by technically qualified personnel.

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

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

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

⚠ **CAUTIONS**

ELECTROSTATIC DISCHARGE (ESD) AND ESD PROTECTION: ESD can damage disk drives, add-in boards, and other components. We recommend doing all procedures in this manual only at an ESD 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.

HANDLING BOARDS AND MODULES: Boards and modules can be extremely sensitive to ESD and always require careful handling. After removing a board or module from its protective wrapper or from the server, place it component-side up on a nonconductive, static-free surface. If you place the system board 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. Do not slide a board or module over any surface.

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

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Notational Conventions

The notational conventions listed below are used throughout this manual.

<F1>	A letter, number, symbol, or word enclosed in < > represents a key on your keyboard. For example, the instruction "press <F1>" means press the key labeled "F1" on your keyboard.
<Enter>	Other manuals refer to <Enter> as RETURN, CARRIAGE RETURN, <CR>, or use an arrow. All of these terms are interchangeable.
<x + y>	Two or three key names, separated by plus signs, indicate multiple-key entries. For example, <Ctrl + Alt + Del> means hold down <Ctrl> and <Alt> and press <Del>.
☐ ☐ ☐	Three squares mark the end of a chapter.

The special notices listed below are used throughout this manual to emphasize specific information:

⚠ WARNING
WARNING indicates a hazard that *can* cause personal injury or equipment damage if the hazard is not avoided.

⚠ CAUTION
CAUTION indicates a hazard that *might* cause personal injury, damage to hardware, or software if the hazard is not avoided.

✎ Note
Notes provide information and may be used to emphasize a recommended sequence of steps.

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Server Description 1

Your system supports symmetrical multiprocessing (SMP) and a variety of operating systems. The server comes with both PCI and ISA buses, one narrow and two wide SCSI channels, and onboard video. The server board set consists of the following:

- **System board** with seven PCI expansion slots, three ISA expansion slots, and several embedded controller devices (PCI video, Dual Ultra SCSI, Narrow SCSI, and IDE)

- **One or two Pentium® II processors**

- **Memory module** with either eight 3.3 V EDO DIMM sockets for up to 1 GB of memory, or four SDRAM DIMM sockets for 512 MB of memory

- **RPX module** with one SIMM† socket for RAID applications

The chassis contains a 3.5-inch diskette drive, a CD-ROM drive, and, depending on the system configuration, up to three 360 watt power supplies. Three 5.25-inch peripheral bays can house tape back-up drives, CD-ROM drives, and other mass storage devices. Any two adjacent 5.25-inch bays can be converted into a single full-height bay. The two 3.5-inch hot-docking peripheral bays, when fully configured with 10 hard disk drives, provide over 40 GB of storage. The bays allow hot-swapping drives without shutting down the system.

As your application requirements increase, you can upgrade the system with

- More powerful processors

- More memory

- Other peripheral devices

- Add-in I/O boards

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System Features

Feature	Description
Processor support	Two slots for Pentium II processors
Memory support	One slot for a memory module that supports up to 1 GB of memory
RAID support	One slot for an RPX module that supports I2O and non-I2O RAID
Chassis	1.44 MB, 3.5-inch diskette drive in the vertical bay
	Three 5.25-inch half-height standard bays; top bay contains a CD-ROM drive
	Two hot-docking bays; each bay has space for five 3.5-inch SCSI hard disk drives
	One or two SCSI hot-docking backplanes
	Two blowers direct air at the processors
	Three integrated power supply fans cool and circulate air through the power supply side of the system; if it contains only one or two power supplies, an additional fan provides cooling and airflow
Power system with optional redundancy	360 watt power supply, autoranging for 115 or 230 VAC operation, includes an integrated fan for cooling (system may be configured with up to three power supplies)
	An optional power share board distributes the power load between the installed power supplies and allows hot swapping power supplies
Server management	Real-time clock/calendar (RTC)
	Front panel controls and indicators (LEDs)
	System Configuration Utility (SCU)
	Basic Input/Output System (BIOS), Power-on Self Test, and Setup stored in a flash memory device

Feature	Description
System I/O	Nine available expansion slots: Six 32-bit PCI, two 16-bit ISA and one common PCI/ISA
	Integrated Cirrus Logic CL-GD54M40 SVGA controller shipped with 512 kilobytes (KB) of video memory (expandable to 1 MB)
	One Symbios SCSI controller for connecting up to seven 8-bit narrow SCSI devices
	Two Symbios wide SCSI controllers for connecting a mixture of fifteen 8-bit narrow and 16-bit wide SCSI devices to the controller—maximum of seven 8-bit narrow SCSI devices
	Diskette controller that supports two drives
	PCI-enhanced Integrated Drive Electronics (IDE) hard disk interface that supports two hard disk drives
	PS/2[†]-compatible keyboard/mouse controller
	PS/2-compatible keyboard and mouse ports
	PS/2-compatible parallel port
	Analog VGA[†], 15-pin video port
	Two 9-pin serial ports

Chassis

The electro-galvanized metal chassis minimizes electromagnetic interference (EMI) and radio frequency interference (RFI). It contains

- Three power supply bays with up to three 360 watt power supplies, depending on the configuration

- One vertical bay that contains a diskette drive

- Three standard 5.25-in bays for removable media devices (a CD-ROM drive is in the top bay)

- Two hot-docking bays; each bay has space for five 1-inch high, 3.5-inch single connector attachment (SCA) SCSI hard disk drives

- Nine I/O expansion slot covers

- A control panel

Two spring-loaded captive screws secure the removable metal door behind the lower plastic front door to the chassis. This door provides proper air-flow and easy access to the hot-docking bays for hot-swapping hard disk drives in and out of the system. Both removable side covers are attached to the chassis with three screws. They provide proper airflow and easy access to the system board and power supplies. These covers can be secured to the chassis with padlocks (not provided). Figures 1-1 and 1-2 show the major system components.
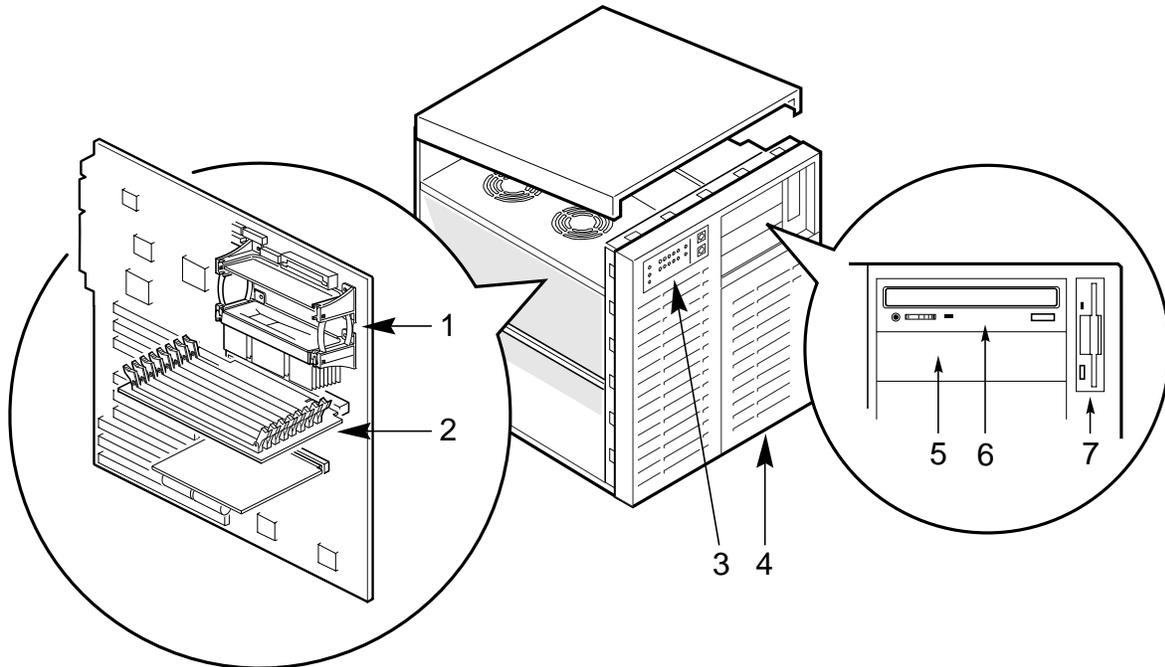
OM05788A

Figure 1-1. Server

1   Processor modules
2   Memory module
3   Front panel
4   SCSI hot-docking bays
5   5.25-inch external bays
6   CD-ROM drive
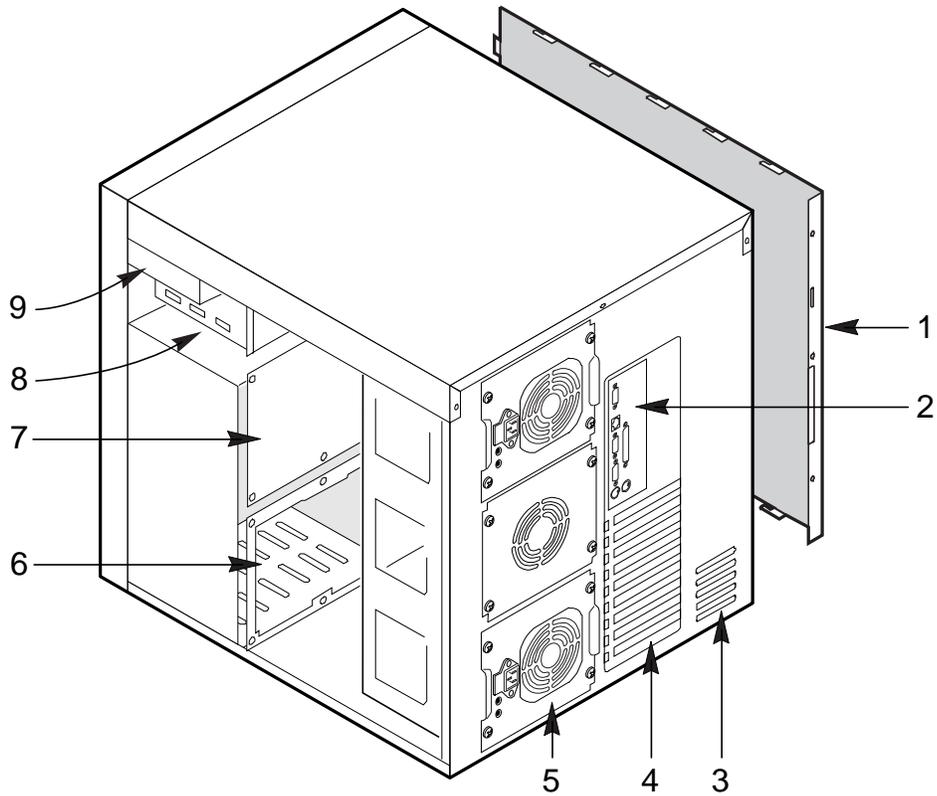
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Figure 1-2. Back/Right Side View

1   Left side cover
2   I/O panel
3   Knock-out slots for external SCSI connectors
4   Expansion slots
5   Power supplies
6   SCSI hot-docking bay
7   SCSI hot-docking backplane
8   5.25-inch peripheral bays
9   3.5-inch diskette drive

Chapter 1 Server Description

Controls and Indicators

Figure 1-3 shows the location of the system controls and indicators, external peripheral bays, 3.5-inch diskette drive, and CD-ROM drive.

Front Panel:

- Green (HD ACT) LED: when lit, indicates hard drive activity.

- Yellow fan failure LED: when flashing, indicates the fan has failed.

- Yellow power supply failure LED: when flashing, indicates a power supply has failed.

- 10 yellow hard drive failure LEDs: when lit, indicates a drive failure in the hot-docking bay.

- Green power LED: when lit, indicates the presence of DC power in the system. The LED goes out when the power is turned off or the power source is disrupted.

- Power button: when pressed, turns the DC power on or off.

- Reset button: when pressed, resets the system and causes POST to run.

Peripherals:

- Diskette drive activity LED: when lit, indicates the drive is in use.

- Diskette drive ejector button: when pressed, ejects the disk.

- CD-ROM headphone jack: used to connect headphones or speakers.

- CD-ROM volume control: used to adjust the volume of headphones or speakers.

- CD-ROM open/close button: used to open and close the CD tray.

- CD-ROM activity LED: when lit, indicates the drive is in use.
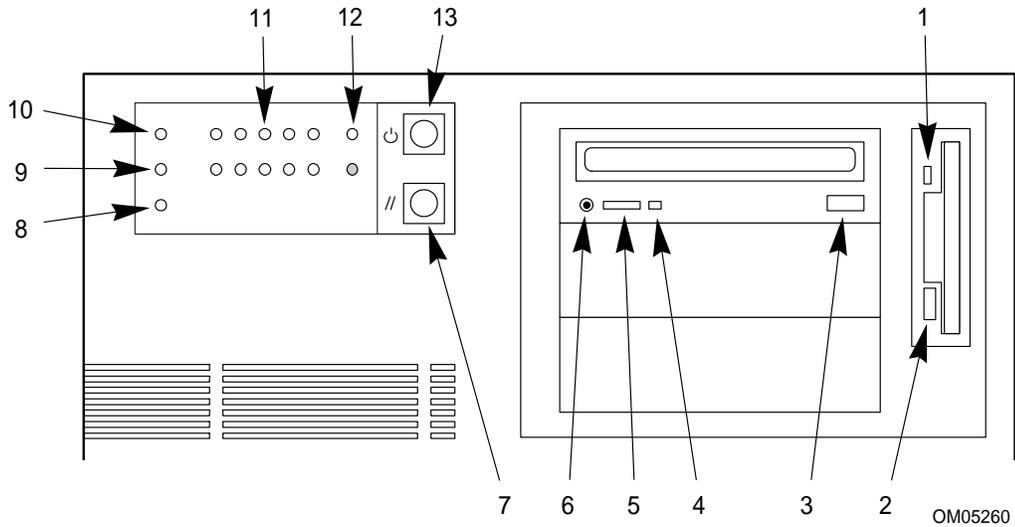
Figure 1-3. Controls and Indicators

1   Diskette drive activity LED
2   Diskette drive ejector button
3   CD-ROM open/close button
4   CD-ROM power LED
5   CD-ROM volume control
6   CD-ROM headphone jack
7   Reset button
8   Power supply failure LED
9   Fan failure LED
10   Hard drive activity LED
11   Drive failure LEDs for hot-docking bays
12   Power on LED
13   Power button

System Security

There are several ways to prevent unauthorized entry or use of the system.

Security with padlocks and alarm switches:

* Secure the side covers and the hot-docking bay metal door to the chassis by inserting padlocks (not provided) through the holes in the metal tabs protruding through slots in the covers and door.

* Activate alarm switches for the side covers and hot-docking bay metal door. These switches transmit alarm signals to the system board. Software on the system board intercepts these signals and alerts the user to unauthorized activity.

Security with the Setup utility:

* Set administrative and user passwords.

* Set secure mode to prevent keyboard or mouse input and to prevent use of the front panel controls.

Security with the System Configuration Utility (SCU):

* Enable the keyboard lockout timer so that the system requires a password to reactivate the keyboard and mouse after a specified time-out period—1 to 128 minutes.

* Set an administrative password.

* Set a user password.

* Activate the secure mode hot-key.

* Disable writing to the diskette drive.

* Enable video blanking if using onboard video.
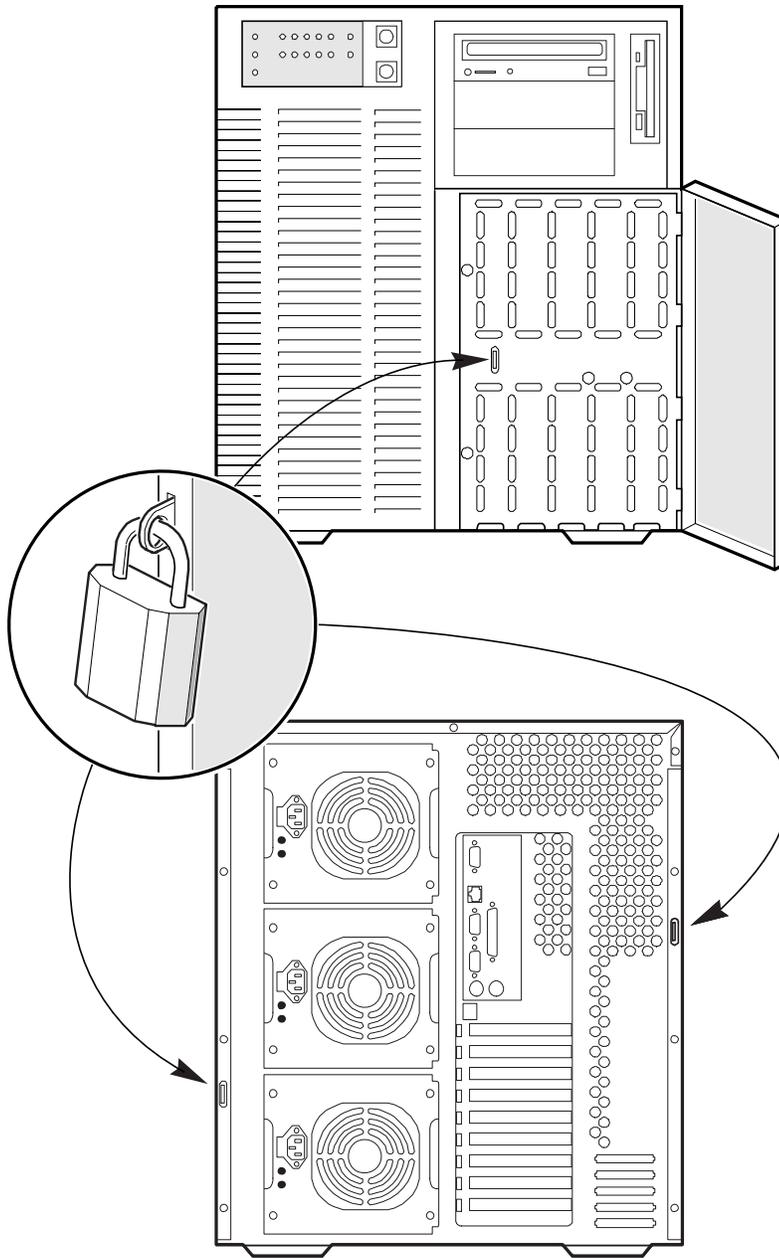
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Figure 1-4. Security Padlocks

Chapter 1 Server Description

Password Protection

If you set the user password but not the administrative password, the BIOS requires you to enter the user password before you can boot the system or run the SCU. If you set both passwords, entering either one lets you boot the system or enable the keyboard and mouse, but only the administrative password lets you change the system configuration.

Secure Boot Mode

The secure boot mode allows the system to boot and run the operating system (OS). However, you cannot use the keyboard or mouse until you enter the user password.

You can use the SCU to put the system into the secure boot mode. If the BIOS detects a CD in the CD-ROM drive or a diskette in drive A at boot time, it prompts you for a password. When you enter the password, the system boots from the CD-ROM drive or diskette drive and disables the secure mode.

If there is no CD in the CD-ROM 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.

You can set a hot-key combination to secure the system immediately.

Boot Sequence Control

The BIOS security features determine the boot devices and the boot sequence. They also control disabling writes to the diskette drive in secure mode. You can use the SCU to select each boot device. The default boot sequence is diskette, hard disk, CD-ROM, and Network.

Boot Without Keyboard

The system can boot with or without a keyboard. Before boot, the BIOS displays a message whether it has detected a keyboard or not. During POST, the BIOS automatically detects and tests the keyboard if it's present.

Power and Reset Button Lock

If enabled by the Setup Utility, the power and reset buttons are disabled when in the secure mode.

Diskette Write Protection

If the protection feature is enabled with the SCU, diskette writes are disabled when the system is in the secure mode. Diskette write protection is only in effect while the system is in the secure mode. Otherwise, write protection is disabled.

Video Blanking

If enabled with the setup or SCU, the video screen goes blank when the system is in secure mode.

Power System

The power system in the server may be configured with one, two, or three 360 watt power supplies.

The 360 watt power supply provides sufficient power for an entry level server. The power supply accepts these input voltage ranges:

- 100-120 VAC at 50/60 Hertz (Hz); 7.7 A maximum current

- 200-240 VAC at 50/60 Hz; 4.4 A maximum current

If a single power supply fails in a redundant power system, the yellow power supply failure LED on the front panel starts flashing. You can swap out the faulty supply without shutting down the server.

Server Cooling

Two blowers inside the chassis provide cooling for the processors, memory modules, and add-in boards. Two more fans may be installed for redundant cooling. If a fan or blower fails, the server management subsystem notifies the system board and turns on an LED on the front panel.

A system with only one power supply includes an auxiliary fan to provide cooling for the hard drives. A system with multiple power supplies provides enough cooling without an auxiliary fan.

Peripheral Drive Bays

3.5-inch User Accessible Diskette Drive Bay

The 3.5-inch diskette drive in the vertical 3.5-inch peripheral bay supports 720 KB and 1.44 MB media.

5.25-inch User Accessible Drive Bays

Three 5.25-inch half-height bays provide space for removable media devices such as tape drives and CD-ROM drives. You can convert any two adjacent 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, and ESD susceptibility increases.

3.5-inch Hot-docking Drive Bays

Using industry standard 80-pin SCA connectors, the hot-docking backplane in the upper bay supports up to five industry standard SCA hard disk drives. The hot-docking bays accept peripherals that consume up to 11 watts of power and run at a maximum ambient temperature of 55 °C.

You can install an additional hot-docking backplane in the lower hot-docking bay for five more drives. However, if you do, you must install an additional power supply in the chassis to support drives in the lower bay. The upper and lower hot-docking bays, when fully configured with 10 4 GB hard disk drives, provide over 40 GB of hard disk drive space.

The plastic front door on the front of the server covers a removable metal door. Two spring-loaded captive screws secure the metal door to the chassis. These doors provide proper air-flow and easy access to the drives in the upper and lower hot-docking bays. Plastic drive carriers for 3.5-inch wide by 1-inch high drives allow easy hot swapping of these drives without shutting down the server.

With the RPX board installed on the system board, RAID software, and SCSI hard disk drives in the hot-docking bays, you can easily set up RAID applications.

Onboard RAID

With the RPX board installed on the system board, RAID software, and SCSI hard disk drives in the hot-docking bays, you can easily set up RAID applications. A two channel RAID solution can be constructed by installing an RPX module with RAID firmware resident in the RPX FLASH memory. The server system supports two types of embedded RAID firmware packages: I2O compliant and vendor proprietary firmware. The RAID features are as follows:

• RAID levels 0, 1, 3, 5, 0+1, and JBOD

• Support for hot spares, hot plugs, and user selectable rebuild rate

• Support for multiple rebuilds across separate arrays and multiple consistency checks

• Write back cache support with battery backup

• Support for up to 2 terabytes per logical array and up to 64 terabytes of attached disk storage

• Support for SAF-TE and SMART

Server System Board

ISA Expansion Slots

One of the ISA connectors shares a common chassis I/O expansion slot with a PCI connector; you can use either ISA or PCI in the slot, but not both.

The ISA bus operates at up to 8.33 MHz and provides

• 24-bit memory addressing

• Type A transfers at 5.33 MB per second

• Type B transfers at 8 MB per second

• 8- or 16-bit data transfers

PCI Expansion Slots

The seven PCI bus master slots on the system board provide for expansion and performance enhancement. One of the PCI connectors shares a common chassis I/O expansion slot with an ISA connector; you can use either PCI or ISA in the slot, but not both.

The PCI bus operates at up to 33 MHz and provides

- 32-bit memory addressing

- Support for 5 V and 3.3V cards

- Burst transfers of up to 133 MB per second

- 8-, 16-, or 32-bit data transfers

- Plug and Play configuration

- Hierarchical bus to maximize connectivity

PCI Video Controller

The onboard Cirrus Logic CL-GD54M40 32-bit video graphics accelerator contains a super video graphics array (SVGA) controller that is fully compatible with these video standards: CGA[†], EGA[†], Hercules[†] Graphics, MDA[†], and VGA. The standard server configuration comes with 512 KB of onboard video memory allowing pixel resolutions of up to 1024 x 768 and 16 colors.

The SVGA controller supports analog VGA monitors (single and multiple frequency, interlaced and noninterlaced) with a maximum vertical retrace interlaced frequency of 87 Hz.

The buffer size of the onboard video memory can be increased from 512 KB to 1 MB with one 40-pin 256 K x 16, 60 ns fast-page dynamic random access memory (DRAM). 1 MB of DRAM will allow the controller to support 132-column text modes and high resolution graphics with 1280 x 1024 x 16 colors. Depending on the environment, the controller displays up to 64,000 colors in some video resolutions. It also provides hardware accelerated bit block transfers (BITBLT) of data.

Video Modes

The 54M40 provides all standard VGA modes. With 512 KB of video memory, the standard server goes beyond standard VGA support. If necessary, you can install an additional 512 KB of video memory on the system board. The following tables show all supported video modes that use 512 KB and 1 MB of video memory.

Table 1-1. Standard VGA Modes

Hexadecimal Mode Number	Bits Per Pixel	Colors (number/palette size)	Resolution	Pixel Frequency (MHz)	Horizontal Frequency (kHz)	Vertical Frequency (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 1-2. Extended VGA Modes

Hexadecimal Mode Number	Bits Per Pixel	Colors (number/palette size)	Resolution	Pixel Frequency (MHz)	Horizontal Frequency (kHz)	Vertical Frequency (Hz)
14, 55	8	16/256K	1056 X 400	41.5	31.5	70
54	8	16/256K	1056 X 350	41.5	31.5	70
58, 6A	8	16/256K	800 X 600	40	37.8	60
58, 6A	8	16/256K	800 X 600	49.5	46.9	75
5C	8	256/256K	800 X 600	36	35.2	56
5C	8	256/256K	800 X 600	40	37.9	60
5C	8	256/256K	800 X 600	49.5	46.9	75
5D	8	16/256K (interlaced)	1024 X 768	44.9	35.5	87
5D	8	16/256K	1024 X 768	65	48.3	60
5D	8	16/256K	1024 X 768	75	56	70
5D	8	16/256K	1024 X 768	78.7	60	75
5F	8	256/256K	640 X 480	25	31.5	60
5F	8	256/256K	640 X 480	31.5	37.5	75
60*	8	256/256K (interlaced)	1024 X 768	44.9	35.5	87
60*	8	256/256K	1024 X 768	65	48.3	60
60*	8	256/256K	1024 X 768	75	56	70
60*	8	256/256K	1024 X 768	78.7	60	75
64*	16	64K	640 X 480	25	31.5	60
64*	16	64K	640 X 480	31.5	37.5	75
65*	16	64K	800 X 600	36	35.2	56
65*	16	64K	800 X 600	40	37.8	60
65*	16	64K	800 X 600	49.5	46.9	75
66*	16	32K Direct/256 Mixed	640 X 480	25	31.5	60
66*	16	32K Direct/256 Mixed	640 X 480	31.5	37.5	75
67*	16	32K Direct/256 Mixed	800 X 600	40	37.8	60
67*	16	32K Direct/256 Mixed	800 X 600	49.5	46.9	75
6C*	16	16/256K (interlaced)	1280 X 1024	75	48	87

* Requires 1 MB video memory.

SCSI Controllers

The system board includes two wide/fast-20 SCSI controller chips integrated as PCI bus masters. These controllers support:

- An 8-bit (narrow SCSI) data path at a data transfer rate of 20 MB/sec.

- A 16-bit (wide SCSI) data path at a data transfer rate of 40 MB/sec.

- Data transfer rates of 133 MB/sec as PCI bus masters.

- The connection of a maximum of seven 8-bit narrow SCSI devices to each controller.

- The connection of a mixture of up to fifteen 16-bit wide and/or 8-bit narrow SCSI devices to each controller (maximum of seven 8-bit narrow devices).

The system board also includes a narrow SCSI controller integrated as a PCI bus master. You can connect a maximum of seven narrow SCSI devices to this controller.

The SCSI controllers provide active negation outputs, controls for external differential transceivers, and a disk activity output. Active negation outputs reduce the chance of data errors by actively driving both polarities of the SCSI bus and avoiding indeterminate voltage levels and common-mode noise on long cable runs. The SCSI output drivers can directly drive a 48 milliampere (mA), single-ended SCSI bus with no additional drivers.

IDE Controller

The PIIX4 multifunction device on the system board acts as a PCI-based Fast IDE controller that supports

- PIO and IDE DMA/bus master operations

- Mode 4 timings

- Transfer rates up to 32 MB/sec

- Buffering for PCI/IDE burst transfers

- Master/slave IDE mode

Server Management

During normal operation, server management receives information about server status and monitors power supply voltages and operating temperature. If server management software determines that the server is not operating within specified limits, the software attempts to notify a supervisor or an administrator of the server's condition. Server management features are implemented with the following system board microcontrollers.

Baseboard Management Controller (BMC) does the following:

- Monitors the processor power supply voltage levels
- Monitors then processor thermal trip and internal error signals
- Monitors the fan sensors
- Manages two I²C thermal sensors located near each processor
- Manages fault resilient booting (FRB) that controls the ability to boot the server using either processor in the event of a catastrophic processor failure

Front Panel Processor (FPP) on the system board does the following:

- Manages power, reset, and front panel NMI buttons
- Monitors all power control sources on the front panel, server manager module, PIIX4, and RTC power control signals

An EEROM associated with the system board temperature sensor contains the following:

- Chassis ID
- System board ID
- Power state
- System board temperature
- Intrusion detection during both power on and off conditions

Pentium® II Processor

The system board has two connectors for Pentium II processors. The secondary processor requires a plug-in DC to DC converter on the system board to provide power to the processor.

In a symmetric multiprocessor (SMP) environment, all processors are equal and have no preassigned tasks. Distributing the processing loads between both processors increases system performance. This is particularly useful when application demand is low and the I/O request load is high. In an SMP environment, both processors share a common bus, the same interrupt structure, and access to common memory and I/O channels. The SMP implementation conforms to the Multiprocessor Specification Version 1.4.

Memory Module

The memory module has eight DIMM sockets. The module supports from 16 MB to 1 GB of extended data out (EDO) ECC memory 3.3 V 60 ns DRAMs, mounted on JEDEC DIMMs. You may install mixed sizes and types of DRAM DIMMS in the eight memory banks; however, their speeds must be the same. The BIOS automatically detects and initializes the memory array.

ECC memory detects and corrects single-bit errors from DRAM in real time, allowing your system to function normally. It detects all double-bit errors but does not correct them; it also detects all three-bit and four-bit adjacent errors in a DRAM *nibble* but does not correct them. When one of these multiple-bit errors occurs, the PAC generates an SERR (system error) that usually halts the system. ECC is calculated on a 64 bit wide memory basis.

System Configuration Options

Base System Configuration

- System board assembly

- Base system chassis

  The electro-galvanized metal chassis minimizes electromagnetic interference (EMI) and radio frequency interference (RFI). It contains:

  — Three power supply bays with one 360 watt power supply installed

  — One vertical drive bay that contains a diskette drive

  — Three standard 5.25-inch drive bays (a CD-ROM drive is installed in the top bay)

  — Two bays each with space for five 3.5-inch SCSI hard disk drives (a SCSI backplane is installed in the top bay)

  — Nine I/O expansion slot covers

  — Two blowers for cooling the processor modules

  — Two cooling fans

  — One control panel

- Uni Processor Kit

  — Choice of 266MHz or 300MHz processor

  — Heat sink assembly

  — Dual processor retention mechanism

- Processor termination card

- Memory Module (either an EDO or SDRAM module)

System Upgrade Options

The system upgrade options provide enhancement to the capabilities of the base system. These options do not include memory and peripheral upgrades.

- Dual Processor upgrade:

  Upgrade from a single processor system to dual processor system. You **must** use processors running at the same frequency. This upgrade kit comes with heat sink assembled processor and VRM. Choose between a 266 MHz or 300 MHz processor.

- Power supply upgrade:

  The system can contain three power supplies. A second power supply provides additional power or acts as an redundant power supply, depending on the system configuration. The powershare upgrade kit is not required to upgrade from two power supplies to three power supplies.

  — 360 W power supply

  — Powershare upgrade kit

- SCSI backplane upgrade:

  The SCSI backplane upgrade allows you to use up to 10 hot-swap drives.

- Rack adapter kit:

  The chassis can be mounted into rack with the rack adapter kit.

- Embedded RAID (RPX board):

  This upgrade provides low cost I2O or non-I2O RAID. This RAID solution uses the on board dual ultra SCSI channels. The kit includes an RPX board and the required RAID software. SIMMs for the RPX board are not included.

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Installing The System 2

This chapter tells how to

- Select a site

- Install the Pentium II processor

- Install the memory module

- Set the line voltage selector switch and check the power cord(s)

- Connect input and output devices

- Turn on the server and create installation diskettes from the Configuration Software CD

- Run PC Diagnostics (Testview)

- Exit to DOS

Selecting a Site

The server operates reliably within the specified environmental limits (see page 41). Choose a site that is

- near a grounded, three-pronged power outlet

  a. In the United States and Canada, this means a NEMA 5-15R outlet for 100-120 VAC or a NEMA 6-15R outlet for 200-240 VAC.

  b. For international sites, this means a three-pronged power outlet applicable for the electrical code of the region.

⚠ **CAUTION**
Ensure that the power service connection is through a properly grounded outlet.

- clean and dust-free

- well ventilated and away from sources of heat

- spacious enough to provide sufficient room behind and around the server so that you can remove AC power from it by unplugging the power cord from each power supply or wall outlet

⟹ **Note**
For cooling, airflow, and access to the server, allow about 31 centimeters (12.2 inches) of clearance in back, 60 centimeters (23.6 inches) on each side, and 22 centimeters (9 inches) in front.

- isolated from strong electromagnetic fields and electrical noise caused by electrical devices—such as air conditioners, large fans, large electric motors, radio and TV transmitters, and high frequency security devices

- away from sources of vibration or physical shock

Physical Specifications

Height	51.44 cm (20.25 inches)
Width	43.56 cm (17.15 inches)
Depth	51.13 cm (20.13 inches)
Weight	29 kg (63 lbs.) minimum configuration
	44 kg (97 lbs.) maximum configuration

Environmental Specifications

Temperature	
Nonoperating	−40° to 70 °C (−40° to 158 °F)
Operating	5° to 35 °C (41° to 95 °F); derated 0.5 °C for every 1000 ft (305 m)
Humidity	
Operating wet bulb	Not to exceed 33 °C (91.4 °F) (with diskette drive or hard disk drive)
Nonoperating	95% relative humidity (noncondensing) at 55 °C (131 °F)
Operating	85% relative humidity (noncondensing) at 35 °C (95 °F)
Shock	
Nonoperating	20 g, 11 msec, 1/2 sine
Operating	2.0 g, 11 msec, 1/2 sine
Altitude	
Nonoperating	To 50,000 ft (15,240 m)
Operating	To 10,000 ft (3,048 m)
Acoustic noise	Typically <45 dBA at 18° to 24 °C (65° to 75 °F) with five internal hard disk drives (measured at 1 meter from the system with the peripherals idle). The noise of the variable-speed system fan will increase with temperature and power load. Your selection of peripherals may change the noise level.
Electrostatic discharge (ESD)	Tested to 20 kilovolts (kV), no component damage. (CD-ROM drive tested to 15 kV, manufacturer's specification.)
AC Input Power	Single power supply, fully loaded
115 VAC	100 to 120 VAC, 7.7 A, 50/60 Hz
230 VAC	200 to 240 VAC, 4.4 A, 50/60 Hz

After Unpacking the Server

Inspect the shipping box for evidence of mishandling during transit. If the shipping box is damaged, photograph it for reference. After removing the contents, keep the damaged box and the packing materials. If the contents appear damaged, file a damage claim with the carrier immediately.

> ⚠ **WARNING**
> **The minimum server configuration weighs 29 kg (63 lbs.) and the maximum one weighs 44 kg (97 lbs.). To avoid personal injury, have someone help you move the server.**

Save the shipping boxes and packing materials to repackage the server in the event you decide to move it to another site.

Installing the Pentium II Processor

The server is shipped without the processor module installed on the system board. Turn to Chapter 4, "Working Inside Your System," and follow the instructions for installing the processor module. Before you install the module in your server, observe the warnings and cautions provided for your safety on page 3, "Safety Guidelines."

Installing the Memory Module

The server is shipped without the memory module installed on the system board. Turn to Chapter 4, "Working Inside Your System," and follow the instructions for installing the memory module. Before you install the module in your server, observe the warnings and cautions provided for your safety on page 3, "Safety Guidelines."

Connecting Peripheral Devices

If your system normally operates without a monitor or keyboard—for example, as a network server—you must install them to configure the system. You may remove them after running the SCU. For information about running this utility, see Chapter 3, "Configuring The System,".

Connect your keyboard, mouse, monitor, and other peripheral devices after installing all internal options and replacing the side cover. See Figure 2-1.

Warnings and Cautions

Before connecting peripheral devices to the server, observe the warnings and cautions provided for your safety on page 3, "Safety Guidelines." Server integration should be done by a qualified technical person.

Keyboard

Insert the cable connector of a PS/2-compatible keyboard into the 6-pin miniature Deutsche Industrie Norm (DIN) connector on the system back panel. The keyboard port is overcurrent-protected by a 1-ampere positive temperature coefficient (PTC) resistor.

Mouse

Insert the cable connector of a PS/2-compatible mouse into the 6-pin miniature DIN connector on the system back panel. The mouse port is overcurrent-protected by a 1-ampere PTC resistor.

Monitor

Insert the cable connector of the video monitor into the 15-pin connector of the Super VGA port on the system back panel.

Other Devices

Connect other external peripheral devices—for example, a printer and an external modem—by following the instructions in the documentation included with the device. Besides the keyboard, mouse, and monitor ports, the back panel also provides two serial ports, and a parallel port.
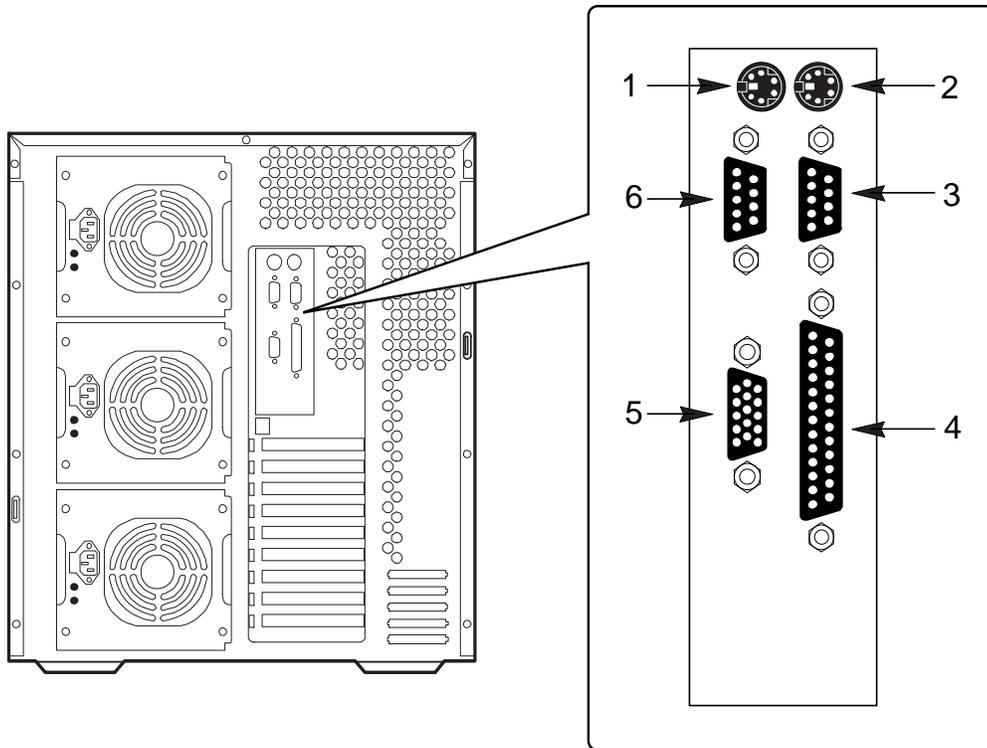
OM05779A

Figure 2-1. Server I/O Panel

1.   PS/2-compatible keyboard connector
2.   PS/2-compatible mouse connector
3.   PS/2-compatible serial port 1 (COM1) connector
4.   PS/2-compatible parallel port (LPT1) connector
5.   Super VGA connector
6.   PS/2-compatible serial port 2 (COM2) connector

Checking the Power Cord(s)

⚠ **WARNING**

Do not attempt to modify or use a supplied AC power cord if it is not the exact type required.

If a power cord supplied with the system is not compatible with the AC wall outlet in your region, get one that meets the following criteria:

• The cord must be rated for the available AC voltage and have a current rating that is at least 125% of the current rating of the system.

• The connector that plugs into the wall outlet must be a grounding-type male plug designed for use in your region. It must have certification marks showing certification by an agency acceptable in your region.

• The connector that plugs into the AC receptacle on the system power supply must be an IEC 320, sheet C13, type female connector.

• In Europe, the cord must be less than 4.5 meters (14.76 feet) long, and it must be flexible <HAR> (harmonized) or VDE certified cordage to comply with the system's safety certifications.

Turning on Your Server

⚠ **WARNINGS**

Ensure that the line voltage selector switch on each power supply is set to the correct line source voltage (see page 42). If the setting is incorrect, the power supply will be damaged when you plug the power cord into an AC outlet.

The *power button* on the front panel of the server *does not* turn off the AC power. To remove AC power from the server, you must unplug the AC power cord from each power supply or wall outlet.

1. Make sure all external devices, such as a monitor, keyboard, and mouse (optional) have been connected.

2. Remove drive protection cards (if present) from the diskette and tape drives.

3. Turn on your video monitor.

4. Plug the female end of each AC power cord into each input receptacle on the back of the chassis (your server may be configured with one, two, or three power supplies).

5. Plug the male end of the cord into a grounded, three-pronged power outlet. (Repeat for each power supply in the server.)

6. If the server doesn't come on when you plug it into the AC outlet, press the power button (Figure 2-2).

7. Verify that the power-on light on the front panel is lit. After a few seconds POST begins. See "Power-on Self-Test."

OM05780
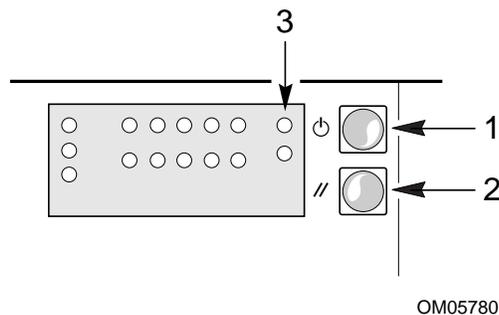
Figure 2-2. Power and Reset Buttons

1.   Power button
2.   Reset button
3.   Power-on light (LED)

Power-on Self-Test

Each time you turn on the server, the power LED on the front panel turns on and the power-on self-test (POST) starts running. It checks the system board, processor, memory, keyboard, and most installed peripheral devices.

During the memory test, the POST displays the amount of memory that it is able to access and test. Depending on the amount of memory installed on the memory module, it may take several minutes to complete the memory test.

Creating Installation Software Diskettes

1. Insert the Configuration Software CD in the CD-ROM Drive.

2. Reboot the system.

3. When POST completes, the server boots from the CD and displays the CD-ROM menu.

4. Follow the menu prompts to create the server configuration software diskettes.

❑ ❑ ❑

Configuring The System 3

This chapter tells how to run the configuration utilities and install video drivers.

Configuration Utilities

- **Symbios SCSI Utility** is used to configure/view the settings of the SCSI host adapters and devices in the system. See page 76.

- **System Configuration Utility (SCU)** is on the Configuration Software CD shipped with the system. See Chapter 2, "Installing The System," for instructions on creating an SCU diskette. See page 51.

- **BIOS Setup Utility** is stored in both flash memory and the battery-backed memory of the real-time clock (RTC) on the system board. See page 59.

If the diskette drive is disabled or improperly configured, use Setup to enable it so that you can run the SCU. If necessary, disable the drive after exiting the SCU. Information entered using the SCU overrides any entered using Setup.

Power-on Self-Test

⚠ **WARNING**
The power button on the front panel of the system *does not* turn off the AC power. To remove AC power from the system, you must unplug the AC power cord from each power supply or wall outlet.

Turn on the video monitor and system. After a few seconds the power-on self test (POST) begins.

Each time you turn on the system the power LED on the front panel turns on and the POST starts running. The POST checks the system board, processor, memory, keyboard, and most installed peripheral devices.

During the memory test, the POST displays the amount of memory that it is able to access and test. Depending on the amount installed on the memory module, the test may take several minutes to complete.

These screen prompts and messages appear after the memory test:

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

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

```
Press Ctrl C to start configuration Utility!
```

If you have installed SCSI devices in the system, press <Ctrl+C>. When the utility appears, follow the instructions on the monitor to configure the onboard SCSI host adapter settings and run the SCSI disk utilities. See "Using the Symbios SCSI Utility" on page 76.

When to Use the System Configuration Utility

The SCU lets you do the following:

- Add and remove boards

- Change the system configuration settings

- Save the system configuration

- View switch and jumper settings on the boards in the system

To install or remove an ISA add-in board in the system, you must run the SCU to reconfigure the system. Running the SCU is optional for a PCI add-in board.

The SCU is PCI-aware and complies with the ISA Plug and Play specifications. The SCU works with any compliant configuration (.CFG) or overlay (.OVL) files supplied by peripheral device manufacturer.

The system board comes with .CFG and .OVL files. The .CFG file describes the board's characteristics and the system resources that the board requires. The configuration registers on PCI and ISA Plug and Play add-in boards contain the same type of information that is in a .CFG file. However, some ISA add-in boards do come with a .CFG file.

The SCU uses the information provided by the .OVL and .CFG files, configuration registers, NVRAM, and the information that you enter, to specify a system configuration. It configures the system by writing the configuration information to flash memory.

The SCU stores most of the configuration values in the battery-maintained memory (NVRAM) of the real-time clock (RTC), and it stores the rest of the values in flash memory. These values take effect when you boot the system. The POST checks the values against the actual hardware configuration; if they do not agree, it generates an error message. You must then run the SCU to specify the correct configuration before the system boots.

The SCU always updates a checksum for both areas so that the BIOS can detect any potential data corruption before the actual hardware configuration takes place. If the data is corrupted, the BIOS requests that the user configure the system before it can boot.

Pressing <F1> on the keyboard, in response to the BIOS prompt during the POST, activates the BIOS Setup Utility.

How to start the SCU

Before you can run the SCU from a diskette, you must copy the SCU from the Configuration Software CD to a DOS bootable diskette. For instructions on creating an SCU diskette, see Chapter 2, "Installing The System."

1. Turn on the video display monitor and system.

2. There are three ways to start the SCU.

   - **After creating an SCU diskette from the CD:** Insert the System Configuration Utility Disk in drive A, and press the reset push-button switch or <Ctrl+Alt+Del> to reboot the system from the diskette.

   - **After installing the operating system:** Insert the System Configuration Utility Disk in drive A, and copy it to a directory on the hard drive. While in the directory, type **AMISCU** and press <Enter>.

   - **From diskette after installing the operating system:** Insert the System Configuration Utility Disk in drive A. At the MS-DOS† prompt, type **a:** and press <Enter> to change to drive A. Type **AMISCU** and press <Enter> to start the SCU.

   When you see this message:

   ```
   MS-DOS Startup Menu
   -------------------------------

   1.  Execute AMISCU
   2.  Execute AMISCU for system with PNP OS
   ```

   If the operating system in the system supports Plug and Play add-in boards, press <2> to start the SCU. If not, press <1> to start it.

3. When the SCU title appears on the screen, press <Enter> to continue.

4. From the main menu, press <↑> or <↓> to highlight an item and then press <Enter> to select it. If you are using a mouse, point to an item and double-click the left button to select it. Press <F1> at any time for help about a selection.

5. For information about setting up the system select "Step 1: About System Configuration" from the main menu.

System Board Settings Field Descriptions

Default values are in bold typeface.

Systems Group

System Identification and Version Information

Config and Overlay Version	Displays configuration and overlay version.
BIOS Version String	Displays BIOS version.
MP Spec. Version	**MP Spec V1.1** MP Spec V1.4

System Processor Modules

Processor 1	Pentium II Processor at XXXMHz (Display only).
Processor 2	Pentium II Processor at XXXMHz (Display only).

Memory Subsystem Group

Shadowing ISA ROMs Options

Shadowing ISA ROM at C8000	Enable **Disable**
Shadowing ISA ROM at CC000	Enable **Disable**
Shadowing ISA ROM at D0000	Enable **Disable**
Shadowing ISA ROM at D4000	Enable **Disable**
Shadowing ISA ROM at D8000	Enable **Disable**
Shadowing ISA ROM at DC000	Enable **Disable**

Extended Memory Options

Cache Mode	Disable **Enable**
Memory Gap Control	**Disable** Extended

On-Board Disk Controllers

On-Board Floppy Controller	**Enable - Primary** Enable - Secondary Disable
On-Board IDE Controller	**Enable** Disable

Onboard Communications Devices

Serial Port 1 Configuration	Port 1 Disable 3E8h - IRQ 4 3E8h - IRQ 3 **3F8h - IRQ 4** 3F8h - IRQ 3 2E8h - IRQ 4 2E8h - IRQ 3 2F8h - IRQ 4 2F8h - IRQ 3
Serial Port 2 Configuration	Port 2 Disable 3E8h - IRQ 4 3E8h - IRQ 3 3F8h - IRQ 4 3F8h - IRQ 3 2E8h - IRQ 4 2E8h - IRQ 3 2F8h - IRQ 4 **2F8h - IRQ 3**
Serial Port 2 Mode	**Port 2 Normal Mode** Port 2 IrDA† Mode Port 2 ASK-IR Mode

Parallel Port Configuration	Parallel Port Disable
	378h - IRQ 7
	278h - IRQ 7
	3BCh - IRQ 7
	378h - IRQ 5
	278h - IRQ 5
	3BCh - IRQ 5
Parallel Port Mode	Output Only Parallel Port
	Bi-directional Parallel Port
	Enhanced Parallel Printer Port
	Extended Capabilities Parallel Port, DMA 1
	Extended Capabilities Parallel Port, DMA 3

Floppy Drive Subsystems Group

Floppy drive A Options	**3.5-inch 1.44/1.25 MB drive**
	5.25-inch 360 KB drive
	5.25-inch 1.2 MB drive
	3.5-inch 720 KB drive
	3.5-inch 2.88 MB drive
	Disable or Not Installed
Floppy drive B Options	**Disable or Not Installed**
	5.25-inch 1.2 MB drive
	5.25-inch 360 KB drive
	3.5-inch 2.88 MB drive
	3.5-inch 1.44/1.25 MB drive
	3.5-inch 720 KB drive

IDE Subsystem Group

IDE Configuration – Primary Master

Configuration Selection	None
	User
	Auto
	CD

IDE Drive Options – Primary Master

If the Configuration Selection Field is set to Auto, the following fields can not be modified.

Multi-Sector Transfer	2 Sector/Block
	4 Sector/Block
	8 Sector/Block
	16 Sector/Block
	Disable
Translation Mode	**Standard CHS**
	Logical Block Addressing
Transfer Mode	**Standard**
	PIO 1
	PIO 2
	PIO 3
	PIO 4

IDE Configuration – Primary Slave

Configuration Selection	None
	User
	Auto
	CD

IDE Drive Options – Primary Slave

If the Configuration Selection Field is set to Auto, the following fields can not be modified.

Multi-Sector Transfer	2 Sector/Block
	4 Sector/Block
	8 Sector/Block
	16 Sector/Block
	Disable
Translation Mode	**Standard CHS**
	Logical Block Addressing
Transfer Mode	**Standard**
	PIO 1
	PIO 2
	PIO 3
	PIO 4

Multiboot Group

Boot Device Priority

IPL Devices   Diskette Drive
                                Hard Drive
                                Removable media
                                Any I2O drives
                                ATAPI CD-ROM Drive
                                Diagnostic Boot

BCV Devices   IDE drives
                                Other Bootable Device

KB and Mouse Subsystem Group

Typematic Speed   **30 CPS**
                                26 CPS
                                21 CPS
                                18 CPS
                                13 CPS
                                10 CPS
                                6 CPS
                                2 CPS

Typematic Delay   250 mS Delay
                                500 mS Delay
                                750 mS Delay
                                1000 mSec Delay

Mouse Control Option   **Mouse Enabled**
                                Mouse Disabled

Console Redirection

COM Port for Redirection   **Enable Redirection on Port 3F8h IRQ4**
                                Enable Redirection on Port 2F8h IRQ3
                                Enable Redirection on Port 3E8h IRQ3
                                Disable

Serial Port Baud Rate   **9600 Baud**
                                19.2K Baud
                                38.4K Baud
                                115.2K Baud

Hardware Flow Control	**None**
	CTS/RTS
	Xoff/Xon
	CTS/RTS + CD

| Select Terminal Type | **PC-ANSI** |
| | VT100 |

Security Subsystem

Administrative Password Option

| Password Menu | Enter Password XXXXX |
| | Verify Password XXXXX |

User Password Option

| Password Menu | Enter Password XXXXX |
| | Verify Password XXXXX |

Other Security Subsystem Options

| Hot Key Option | **Disable** |
| | Enable |

Lockout Timer	**Disable**
	1 Minute
	2 Minute
	5 Minute
	10 Minute
	20 Minute
	1 Hour
	2 Hour

| Secure Boot Mode | **Disable** |
| | Enable |

| Video Blanking | **Disable** |
| | Enable |

| Floppy Writes | **Disable** |
| | Enable |

SCSI ROM BIOS Options Group

Embedded SCSI Option ROM   **Enable**
Scan   Disable

Management Subsystem Group

System Management Mode   **Disable**
                           Enable

Event Logging   Disable
                           Enable

When to Run the BIOS Setup Utility

The Setup utility lets you change the system configuration defaults. It does not let you enter or change information about PCI or ISA add-in boards; you must use the SCU instead. Setup stores most of the configuration values in the battery-backed memory of the RTC; the rest of the values are stored in flash memory. The values take effect when you boot the system. The POST checks these values against the actual hardware configuration; if they do not agree, it generates an error message. You must then run Setup to specify the correct configuration.

You can run the Setup utility with or without an operating system being present.

Since values entered using the Setup utility are overwritten when you run the SCU, you should only run Setup under the following conditions:

- To enable the diskette drive

- If you do not have access to a diskette drive

- If you do no want to configure any ISA add-in boards in the system

Running the Setup Utility

Reset the system. When you see this message:

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

Press <F2> to run Setup.

Setup provides six major menus and nine submenus:

- Main Menu
    — Primary IDE Master Submenu
    — Primary IDE Slave Submenu
    — Keyboard Features Submenu
- Advanced Menu
    — PCI Configuration Submenu
    — Integrated Peripheral Configuration Submenu
- Security Menu

- Server Menu
  — System Management Submenu
  — Console Redirection Submenu
- Boot Menu
  — Boot Device Priority Submenu
  — Hard Drive Submenu
- Exit Menu

Use the following keys to navigate through the menus and submenus.

Press	To
F1	Get help about an item
ESC	Go back to a previous item
Enter	Select an item
↑	Return to a previous item
↓	Move to the next Item
← →	Select a major menu
F5	Load Setup defaults
F6	Return to previous values
F10	Save and exit Setup

Main Menu

Default values are in bold typeface, and autoconfigured values are shaded.

Feature	Option	Comments
System Time	Current Time	To change this field type the hour (this is a 24-hour clock), minutes, and seconds, each followed by <Enter>.
System Date	Current Date	To change this field type the month, day, and year, each followed by <Enter>.
Diskette A:	Disabled 360 KB 5¼" 1.2 MB 5¼" 720 KB 3½" **1.44/1.25 MB 3½"** 2.88 MB 3½"	
Diskette B:	**Disabled** 360 KB 5¼" 1.2 MB 5¼" 720 KB 3½" 1.44/1.25 MB 3½" 2.88 MB 3½"	
Primary IDE Master	Press <Enter>	See page 63, IDE Submenu.
Primary IDE Slave	Press <Enter>	See page 63, IDE Submenu.
Keyboard Features	Press <Enter>	See page 64, Keyboard Features Submenu.
Memory Cache	**Enabled** Disabled	
CPU Speed Setting	133 MHz **233 MHz** 266 MHz 300 MHz 333 MHz	To activate this field, see Chapter 8, "System Board Jumpers".
Language	**English (US)** German French Italian Spanish	

IDE Submenu

Feature	Option	Comments
Type	**Auto** None CD-ROM User	Use the <+> and <-> keys to cycle through the choices. Depending on the selection, some of the following fields will be visible.
Multi-Sector Transfers	**Disabled** 2 Sectors 4 Sectors 8 Sectors 16 Sectors	Determines the number of sectors per block for multiple sector transfers.
LBA Mode Control	**Disabled** Enabled	Disables/Enables Logical Block Access.
32 Bit I/O	**Disabled** Enabled	Disables/Enables 32-bit IDE data transfers.
Transfer Mode	**Standard** Fast PIO 1 Fast PIO2 Fast PIO3 Fast PIO4	Selects the method for moving data to/from the drive.
Cylinders	0	
Heads	0	
Sectors/Track	0	
Maximum Capacity	X MB	The system calculates this number from the cylinders, heads, and sectors/track numbers.

Keyboard Features Submenu

Feature	Option	Comments
Numlock	**Auto** On Off	Selects the state for NumLock at power on.
Key Click	**Disabled** Enabled	
Keyboard auto-repeat rate	**30/sec** 26.7/sec 21.8/sec 18.5/sec 13.3/sec 10/sec 6/sec 2/sec	
Keyboard auto-repeat delay	1/4 sec **1/2 sec** 3/4 sec 1 sec	

Advanced Menu

Feature	Option	Comments
Plug & Play OS	**No** Yes	Select Yes if you are booting a Plug and Play capable operating system.
Reset Configuration Data	**No** Yes	Select Yes if you want to clear the System Configuration Data during the next boot. Automatically reset to No during boot.
PCI Configuration	Press <Enter>	See page 66, PCI configuration Submenu.
Integrated Peripheral Configuration	Press <Enter>	See page 68, Integrated Peripheral Configuration Submenu.
Use Multiprocessor Specification	**1.1** 1.4	
Large Disk Access Mode	DOS Other	DOS - select DOS UNIX[†], Novell[†] NetWare[†], or other OS - select Other.
Enable Memory Gap	**Disabled** Extended	
Delay on Option ROMS	**Disabled** Enabled	
Clock control	**Enabled** Disabled	Enabled programs the clock drivers to optimum settings
IO processor	**Enabled** Disabled	Enables onboard IO processor (i960 RD)

PCI Configuration Submenu

Feature	Option	Comments
PCI Device, Embedded SCSI Devices	Press <Enter>	See page 67, Embedded SCSI Device Submenu
PCI Device, Slot #1	Press <Enter>	See page 68, PCI Device Submenu
PCI Device, Slot #2	Press <Enter>	See page 68, PCI Device Submenu
PCI Device, Slot #3	Press <Enter>	See page 68, PCI Device Submenu
PCI Device, Slot #4	Press <Enter>	See page 68, PCI Device Submenu
PCI Device, Slot #5	Press <Enter>	See page 68, PCI Device Submenu
PCI Device, Slot #6	Press <Enter>	See page 68, PCI Device Submenu
PCI Device, Slot #7	Press <Enter>	See page 68, PCI Device Submenu

Embedded SCSI Device Submenu

Feature	Option	Comments
Option ROM Scan	**Enabled** Disabled	
Narrow SCSI Latency Timer	Default 0020h **0040h** 0060h 0080h 00A0h 00C0h 00E0h	
Wide SCSI A Latency Timer	Default 0020h **0040h** 0060h 0080h 00A0h 00C0h 00E0h	
Wide SCSI B Latency Timer	Default 0020h **0040h** 0060h 0080h 00A0h 00C0h 00E0h	

PCI Device Submenu

Feature	Option	Comments
Option ROM Scan	**Enabled** Disabled	
Enable Master	Disabled **Enabled**	
Wide SCSI A Latency Timer	Default 0020h **0040h** 0060h 0080h 00A0h 00C0h 00E0h	

Integrated Peripherals Submenu

Feature	Option	Comments
Serial port A	Disabled **Enabled** Auto PnP OS	
Serial port A: Base I/O address	**3F8** 2F8 3E8 2E8	
Serial port A: Interrupt	IRQ 3 **IRQ 4**	
Serial port B	Disabled **Enabled** Auto PnP OS	
Serial port B: Mode	**Normal** IrDA ASK-IR	

Chapter 3 Configuring The System

Integrated Peripherals Submenu (continued)

Feature	Option	Comments
Serial port B: Base I/O address	3F8 **2F8** 3E8 2E8	
Serial port B: Interrupt	**IRQ 3** IRQ 4	
Parallel port	Disabled **Enabled** Auto PnP OS	
Parallel port: Mode	Output only Bi-directional EPP **ECP**	
Parallel port: Base I/O address	**378** 278	
Parallel port: Interrupt	IRQ 5 **IRQ 7**	
Parallel port: DMA Channel	**DMA 1** DMA 3	
Floppy Disk Controller	Disabled **Enabled**	
Floppy Disk Controller: Base I/O address	**Primary** **Secondary**	

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Security Menu

Feature	Option	Comments
User Password is	Clear	When you enter a supervisor password, this field automatically changes to Set.
Administrator Password is	Clear	When you enter a user password, this field automatically changes to Set.
Set User Password	Press <Enter>	User password controls access to the system at boot. Password may be from one to seven characters. See page 71, Password Menu.
Set Administrative Password	Press <Enter>	Supervisor password controls access to the setup utility. Password may be from one to seven characters. See page 71, Password Menu.
Password On Boot	**Disabled** Enabled	Enabled requires password to boot the system. Password On Boot takes precedence over Secure Mode Boot.
Diskette Access	User **Administrator**	
Fixed Disk Boot Sector	**Normal** Write Protect	Write-protects hard disk boot sector to guard against viruses.
System Backup Reminder	**Disabled** Daily Weekly Monthly	
Virus Check Reminder	**Disabled** Daily Weekly Monthly	

Security Menu (continued)

Feature	Option	Comments
Secure Mode Timer	**Disabled** 1 min 2 min 5 min 10 min 20 min 1 hr 2 hr	Select the period of keyboard inactivity before securing the system.
Secure Mode Hot Key (CTRL-ALT-)		Enter a hot key. Press <CTRL + Alt> + <(hot key)> to place the system in the secure mode.
Secure Mode Boot	**Disabled** Enabled	Enabled lets the system boot before a password is required. However, the keyboard and mouse remain locked until the user password is entered.
Video Blanking	**Disable** Enable	
Floppy Write Protect	**Disabled** Enabled	

Password Submenu

Feature	Option	Comments
Enter New Password	(password field)	Type a password in this field, and press <Enter> or <Tab>. Press ESC to abort.
Confirm New Password	(confirm password field)	Type a password again, and press <Enter> or <Tab> to accept it. Press ESC to abort.

Server Menu

Feature	Option	Comments
System Management	Press <Enter>	See page 72, System Management Submenu.
Console Redirection	Press <Enter>	See page 73, Console Redirection Submenu.
PCI IRQs to IO-APIC mapping	**Disabled** Enabled	
Processor Retest	**No** Yes	Selecting Yes will cause the BIOS to clear the historical processor status and retest all processors on the next boot.

System Management Submenu

Feature	Option	Comments
System Management Mode	**Disabled** Enabled	Loads the embedded Server Management firmware.
System Event Logging	Disabled **Enabled**	When Enabled, system events will be logged by BIOS and the BMC.
Clear Event Log	**No** Yes	If set to yes, the event log will be cleared on the next boot.
Memory Scrubbing	**Disabled** Enabled	
PERR# Reporting	**Disabled** SMI Only SMI & NMI	
SERR# Reporting	**Disabled** Enabled	
Server Management Info	Press <Enter>	Displays board and firmware revision information.

Console Redirection Submenu

Feature	Option	Comments
COM Port Address	Disabled **3F8** 2F8 3E8	Uses the specified I/O port for console redirection.
IRQ #	4	Display only.
COM Port Baud Rate	**9600** 19.2 K 38.4 K 115.2 K	Uses the specified baud rate for console redirection. Cannot be set unless the COM Port Address field is set.
Flow Control	No Flow Control CTS/RTS XON/XOFF CTS/RTS + CD	Uses the specified flow control for console redirection. Cannot be set unless the COM Port Address field is set.

Boot Menu

Feature	Option	Comments
Floppy check	**Disabled** Enabled	If Enabled, the system verifies floppy type on boot. Disable results in a faster boot.
Summary screen	Disabled **Enabled**	Displays system configuration on boot.
Boot Device Priority	Press <Enter>	See page 74, Boot Device Priority Submenu.
Hard Drive	Press <Enter>	See page 74, Hard Drive Submenu.

Boot Device Priority Submenu

These options may change depending on the system configuration.

Feature	Option		Comments
	1	Diskette Drive	Select a device and use the <+> and <-> keys to move it up or down in the list.
	2	Hard Drive	
	3	ATAPI CD-ROM Drive	
	4	Diagnostic Boot	

Hard Drive Submenu

These options may change depending on the system configuration.

Feature	Option		Comments
	1	Hard Drive	Select a device and use the <+> and <-> keys to move it up or down in the list.
	2	Other Bootable Card	Other bootable cards covers all the boot devices that are not reported to the system BIOS. It may or may not be bootable, and may not correspond to any device.

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Exit Menu

Feature	Option	Comments
Exit Saving Changes	Press <Enter>	Saves the Setup data to CMOS, and exits the utility.
Exit Discarding Changes	Press <Enter>	Exits the utility without saving Setup data to CMOS.
Load Setup Defaults	Press <Enter>	Loads and displays the default Setup data.
Load Custom Defaults	Press <Enter>	Loads and displays settings from Custom Defaults.
Save Custom Defaults	Press <Enter>	Save the current settings to Custom Defaults.
Discard Changes	Press <Enter>	Loads the last values saved.
Save Changes	Press <Enter>	Saves the Setup data to CMOS without stopping the utility.

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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

1. When this message appears on the video monitor:

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

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

Hot Keys

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

To	Press these keys
Clear memory and reload the operating system—this is a soft boot reset.	<Ctrl+Alt+Del>
Secure the server system immediately.	<CTRL + Alt> + <(hot key)> (Set the hot-key with the SCU)

Installing Video Drivers

After you have configured the system, you can install various video drivers to take full advantage of its onboard, integrated Cirrus Logic CL-GD54M40 super VGA video controller's enhanced features. The system may not operate properly without these video drivers installed.

For the most current information on which video drivers you need, read the README.TXT file on the Display Drivers and DOS Utilities diskette. To install drivers from the diskettes, follow the installation instructions in the README.TXT file.

The video drivers are on the Configuration Software CD. For instructions on creating Video diskettes, see Chapter 2, "Installing The System."

To install these video drivers, do this:

1. Fully configure the system. (This may include adding video DRAM buffer memory, application software, or new ISA or PCI add-in boards.)

2. Insert disk 1 of the video drivers and utilities for MS-DOS and Windows[†] into drive A.

3. At the DOS command prompt, type **A:install** and press <Enter>.

4. Follow the directions on the monitor to install the video drivers.

If the system does not operate as described in this chapter, follow the instructions in Chapter 10, "Solving Problems."

Installing SCSI Drivers

The SCSI drivers are on the Configuration Software CD. For instructions on creating SCSI diskettes, see Chapter 2, "Installing The System." To install the SCSI drivers, follow the instructions in the README.TXT file on the first diskette.

☐ ☐ ☐

Working Inside Your System 4

This chapter tells how to install and remove major system components.

Preparation

Before opening your system, do the following:

- Turn the system off with the power button on the front panel and unplug the AC power cord(s).

- Turn off all peripheral devices connected to the system. Label and disconnect all peripheral cables attached to the I/O panel on the back of the system.

- If you installed a padlock, unlock and remove it.

Warnings and Cautions

Before you remove the covers, observe the warnings and cautions provided for your safety on page 3, "Safety Guidelines."

System integration should be done by technically qualified personnel.

Tools and Supplies You Need

- Phillips screwdriver (#2 bit)

- Antistatic wrist strap (recommended)

Equipment Log

Use the equipment log form provided in Appendix B, "Equipment Log," to record the model and serial numbers of the system, all installed options, and any other pertinent information specific to the system. You will need this information when running the SCU.

Covers

The system comes with the following removable covers:

- The left side cover provides access to the system board and fans.

- The right side cover provides access to the power supplies, power-sharing board, 3.5-inch vertical drive bay, 5.25-inch horizontal peripheral bays, and SCSI hot-docking backplanes.

- The top cover provides access to the front panel board. You must remove both side covers before you can remove the top cover.

- The plastic front cover provides access to the front of the chassis and the 5.25-inch horizontal peripheral bays. You must remove both side covers and the top cover before you can remove the front cover.

- The snap-in plastic peripheral bay cover provides access to the 5.25-inch horizontal peripheral bays without the need to remove other covers.

⚠ **CAUTION**
For proper cooling and airflow, do not operate the system with the covers removed. Always replace them before turning on the system.

Removing a Side Cover

The side covers are interchangeable. See Figure 4-1.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the three screws from the side cover, and save them.

3. Slide the cover backwards, about an inch, until it stops.

4. Pull the back end of the cover toward you to disengage its tabs from the slots in the chassis. Set the cover aside.
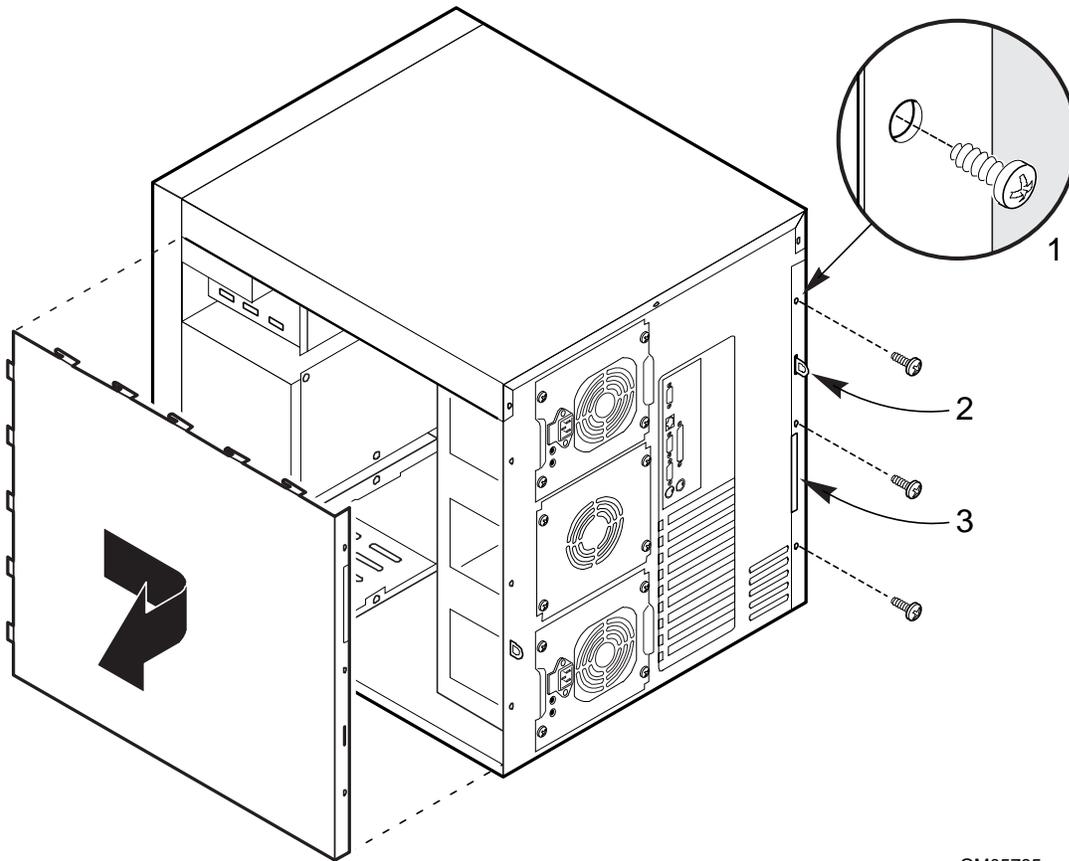
OM05785

Figure 4-1. Side Covers

1   Retaining screw
2   Metal loop (for padlock)
3   Built-in handle

Replacing a Side Cover

The identical side covers can be installed on either side of the system. See Figure 4-1.

1. Before replacing the side cover, make sure you did not leave any tools or loose parts inside the chassis.

2. Ensure that add-in boards are firmly seated in their respective slots, retaining brackets are firmly secured with screws tightened to 6.0 inch-pounds, and interior cables are properly connected.

3. Position the side cover over the chassis so that the metal tabs across the top and bottom edges of the cover align with the slots in the top cover and bottom edge of the chassis. Slide the cover toward the front of the system so that the tabs along the front edge of the cover firmly engage in the front slots of the chassis.

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⚠ **CAUTION**

When you replace the side cover, be careful not to damage the EMI gaskets mounted on the cover and chassis. If necessary, replace any damaged gaskets.

4. Attach the cover to the chassis with the three screws you removed earlier, and tighten them firmly (6.0 inch-pounds).

5. For security, and to prevent unauthorized entry into the system, insert a padlock through the metal loop protruding through the slot in the back of the side cover and lock it.

6. Connect all external cables and the power cord(s) to the system.

Removing the Top Cover

See Figure 4-2.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove both side covers and set them aside (page 80).

3. Remove the three screws from the top cover, and set them aside.

4. Slide the cover backwards until the tabs along the front of the cover disengage from the slots in the chassis.

5. Lift the cover off and set aside.

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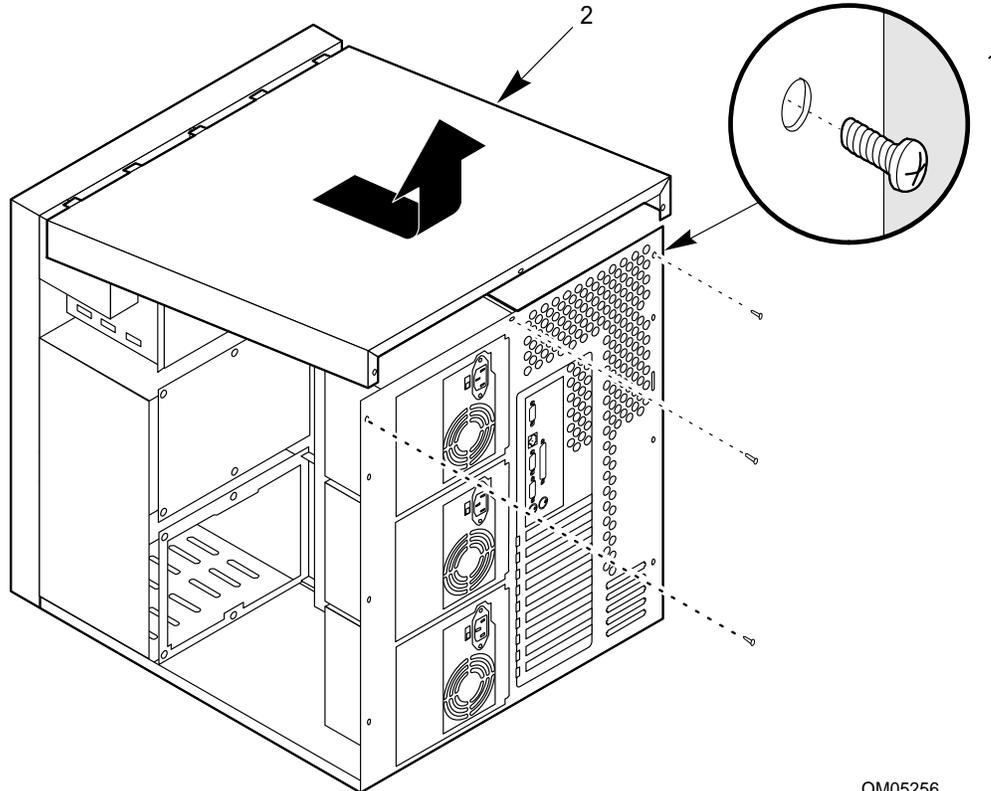
Figure 4-2. Top Cover

1   Screw
2   Top cover

Replacing the Top Cover

See Figure 4-2.

1. Before replacing the top cover, make sure you did not leave any tools or loose parts inside the chassis.

2. Ensure that interior cables are properly connected.

3. Position the top cover (Figure 4-2) over the chassis so that the tabs along the front of the cover align with the slots in the top edge of the chassis.

4. Slide the cover toward the front of the system so that the tabs firmly engage in the slots in the chassis.

5. Attach the cover to the chassis with the three screws you removed earlier, and tighten them firmly (6.0 inch-pounds).

6. Replace both side covers. Connect all external cables and power cords to the system.

Removing the Plastic Front Cover

See Figure 4-3.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove both side covers and the top cover, and set them aside (page 80).

3. Remove the two screws from the front cover, and save them.

4. Unsnap the front cover from the chassis, and place it on a smooth surface so that it doesn't get scratched.

Replacing the Plastic Front Cover

See Figure 4-3.

1. Insert the plastic T-shaped tabs on the bottom front cover into the T-shaped notches along bottom of the chassis. Then gently press the cover onto the chassis until all tabs snap into place.

2. Attach the front cover to the chassis with the two screws you removed earlier, and tighten them firmly (6.0 inch-pounds).

3. Replace the top cover and both side covers.

4. Connect all external cables and power cords to the system. (Some systems have more than one power cord.)
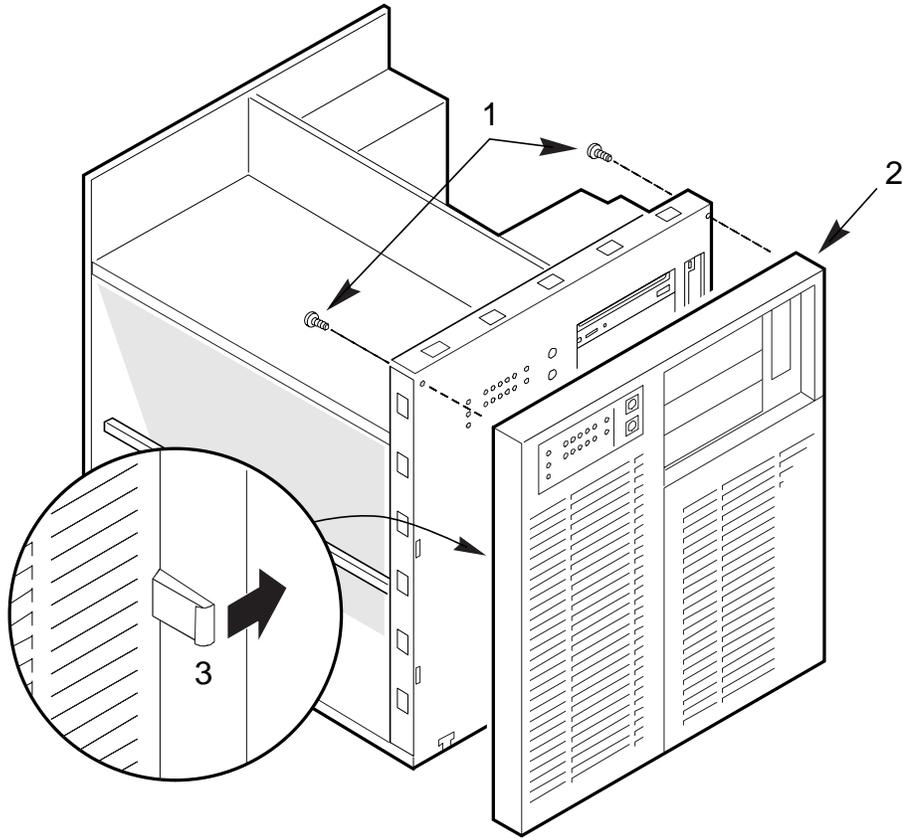
OM05786

Figure 4-3. Plastic Front Cover

1   Screw
2   Plastic front cover
3   Plastic tab

Removing the Snap-in Plastic Peripheral Bay Cover

See Figure 4-4.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the right side cover (when viewed from the front, see page 80).

3. To remove the snap-in plastic peripheral bay cover, push up on the bottom flexible tab below the 3.5-inch diskette drive. Then push the tab toward the front of the system until you can grasp the lower right corner of the cover.

⚠ **CAUTION**
Do not try to remove the snap-in peripheral bay cover by inserting a screwdriver or other tool in the notch on the left side of the cover. The cover may break.

4. Pull the lower right corner of the cover toward you with an upward twisting motion to disengage the top flexible tab.

5. Remove the snap-in peripheral bay cover from the system, and place it on a flat surface.
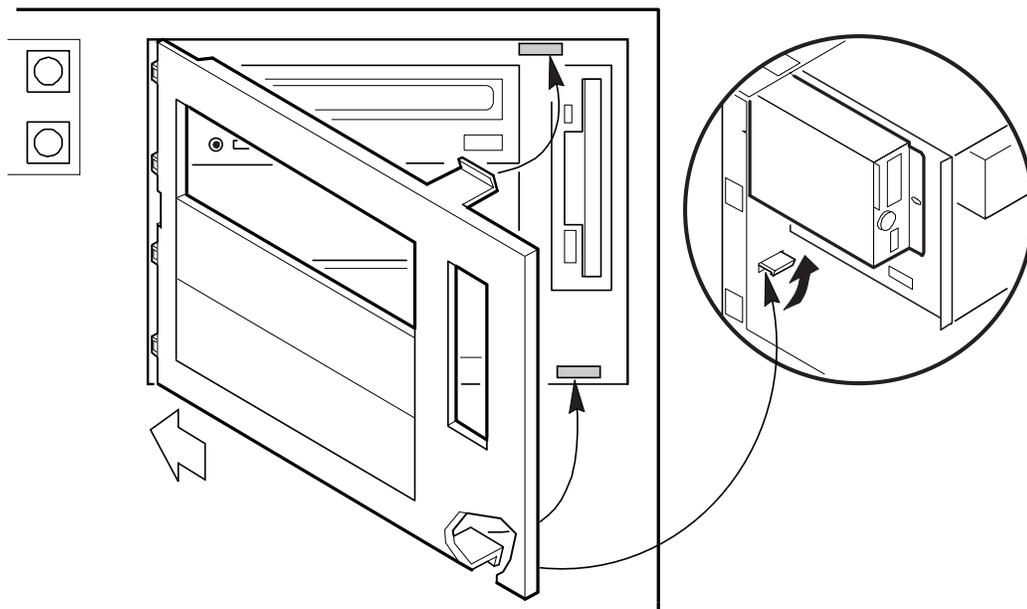
OM05778

Figure 4-4. Snap-in Plastic Peripheral Bay Cover

Replacing the Snap-in Plastic Peripheral Bay Cover

See Figure 4-4.

1. Insert the rigid tabs on the plastic snap-in peripheral bay cover into the notches along the inside edge of the plastic front panel.

2. Push the top right corner of the plastic cover toward the chassis with an inward twisting motion to insert the top flexible tab in the slot above the 3.5-inch diskette drive.

3. Gently press on the cover until both the top and bottom flexible tabs snap into place.

4. Replace the right side cover (page 81).

5. Connect all external cables and power cords to the system. (Some systems have more than one power cord.)

Board Set

The system board supports two processor modules, a memory module, and an RPX module.

⚠️ **CAUTION**
The Pentium II processor is be extremely sensitive to ESD and always requires careful handling. After removing the module from its protective wrapper or from the system board, place it heat sink side down on a nonconductive, static-free surface. Do not slide the module over any surface.

If you are upgrading a one-processor system with a second processor, you must install a voltage regulator and remove the termination board from the CPU1 slot.

Removing the Termination Board

See Figure 4-5.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover (page 80).

3. Press the latches on the Terminator Latching Assembly (TLA) inward.

4. Pull the TLA out of the module retention bracket.

5. Holding the terminator board by its top edge, carefully rock it back and forth until the edge connector pulls free.
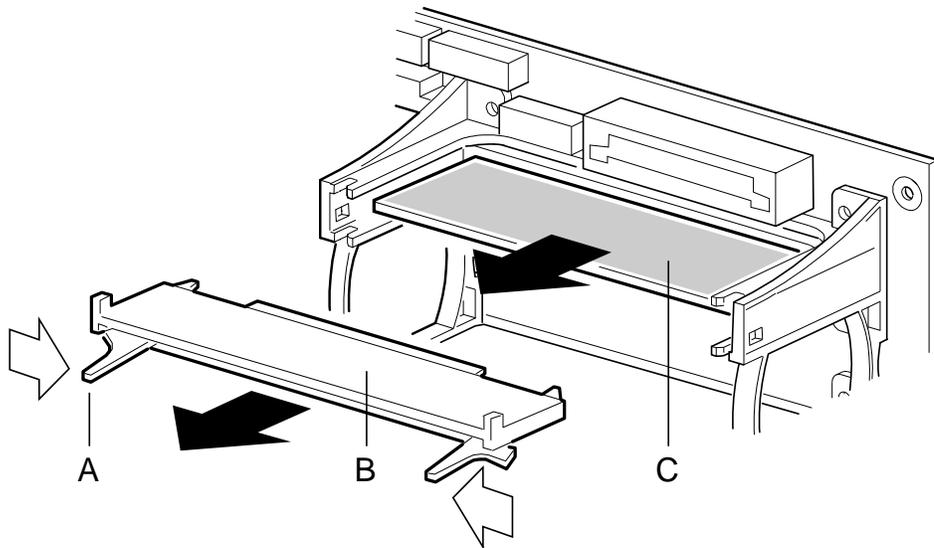
OM05773A

Figure 4-5. Removing a Termination Board

A   Latch
B   Terminator Latching Assembly
C   Terminator Board

Installing a Voltage Regulator Module

See Figure 4-6.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover (page 80).

3. Being careful not to touch the components or connector on the voltage regulator module, remove it from its protective wrapper and place it on a nonconductive, static-free surface.

4. Record the module ID information (may be a date code) in your equipment log.

5. Hold the module by its top edge or upper corners and firmly press it into the connector (Figure 4-6) on the system board until the lock tabs click into place.
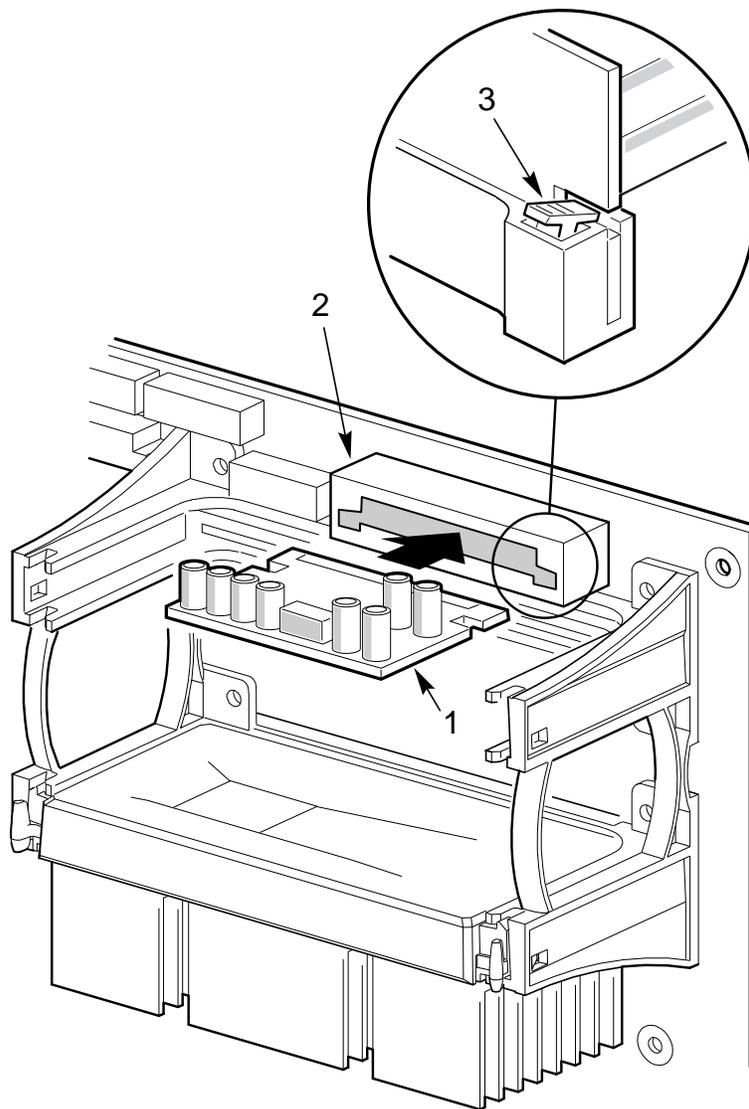
Figure 4-6. Installing a Voltage Regulator Module

1   Module
2   Connector
3   Lock Tab

Installing a Pentium II Processor

See Figure 4-7.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover (page 80).

3. Being careful not to touch the components or gold edge connectors on the processor module, remove it from its protective wrapper and place it heat-sink side down on a nonconductive, static-free surface.

4. Record the module serial number in your equipment log.

5. Press the locking tabs inward until they remain retracted.

6. Hold the module by its top edge or upper corners, and firmly press it into the connector (Figure 4-7) on the system board. Press the locking tabs outward so they engage the support bracket.

CPU1

CPU0

OM05775
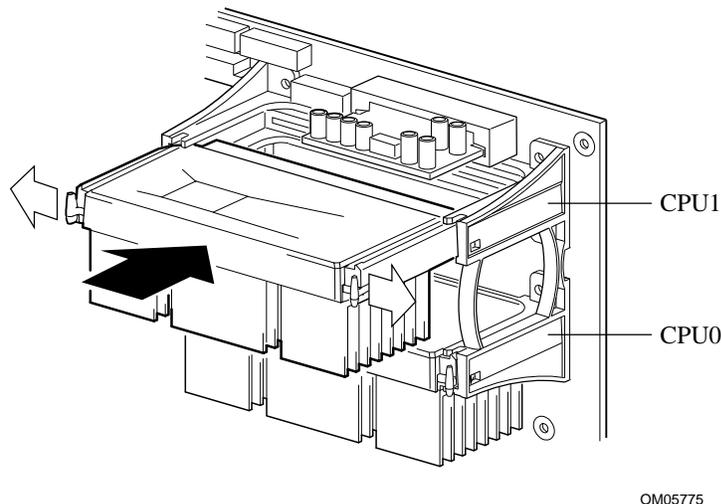
Figure 4-7. Installing a Pentium II Processor

7. Replace the left side cover (page 81).

8. Run the SCU to configure the system. For information about running the utility, see Chapter 3, "Configuring The System."

Removing a Pentium II Processor

See Figure 4-7.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover (page 80).

3. Squeeze the locking tabs and pull the module free from the connector.

4. Store the module in an antistatic protective wrapper, or place it processor-side up on a nonconductive, static-free surface.

Installing the Memory Module

See Figure 4-8.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover (page 80).

3. Remove the rail.

4. Being careful not to touch the components or gold edge connectors on the memory module, remove it from its protective wrapper and place it socket-side up on a nonconductive, static-free surface.

5. Record the module serial number in your equipment log.

6. Hold the module by its top edge or upper corners, and firmly press it into the connector (Figure 4-8) on the system board.

7. Install the rail.
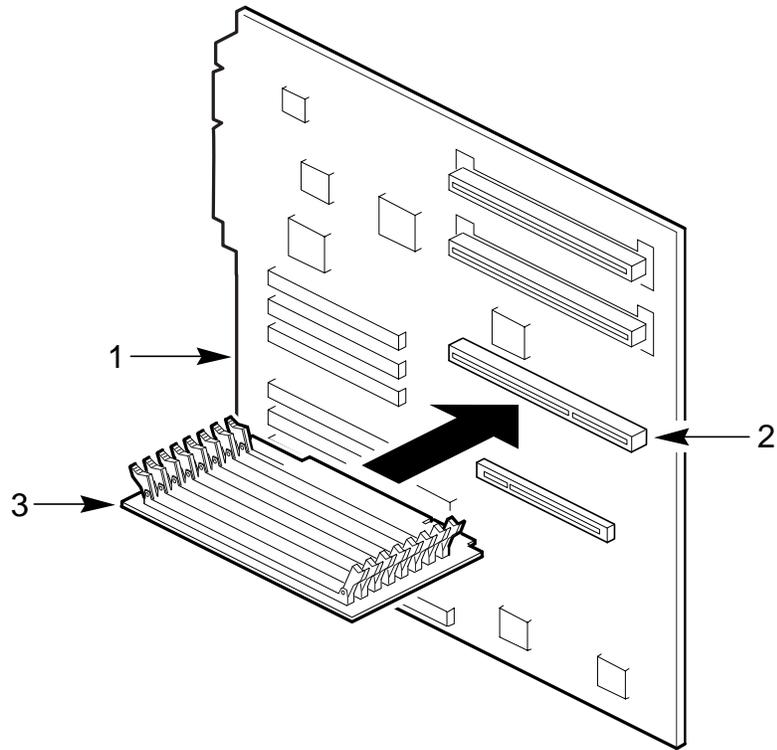
OM05760B

Figure 4-8. Installing the Memory Module

1	System board
2	Connector
3	Module

8. Run the SCU to configure the system. For information about running the utility, see Chapter 3, "Configuring The System."

Removing the Memory Module

See Figure 4-8.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover (page 80).

3. Remove the rail.

4. Holding the module by its top edge or upper corners, carefully rock it back and forth until the edge connector pulls free.

5. Store the module in an antistatic protective wrapper, or place it Socket side up on a nonconductive, static-free surface.

6. Install the rail.

Installing the RPX Module

See Figure 4-9.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover (page 80).

3. Remove the RPX rail.

4. Being careful not to touch the components or gold edge connectors on the RPX module, remove it from its protective wrapper and place it component side up on a nonconductive, static-free surface.

5. Record the module serial number in your equipment log.

6. Plug in the RPX battery.

7. Hold the module by its top edge or upper corners, and firmly press it into the connector (Figure 4-9) on the system board.

8. Install the rail.
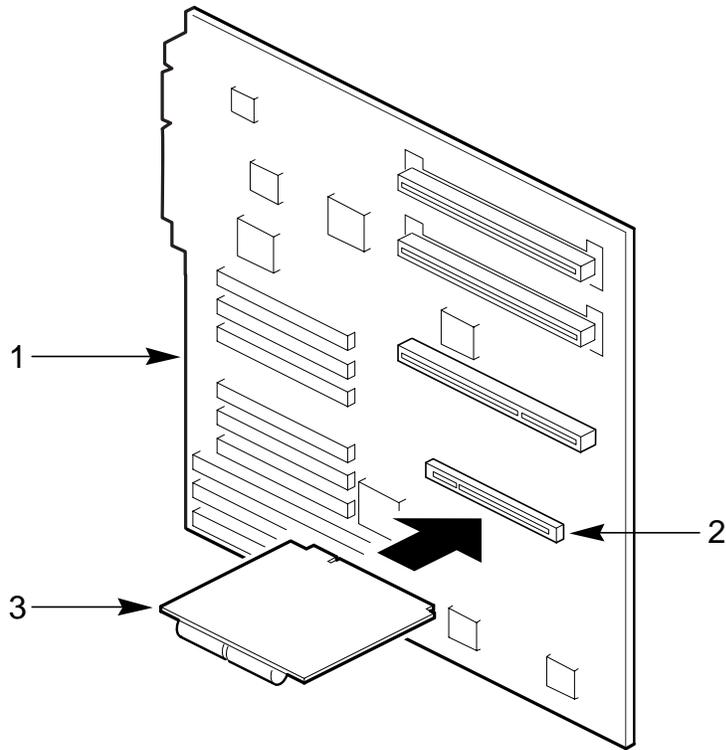
OM05760A

Figure 4-9. Installing the RPX Module

1   System board
2   Connector
3   Module

9.   Run the SCU to configure the system. For information about running the utility, see Chapter 3, "Configuring The System."

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Removing the RPX Module

See Figure 4-9.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover (page 80).

3. Remove the RPX rail.

4. Holding the module by its top edge or upper corners, carefully rock it back and forth until the edge connector pulls free.

5. Unplug the RPX battery.

6. Store the module in an antistatic protective wrapper, or place it component side up on a nonconductive, static-free surface.

7. Install the rail.

Add-in Boards

The system board provides seven PCI bus master slots and three ISA bus master slots. They accept any add-in PCI and ISA boards. One PCI connector shares a common chassis I/O expansion slot with an ISA connector; you can use either PCI slot or ISA in the slot, but not both.

⚠ **CAUTIONS**

Do not overload the system board by installing add-in boards that draw excessive current. For expansion slot current limitations, see Chapter 7, "Power System."

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 system board, place it component-side up on a nonconductive, static-free surface. Do not slide the board over any surface.

➡ **Note**

If you are installing or removing an ISA add-in board, you must run the SCU to reconfigure the system. Running the SCU is optional for a PCI add-in board.

Installing an Add-in Board

See Figures 4-10, 4-11, and 4-12.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover (page 80).

3. Remove and save the expansion slot screw and cover.
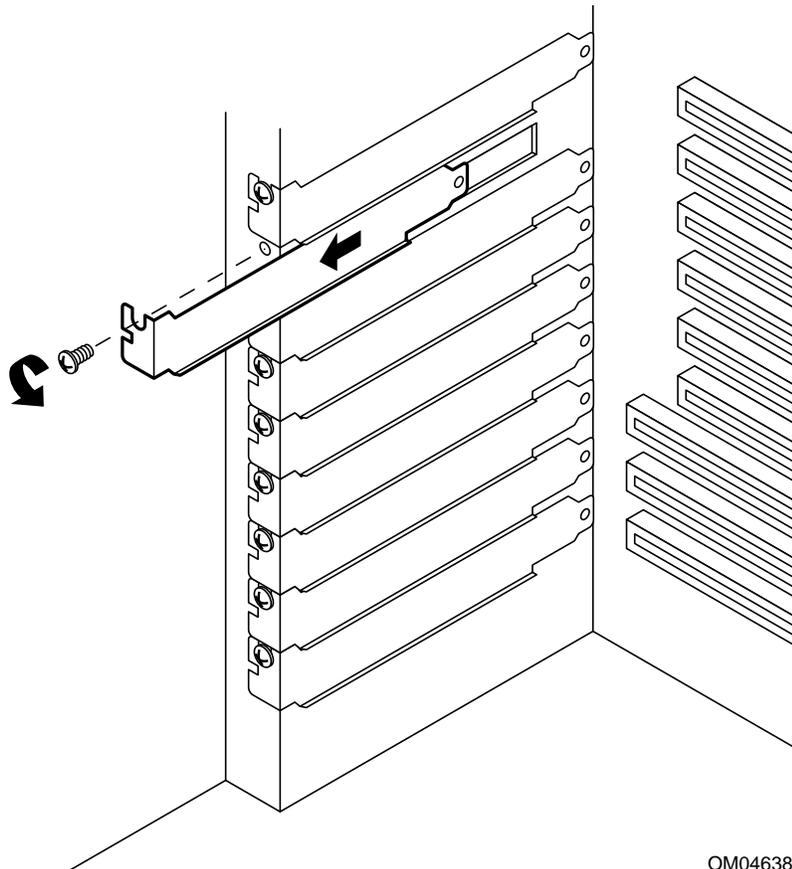
OM04638

Figure 4-10. Expansion Slot Cover

4. Being careful not to touch the components or gold edge connectors on the board, remove it from its protective wrapper and place it component-side up on a nonconductive, antistatic surface.

5. Record the board serial number in your equipment log.

6. Set any jumpers or switches according to the board manufacturer's instructions.

7. Hold the board by its top edge or upper corners, and firmly press it into an expansion slot on the system board (Figure 4-11 or Figure 4-12). The tapered foot of the board retaining bracket must fit into the mating slot in the expansion slot frame.

8. Align the rounded notch in the retaining bracket with the threaded hole in the expansion slot frame. The retaining bracket fits into the space that was occupied by the slot cover.

9. Insert the screw you removed earlier, and push the rounded notch up against the screw. Tighten the screw firmly (6.0 inch-pounds) to prevent the bracket from interfering with an adjacent one.

10. Replace the left side cover (page 81).

11. If you installed an ISA add-in board, run the SCU to reconfigure the system. Running the SCU is optional for a PCI add-in board. For information about running this utility, see Chapter 3, "Configuring The System."
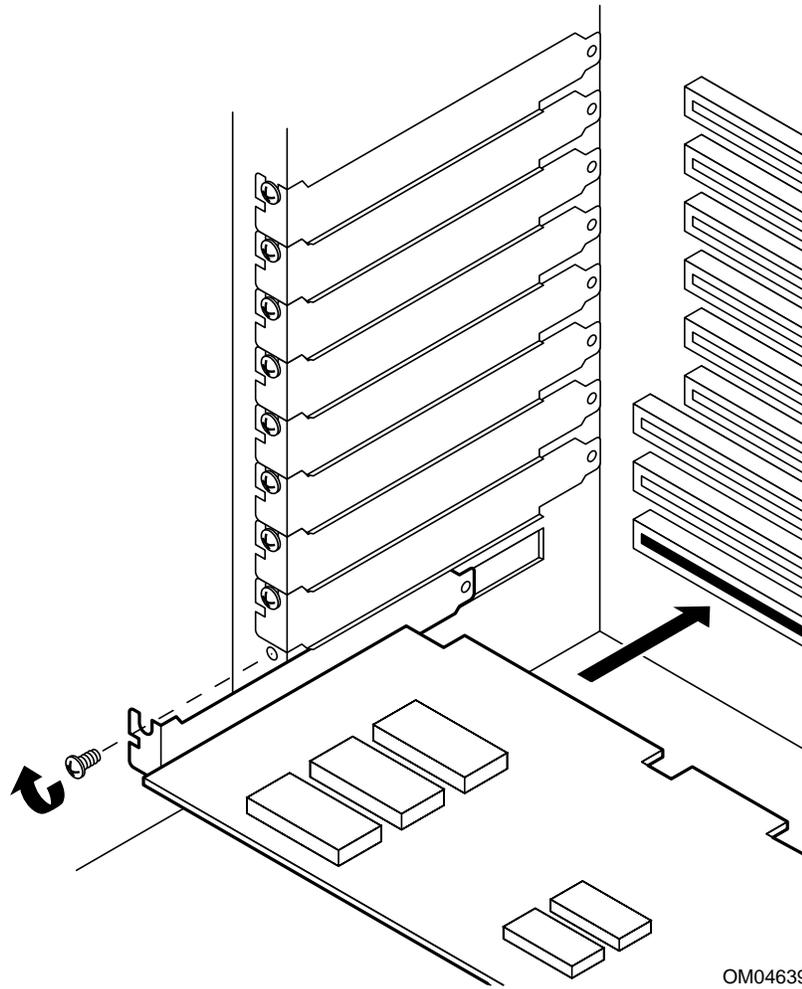
OM04639

Figure 4-11. Installing an ISA Add-in Board, Component-side Up
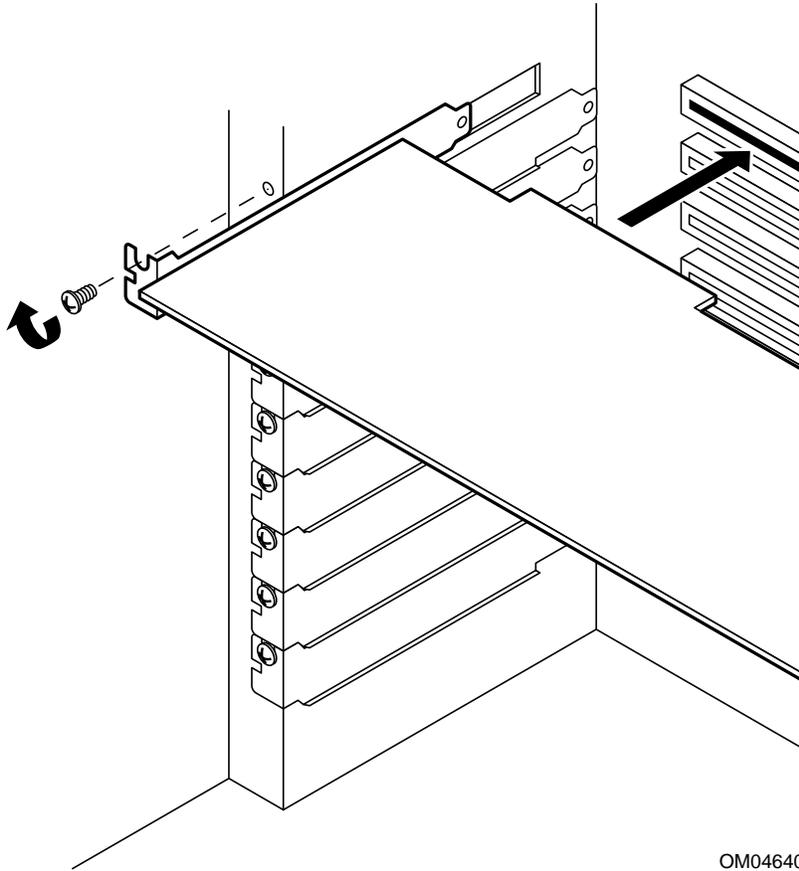
OM04640

Figure 4-12. Installing a PCI Add-in Board, Component-side Down

Removing an Add-in Board

⚠ **CAUTION**

Expansion slot covers must be installed on all vacant slots to maintain the electromagnetic emissions characteristics of the system and to ensure proper cooling of the system components.

See Figures 4-10, 4-11, and 4-12.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the side cover (page 80).

3. Disconnect any cables attached to the board you are removing.

4. Remove and save the add-in board retaining bracket screw.

5. Holding the board by its top edge or upper corners, carefully rock it back and forth until the edge connector pulls free. Make sure that you do not scrape the board against other components.

6. Store the board in an antistatic protective wrapper.

7. Install an expansion slot cover (Figure 4-10) over the vacant slot. The tapered foot of the cover must fit into the mating slot in the bottom of the expansion slot frame.

8. Insert the screw you removed earlier, and push the rounded notch up against the screw. Tighten the screw firmly (6.0 inch-pounds) to prevent the bracket from interfering with an adjacent one.

9. Replace the side cover (page 81).

10. If you removed an ISA add-in board, run the SCU to configure the system. For information about running this utility, see Chapter 3, "Configuring The System."

Diskette Drive

The system comes with a 3.5-inch diskette drive installed in the vertical 3.5-inch peripheral bay.

Contact your sales representative or dealer for a list of approved add-in peripheral devices.

Removing the Diskette Drive

See Figures 4-13 and 4-14.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the right side cover (page 80).

3. Disconnect the power and signal cables from the diskette drive.

4. Remove the screw that secures the drive and carrier assembly to the chassis, and set it aside.

5. Slide the assembly toward the top power supply to disengage the tabs from the slots in the chassis wall.

6. Remove the assembly from the chassis, and place it bracket-side up on an antistatic surface.
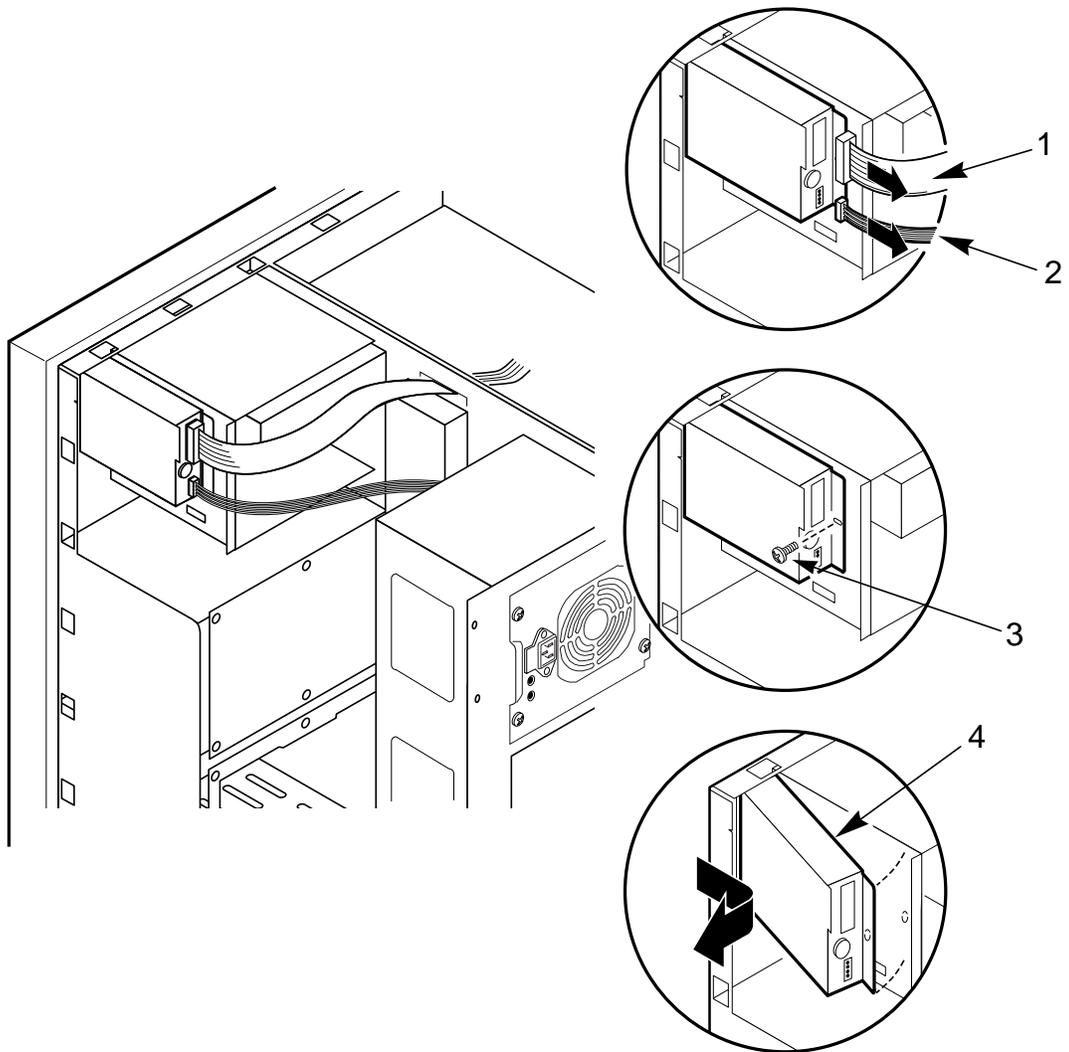
OM05769

Figure 4-13. Removing the Diskette Drive

1   Signal cable
2   Power cable
3   Screw
4   Drive and carrier assembly

7. Remove the three screws, and set them and the drive carrier aside. See Figure 4-14.

8. Place the drive in an antistatic protective wrapper.

9. Replace the right side cover (page 81).
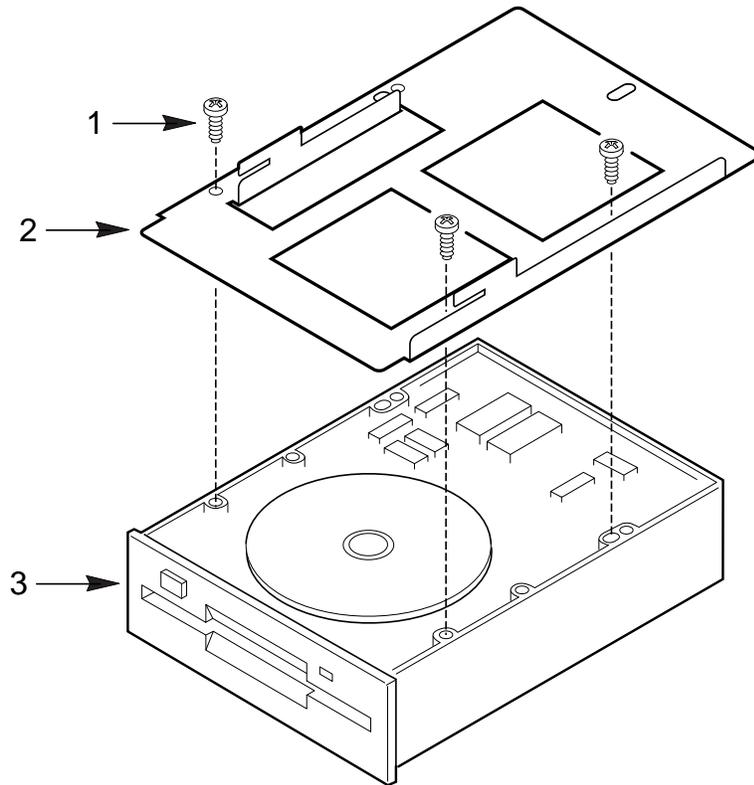
OM05791

Figure 4-14. Diskette Drive and Carrier Assembly

1 Screw
2 Carrier
3 Diskette drive

Installing a Diskette Drive

See Figures 4-13 and 4-14.

1. Remove the 3.5-inch diskette drive from its protective wrapper, and place it component-side up on an antistatic surface.

2. Record the drive model and serial number in your equipment log.

3. Set any jumpers or switches according to the drive manufacturer's instructions.

4. Place the drive carrier on the component-side of the drive, and align the three mounting holes.

5. Attach the carrier to the drive with three screws of the appropriate size and length (not supplied), and tighten the screws firmly (between 4.0 and 6.0 inch-pounds).

6. Position the drive and carrier assembly over the slots in the chassis wall, and slide the assembly toward the front of the system to engage its tabs in the slots.

7. Secure the drive and carrier assembly to the chassis wall with the screw you removed earlier; tighten the screw firmly (6.0 inch-pounds).

8. Connect the signal and power cables to the diskette drive. The red stripe on the signal cable must face toward the center of the drive.

9. Replace the right side cover (page 81).

10. Run the SCU to specify that the diskette drive is installed in the system. For information about running this utility, see Chapter 3, "Configuring The System."

5.25-inch Peripherals

The system comes with an IDE CD-ROM drive installed in the top 5.25-inch peripheral bay.

The two 5.25-inch half-height bays below the CD-ROM drive provide space for tape backup or other removable media devices.

To install devices in the 5.25-inch bays, you must remove the plastic filler panels and stainless steel EMI shields that cover the bays.

⟹ **Note**
We do not recommend mounting a hard disk drive in a 5.25-inch bay because the drive generates EMI, its susceptibility to ESD increases, and it may not be adequately cooled.

Contact your sales representative or dealer for a list of approved add-in peripheral devices.

Installing a 5.25-inch Peripheral Device

See Figures 4-15, 4-16, 4-17, and 4-18.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove both side covers and the top cover (page 80).

3. Remove the snap-in plastic peripheral bay cover (page 86), and place it on a smooth surface so that it doesn't get scratched.

4. Remove the screws and filler panel, and set them aside.
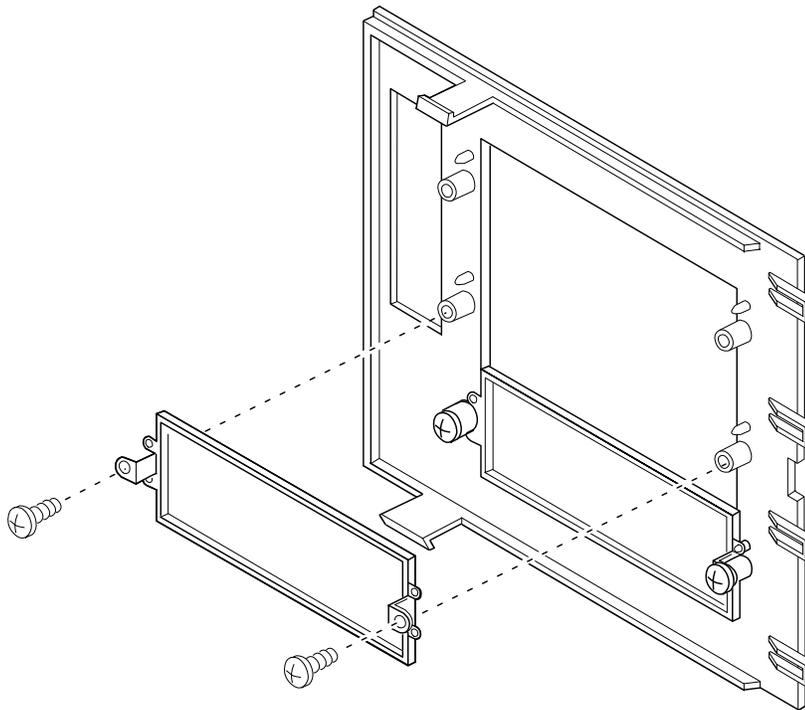
OM05315

Figure 4-15. Filler Panels

5. Push the tab on the left side of the EMI metal shield to the right to disengage it from the chassis. Save the shield.

6. Remove the device from its packaging, and place it on an antistatic surface.

7. Record the device model and serial number in your equipment log.

8. Set any jumpers and/or switches on the device according to the manufacturer's instructions.

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OM04647

Figure 4-16. Removing the EMI Shield

9.   Using two screws of the appropriate size and length (not supplied), attach each plastic slide rail to the device.
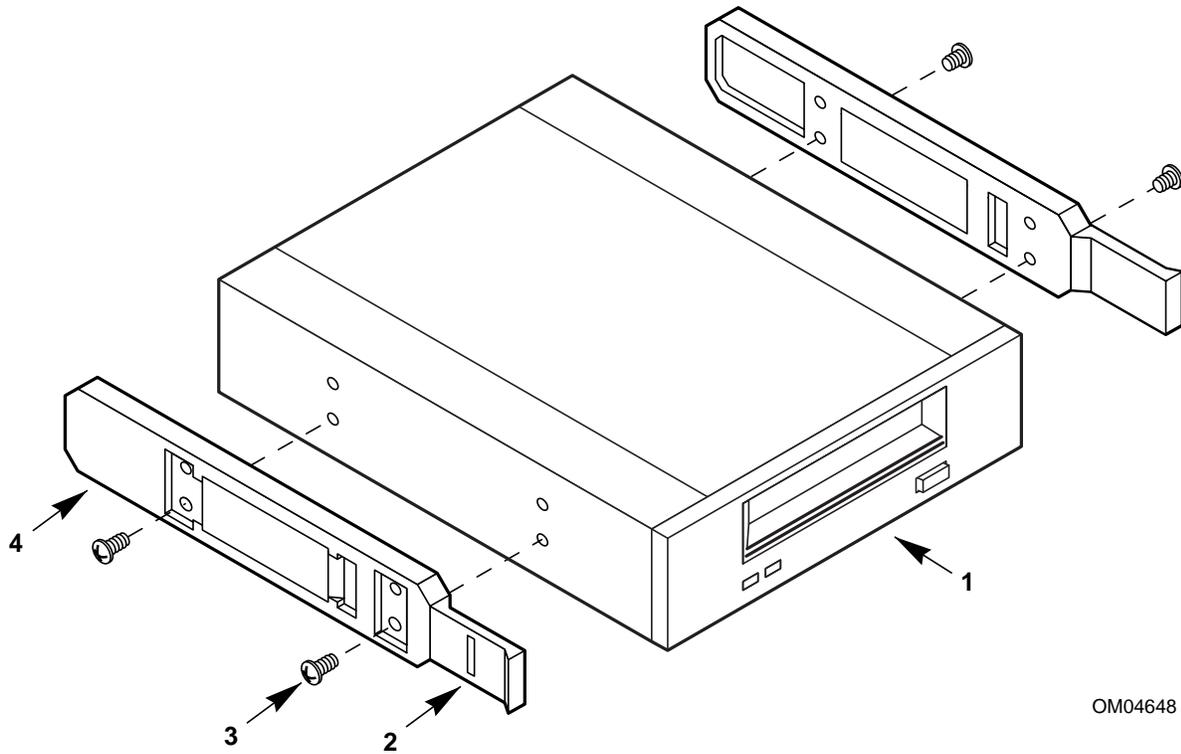
OM04648

Figure 4-17. Snap-in Plastic Slide Rails

1	Tape drive or other device
2	Tab
3	Screw
4	Slide rail

10. Position the device so that the plastic slide rails on each side of it engage in the bay guide rails. Push the device into the bay until the slide rails lock in place.
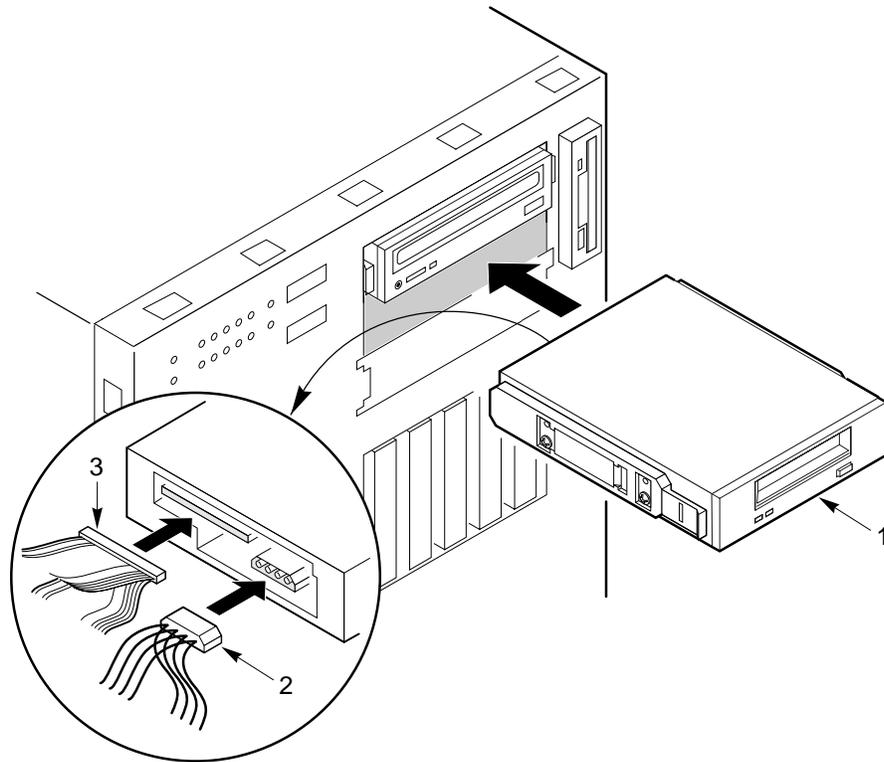
OM05789

Figure 4-18. Installing a 5.25-inch Peripheral Device

1   Tape drive or other device
2   Power cable
3   SCSI signal cable

11. Replace the snap-in plastic peripheral bay cover, top cover, and both side covers.

12. This step is optional. If you installed a SCSI CD-ROM drive, run the Symbios SCSI utility to enable BIOS support for a bootable CD-ROM. Run the SCU or Setup to specify that the CD-ROM is the boot device. For information about running these utilities, see Chapter 3, "Configuring The System."

Removing a 5.25-inch Peripheral Device

See Figures 4-15, 4-16, 4-17, and 4-18.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove both side covers and the top cover (page 80).

3. Remove the snap-in plastic peripheral bay cover (page 86), and place it on a smooth surface so that it doesn't get scratched.

4. Disconnect the power cable and the signal cable from the drive.

5. While squeezing the protruding plastic snap-in rails attached to the drive toward each other, carefully slide the drive forward out of the bay, and place it on an antistatic surface.

6. Remove and save the four screws and the two snap-in slide rails from the device.

7. If you leave the bay empty, install a stainless steel EMI shield on the bay and a filler panel on the snap-in plastic peripheral bay cover for proper cooling and airflow.

8. Replace the snap-in plastic peripheral bay cover.

9. Replace the top cover and both side covers.

10. If you leave the bay empty, run the SCU to reconfigure the system. For information about running this utility, see Chapter 3, "Configuring The System."

Back-up Battery

The lithium battery on the system board powers the real-time clock (RTC) for up to 10 years in the absence of power. The RTC contains 256 bytes of general purpose RAM that stores the system BIOS configuration information, clock registers, and general purpose control registers. When the battery starts to weaken, it loses voltage, and the system settings stored in CMOS RAM in the RTC (for example, the date and time) may be wrong. Contact your sales representative or dealer for a list of approved replacement devices and available service.

⚠ **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 system board 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 real-time clock.

⚠ **CAUTION**
Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used battery 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.

Replacing the Back-up Battery

See Figure 4-19.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover (page 80).

3. Insert the tip of a small flat-bladed screw driver, or equivalent, under the plastic tab on the snap-on plastic retainer. Gently lift up and pull back on the retainer to remove it from the lithium battery socket.

4. Remove the battery from its socket.

5. Dispose of the lithium battery according to local ordinance.

6. Remove the new lithium battery from its package, and, being careful to observe the correct polarity, insert it into the battery socket.

7. Install the snap-on plastic retainer on the socket.

8. Replace the left side cover (page 81).

9. Run the SCU to restore the configuration settings to the RTC. For information about running this utility, see Chapter 3, "Configuring The System."
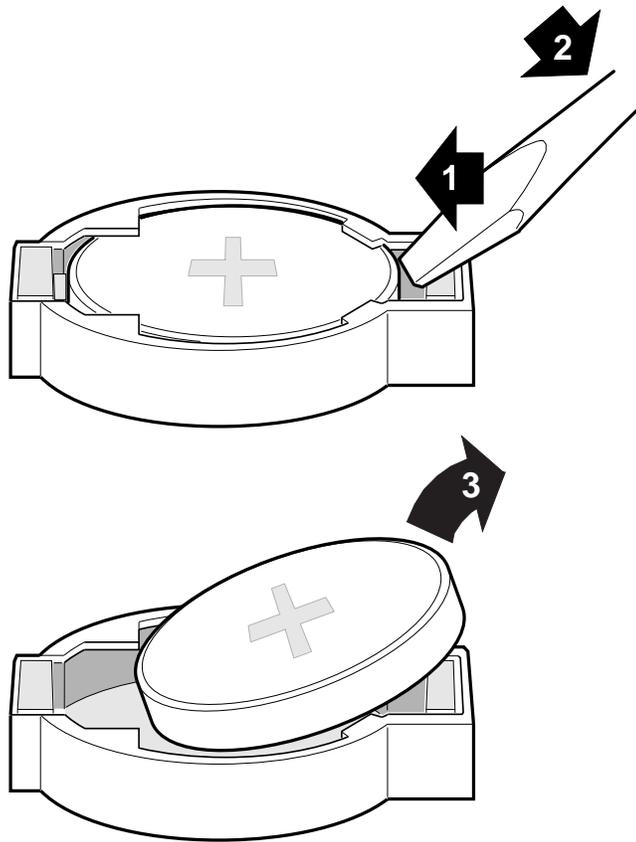
OM05791A

Figure 4-19. Lithium Back-up Battery

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.

Removing the Front Panel Board

See Figure 4-20.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove both side covers and the top cover (page 80).

3. Remove the screw from the threaded standoff inside the chassis, and set it aside. You will need the screw later.

4. Grasp the front panel board, and gently pull it toward the back of the system until it clears the snap-on standoff.

5. Label and disconnect all the cables connected to the front panel board.

6. Remove the board from the system, and place it on an antistatic foam pad or a grounded workstation.

Replacing the Front Panel Board

See Figure 4-20.

1. Place the front panel board on the chassis panel above the system board.

2. Reconnect the cables to the front panel board.

3. Carefully position the front panel board over the snap-on and threaded standoffs inside the chassis.

4. Gently press the front panel board onto the snap-on standoff until it snaps in place.

5. Replace and tighten firmly (6.0 inch-pounds) the screw that secures the front panel board to the chassis.

6. Replace the top cover and the side covers (page 81).
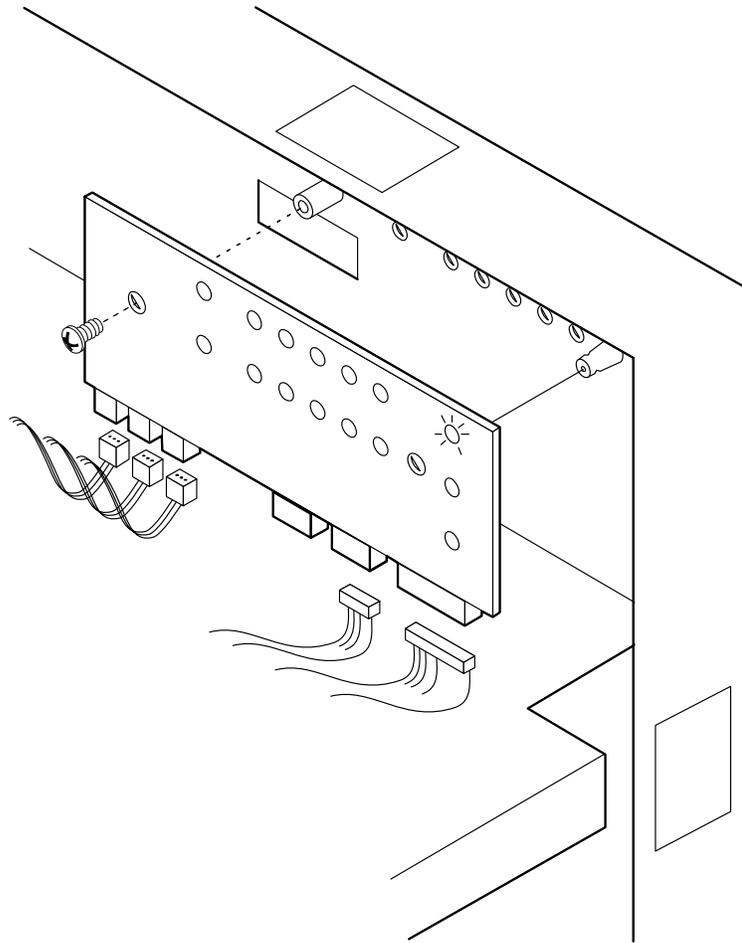
OM05268

Figure 4-20. Removing the Front Panel Board

Fans

The system contains up to three fans and two blowers for cooling and airflow.

- Located in the system board side of the system: some configurations may have up to two fans and two blowers.

- Located in the power supply side of the system: configurations with only one or two power supplies also have a fan on the rear bulkhead. Configurations with three supplies do not have this fan. The fans integrated in the power supplies provide sufficient cooling and airflow.

Replace a failed fan with the same type, 92 mm with a tachometer signal, or an approved fan. Replace a failed blower with the same type. See Chapter 9, "I/O Ports and Connectors." Contact your sales representative or dealer for a list of approved fans and blowers.

Removing a Front Panel Fan

See Figures 4-21 and 4-22.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover (page 80).

3. Depending on which fan you are removing, disconnect the fan power cable connector from the fan header, Fan 3 or Fan 4, on the system board.

4. Press the left outer flexible tab on the plastic housing and fan assembly toward the fan until you can pull the tab through the slot in the chassis.

5. Pull the assembly toward you, remove it from the chassis, and place it— fan-side up—on a flat surface.
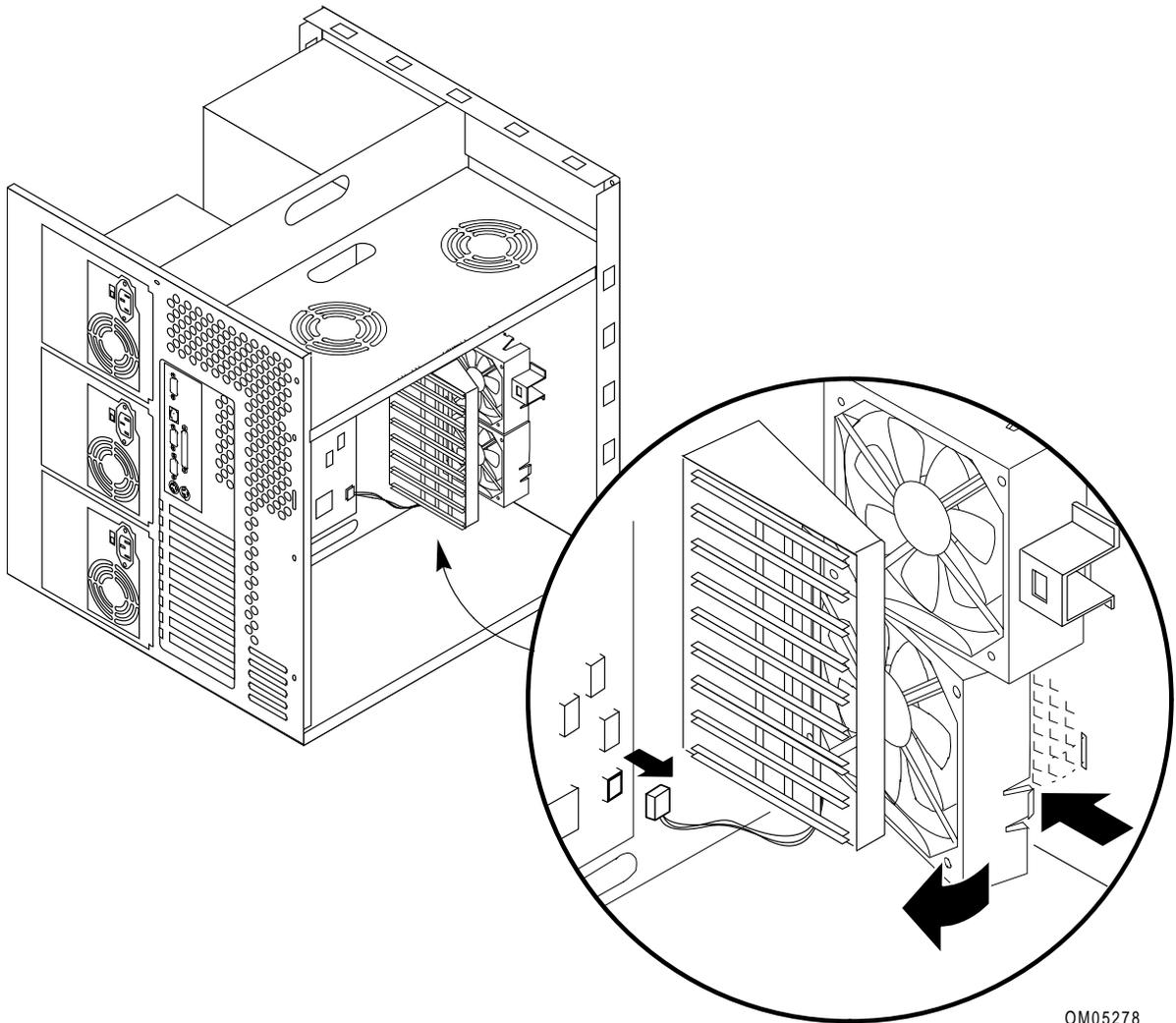
Figure 4-21. Front Panel Fans

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6. Remove the fan from the plastic housing by pushing the inner flexible tabs on the housing away from the fan. Save the housing.
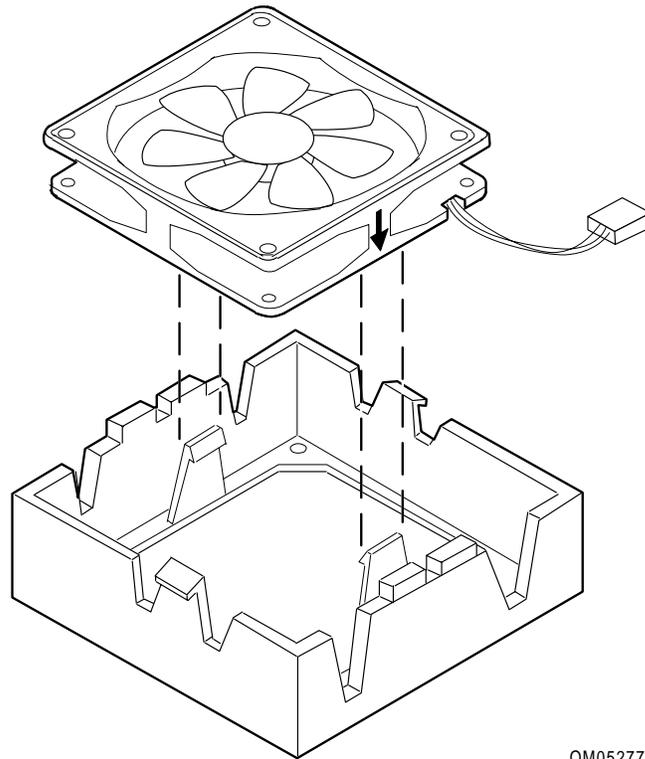
OM05277

Figure 4-22. Front Fan Assembly

Replacing a Front Panel Fan

See Figures 4-21 and 4-22.

⟹ **Note**
The front panel fans pull air from in front of the chassis so that it flows across the boards and out the back. Thus, the fans must be oriented for the correct airflow direction. If you place the fan so the label faces the back of the chassis, this should provide the correct orientation. You can confirm this by checking the embossed arrows on the side of the fan as you place it in its bracket:

⟹   Arrow points horizontally toward back of chassis
⇑   Arrow points vertically up

1. Place the plastic housing—flexible tabs facing up—on a flat surface.

2. With the power cable side of the fan facing down, place it inside the plastic housing. Route the cable through the slot in the side of the housing.

3. Press down on the fan until the inner flexible plastic tabs on the housing snap into place on the fan. Make sure you do not pinch the cable between the housing and the fan.

4. Position the plastic housing and fan assembly inside the chassis in front of the card guide, and align the tabs with the slots in the front of the chassis.

5. Insert the right flexible tab through the right slot in the front of the chassis. Then press the left flexible tab through the left slot until it snaps into place.

6. Connect the fan power cable connector to the fan header on the system board. The bottom fan connects to connector Fan 2 and the top one connects to connector Fan 4.

7. Replace the left side cover (page 81).

Removing the Fan Below the Top Power Supply

See Figures 4-23 and 4-24. The arrow on the fan indicates the direction of airflow. The fan pulls air through the hot-docking bays and exhausts it out of the system.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove both side covers and the top cover (page 80).

3. Disconnect the fan power cable connector from the fan header on the hot-docking backplane.

4. Press the top outer flexible tab on the plastic housing and fan assembly toward the fan until you can pull the tab through the slot in the chassis.

5. Pull the top of the assembly toward the hot-docking bays to disengage the bottom flexible tab.

6. Remove the assembly from the chassis, and place it—fan-side down— on a flat surface.
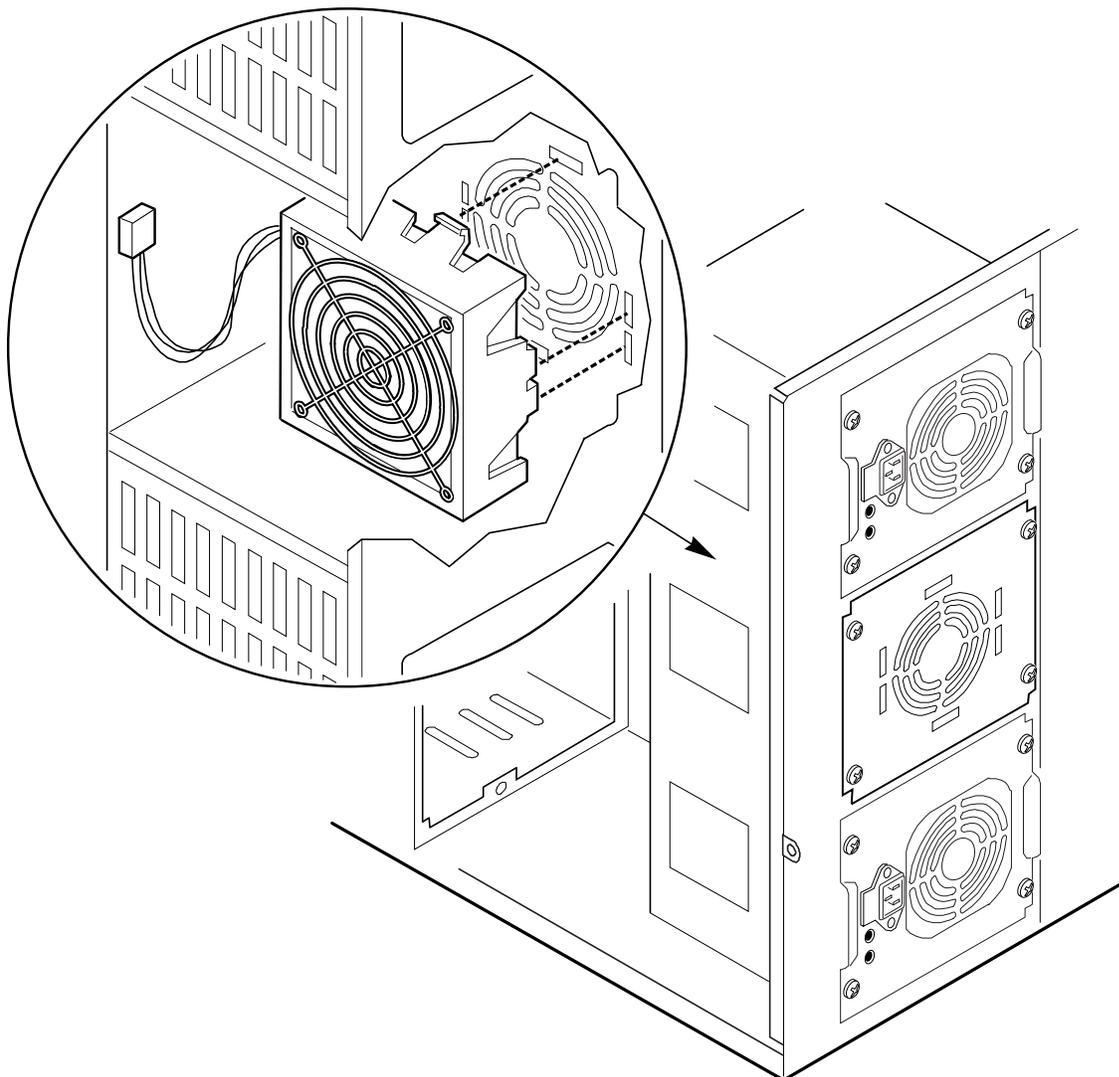
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Figure 4-23. Fan Below the Top Power Supply

7. Remove the two screws that attach the finger guard to the fan. Set the screws and finger guard aside.

8. Place the assembly—fan-side up—on a flat surface. Remove the fan from the plastic housing by pushing the inner flexible tabs on the housing away from the fan. Save the housing.
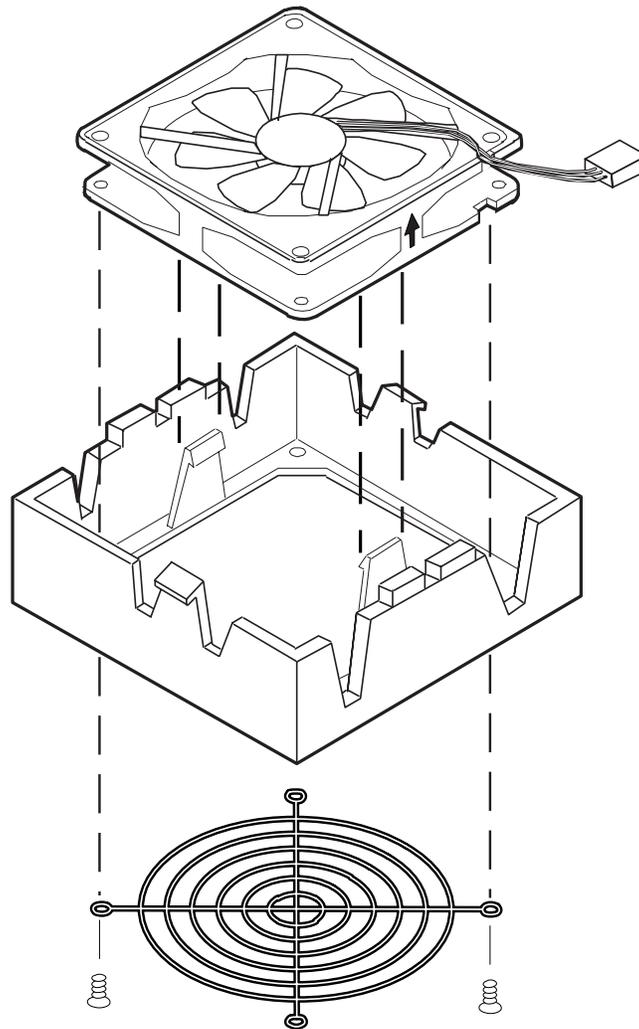
OM05325

Figure 4-24. Rear Fan Assembly

Replacing the Fan Below the Power Supply

See Figures 4-23 and 4-24. The arrow on the fan indicates the direction of airflow. The fan pulls air through the hot-docking bays and exhausts it out of the system.

1. Place the plastic housing—flexible tabs facing up—on a flat surface.

2. With the power cable side of the fan facing up, place it inside the plastic housing. Route the cable through the slot in the side of the housing.

3. Press down on the fan until the inner flexible plastic tabs on the housing snap into place on the fan. Make sure you do not pinch the cable between the housing and the fan.

4. Place the assembly—fan-side down—on a flat surface. Attach the finger guard to the fan with the screws you removed earlier.

5. Position the plastic housing and fan assembly inside the chassis below the top power supply, and align the tabs with the slots in the back of the chassis.

6. Insert the bottom flexible tab through the bottom slot in the back of the chassis. Then press the top flexible tab through the top slot until it snaps into place.

7. Connect the fan power cable connector to the fan header on the hot-docking backplane.

8. Replace the top cover and both side covers (page 80).

Power System

The system may be configured with one, two, or three 360 watt power supplies.

- One power supply.

- Two power supplies and a power share board.

- Two power supplies without a power share board.

- Three power supplies and a power share board.

If a single power supply fails in a system with a power share board, the yellow power supply failure LED on the front panel starts flashing. Generally, a failed power supply can be replaced while the system is running.

Removing a Power Supply

See Figure 4-25.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Unplug the AC power cord from the power supply.

3. Remove the screws that attach the power supply to the chassis, and set them aside.

4. Slide the defective power supply out the back of the chassis.
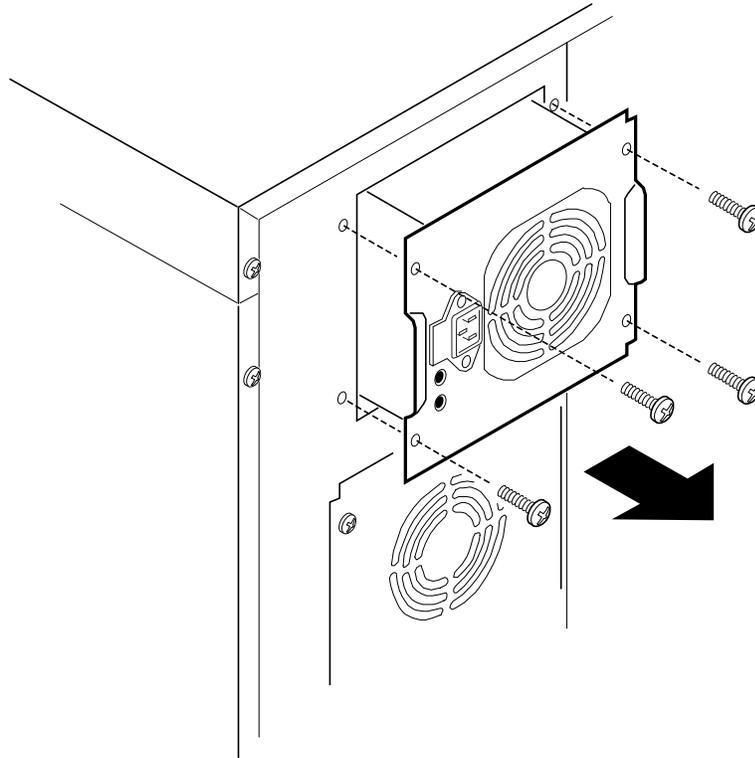
OM05765

Figure 4-25. Removing a Power Supply

Replacing a Power Supply

See Figure 4-25.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Slide the power supply through the back of the system.

3. Attach the power supply to the system chassis with the four screws you saved. Tighten the screws firmly (6.0 inch-pounds).

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Power Share Backplane

The power share backplane distributes the power load of the system among two or three power supplies. The backplane is mounted on two snap-on standoffs and six threaded standoffs on the center wall inside the chassis.

⚠️ **WARNINGS**

The *power button* on the front panel of the system *does not* turn off the AC power. To remove AC power from the system, you must unplug the AC power cord from each power supply or wall outlet.

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

Removing the Power Share Backplane

See Figures 4-26 and 4-27.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Unplug the AC power cord from each power supply or wall outlet.

3. Remove the right side cover (page 80).

4. Label and disconnect the power and signal cables from the power share backplane.

5. Remove the power supplies.

6. Remove the screws that attach the backplane to the threaded stand-offs on the inside chassis wall, and set them aside.

7. Pull the backplane toward you to unsnap it from the snap-on standoffs.

8. Remove the backplane from the system, and set it aside.
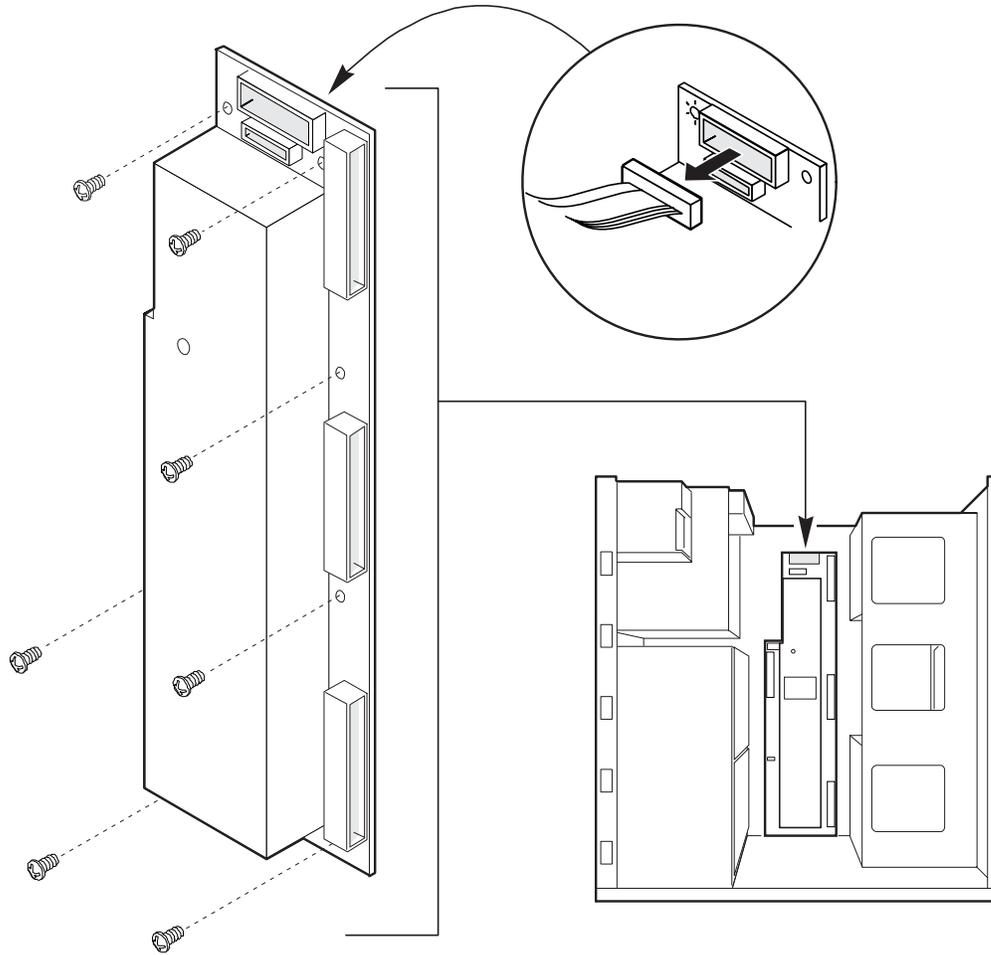
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Figure 4-26. Removing the Power Share Backplane
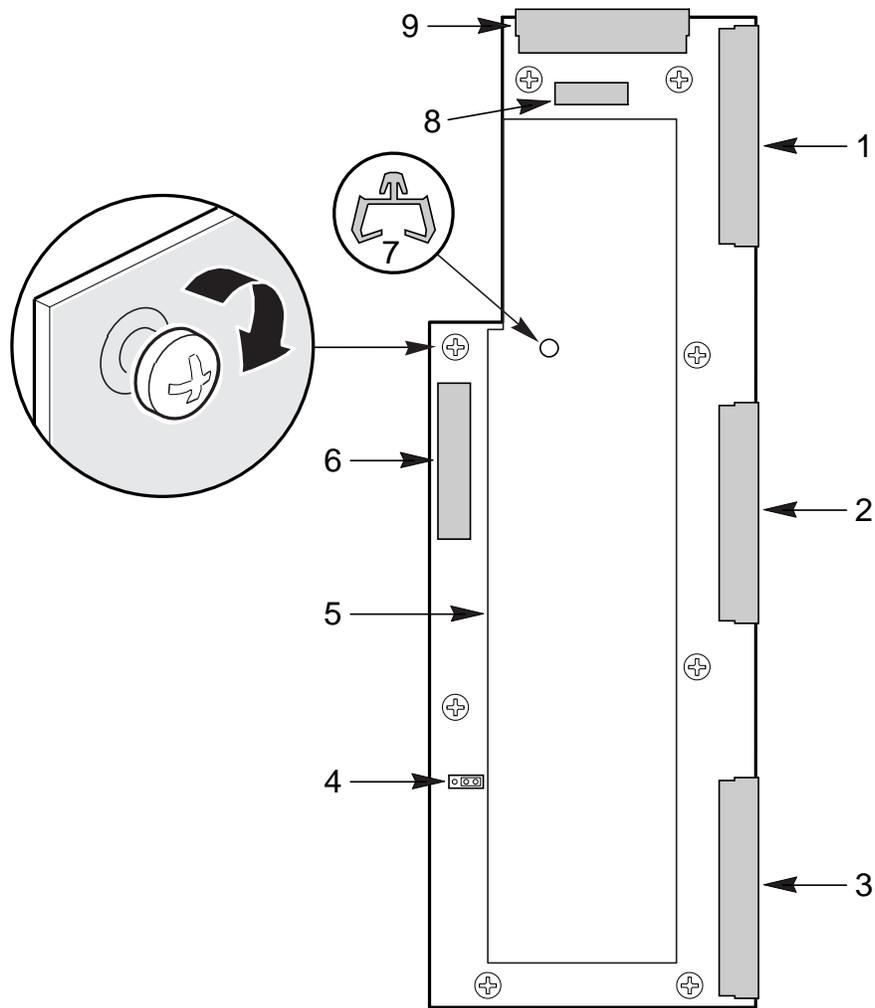
Figure 4-27. Power Share Backplane Connectors

1   Input from top power supply
2   Input from middle power supply if present
3   Input from bottom power supply if present
4   Factory configured jumper
5   Nonremovable cover
6   Output to system peripherals
7   Cable tie-down
8   Output to auxiliary power connector on system board
9   Output to system board

Installing the Power Share Backplane

See Figures 4-26 and 4-27.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the right side cover (page 80).

3. Position the mounting holes in the power share backplane over the snap-in standoffs and threaded standoffs on the inside chassis wall.

4. Push the backplane toward the chassis wall until it snaps onto the snap-in standoffs.

5. Insert the screws through the mounting holes in the backplane and into the threaded stand-offs on the inside chassis wall; tighten the screws firmly (6.0 inch-pounds).

6. Replace the power supplies.

7. Connect the power and signal cables to the power share backplane.

8. Replace the side cover (page 80).

SCSI Hot-docking Backplane

The system may be configured with one or two SCSI hot-docking backplanes.

Removing a Hot-docking Backplane

See Figure 4-28.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove all the hard disk drives from the hot-docking bay. See Chapter 5, "SCSI Backplane and Drives: Hot-swapping and Configuring." Label each drive so that you can install them in the same place.

3. Remove the right side cover (page 80).

4. Label and disconnect the power and signal cable connectors from the hot-docking backplane. And, if present, disconnect the auxiliary fan connector.

5. Remove the four screws that attach the backplane to the back of the hot-docking bay, and set them aside.

6. Remove the backplane from the system, and place it on an antistatic surface.

Installing a Hot-docking Backplane

See Figure 4-28.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Slide the hot-docking backplane into the notches in the metal tabs on the back of the bay.

3. Position the screw holes in the backplane over the stand offs on the back of the bay.

4. While holding the backplane in place, insert the four screws through the holes in the backplane and into the standoffs. Tighten the screws firmly (6.0 inch-pounds).

5. Connect the power and signal cables to the hot-docking backplane.

6. Install the hard disk drives in the hot-docking bay. See Chapter 5, "SCSI Backplane and Drives: Hot-swapping and Configuring ." Make sure you install the drives in the same places you removed them from.

7. Replace the right side cover (page 81).
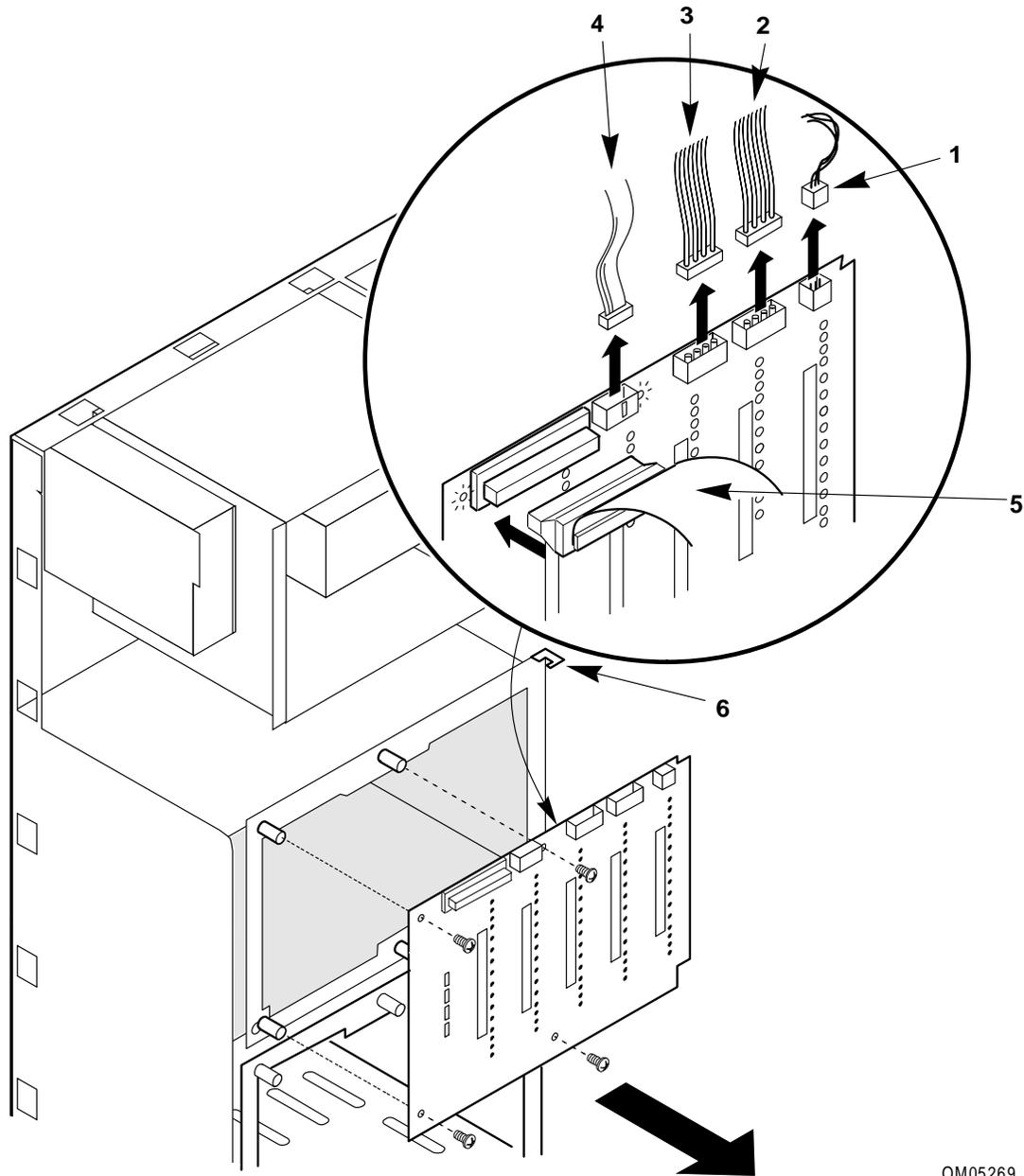
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Figure 4-28. Removing a Hot-docking Backplane

1	Fan cable if present	4	Front panel cable
2	Peripheral power connector	5	SCSI signal cable
3	Peripheral power connector	6	Notch in metal tab

☐ ☐ ☐
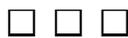
SCSI Backplane and Drives: Hot-swapping and Configuring 5

This chapter tells how to configure the SCSI backplane and install hot-swap SCSI hard disk drives.

Warnings and Cautions

Before you remove the system covers to work inside it, observe the warnings and cautions provided for your safety on page 3, "Safety Guidelines."

System integration should be done by technically qualified personnel.

Tools and Supplies You Need

- Phillips (cross-head) screwdriver (#1 bit and #2 bit)
- Jumper removal tool
- Pen or pencil
- Antistatic wrist strap (recommended)

Hot-docking Bays

The plastic front door covers a removable metal door that is secured to the chassis with two screws. Plastic drive carriers for 3.5-inch wide by 1-inch high drives allow easy hot-swapping of drives without shutting down the system.

The upper and lower bay each have a separate backplane. Each backplane uses industry standard 80-pin SCA connectors to support up to five industry standard wide/fast-20 SCSI III SCA hard disk drives. The bays accept peripherals that consume up to 11 watts of power and run at a maximum ambient temperature of 65 °C.

By installing an RPX board and appropriate software on the system board and SCSI hard disk drives in the hot-docking bays, you can easily set up Redundant Array of Inexpensive Disks (RAID) applications.

SCSI Hard Disk Drive

The system supports a variety of single-ended SCSI SCA devices. As shipped from the supplier, the system might not contain any hard disk drives.

Contact your sales representative or dealer for a list of approved single-ended SCSI SCA devices.

> ⚠️ **WARNING**
> **The single-ended SCSI hot-docking backplane requires installing single-ended SCSI devices in your system. Installing differential SCSI drive types can result in electrical damage to the system board and the peripherals.**

> ⚠ **CAUTION**
> **ELECTROSTATIC DISCHARGE (ESD) AND ESD PROTECTION:**
> ESD can damage disk drives, add-in boards, and other components. This server can withstand normal levels of environmental ESD while hot-swapping SCSI hard disk drives. However, we recommend doing all procedures in this manual only at an ESD 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 SCA Hard Disk Drive in a Plastic Carrier

See Figure 5-1.

1. Remove the 3.5-inch hard disk drive from its protective wrapper, and place it on an antistatic surface.

2. Record the drive model and serial number in your equipment log.

3. Orient the drive so the connector is near the top surface of the drive, and place it on an antistatic surface.

4. Place the plastic carrier on top of the drive.

5. Using four screws of the appropriate size and length (not supplied), attach the carrier to the drive.
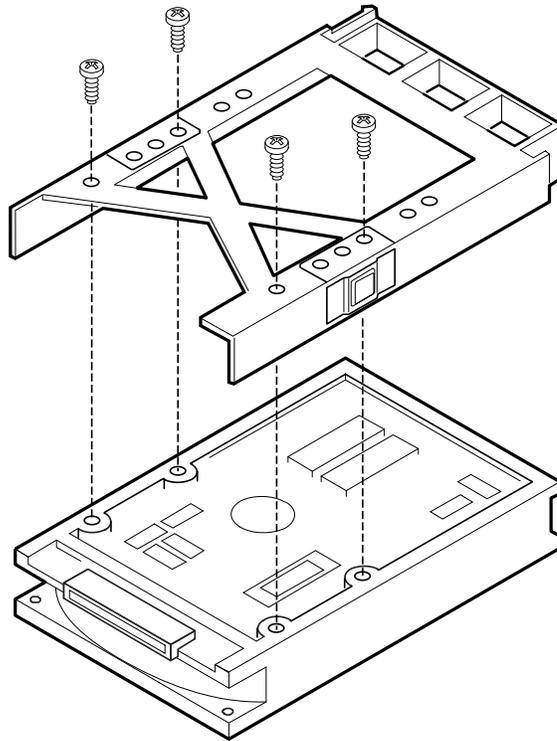
OM05787

Figure 5-1. Hard Disk Drive and Plastic Carrier

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Installing a SCSI SCA Hard Disk Drive in a Hot-docking Bay

See Figure 5-2.

1. Open the plastic front door.

2. If you installed a padlock on the metal door to the hot-docking bays, unlock the padlock and remove it.

3. Loosen the two spring-loaded, captive screws that secure the metal door to the chassis, and open the door.

4. Position the plastic carrier, locking tab up, and drive assembly so it engages the hot-docking bay guide rails.

5. Gently push the drive into the bay until it docks with the backplane connector and snaps into place.

6. Gently close the metal door, and secure it to the chassis with the two captive screws.

7. For security and to prevent unauthorized access to the bays, insert a padlock through the metal door and chassis and lock it.

8. Close the lower plastic front door.

9. If you installed an RPX board in the system, run the Disk Array Controller Configuration utility supplied with the board. See the documentation provided with the board.
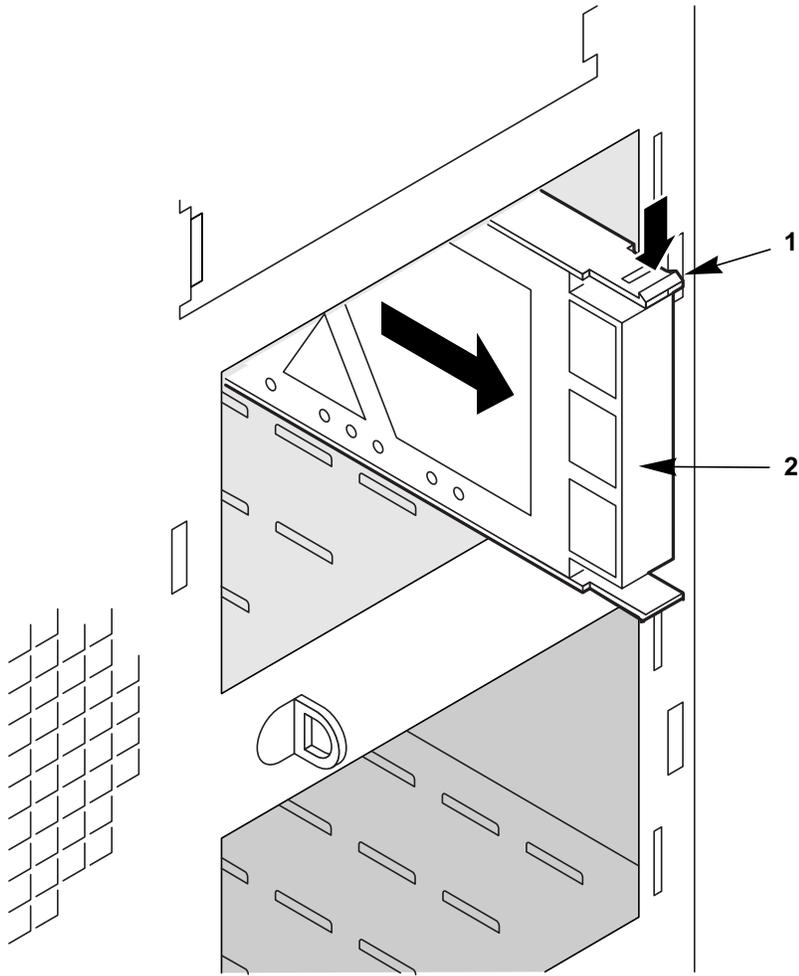
OM06470

Figure 5-2. Installing a Hard Disk Drive

Hot-swapping a SCSI SCA Hard Disk Drive

A bank of 10 yellow LEDs on the front panel monitors the drive status of each drive in the upper and lower hot-docking bays. 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.

See Figure 5-2.

1. Open the plastic front door of the system.

2. If you installed a padlock on the metal door to the bays, unlock the padlock and remove it.

3. Loosen the two captive, spring loaded screws securing the metal door to the chassis, and open the door.

4. Check the two banks of yellow LEDs on the front panel to determine which drive is bad. Grasp the plastic drive carrier and pull it toward you to disengage the drive connector from the backplane connector.

5. Squeeze the tabs on the carrier toward each other, and carefully slide the bad drive forward out of the bay. Place the drive on an antistatic surface.

6. Position the new plastic carrier and drive assembly so that it engages the bay guide rails.

7. Gently push the drive into the bay until it docks with the backplane connector and snaps into place.

8. Gently close the metal door, and secure it to the chassis with the two captive, spring loaded screws.

9. For security and to prevent unauthorized access to the bays, insert a padlock through the metal loop protruding through the door and lock it.

10. Close the lower plastic front door of the system.

SCSI Hot-docking Backplane

The hot-docking backplane provides the following:

- Five SCA connectors for SCA-compatible SCSI drives

- Power control for each drive, including automatic slot-power-down upon removing a drive

- Signal for a fault indicator on the front panel for each drive

- Internal I^2C bus

- +12 V connector for a fan with tachometer

- Local I^2C-based temperature sensor

The SCSI hot-docking backplane provides control signals and power for five wide/fast 3.5-inch SCA SCSI hard disk drives. The backplane receives control signals from the Symbios SCSI controller on the system board through a cable connected to the wide SCSI connector on the backplane. The backplane gets power from the power system through cables connected to the two power connectors.

The drives get their control signals and power from the SCA connectors on the backplane.

The fault indicators on the front panel indicate failure status for each drive in the bay. These indicators get their signals through a cable connected to the front panel connector on the backplane.

The temperature sensor on the backplane provides temperature information to other devices in the system through enclosure service messages.

The backplane power control provides powering down of a drive when a failure is detected and reported to the SCSI bus. When a new drive is inserted, the power control waits a short time for the drive to become fully seated and then applies power to the drive.

Configuration Options

The hot-docking backplane contains only one configuration jumper: J8, the internal/external jumper.

A jumper is a small plastic-encased conductor—shorting plug—that slips over two jumper pins.

Internal/External (INT/EXT) Jumper J8

When this jumper is in the "INT" position—jumper on pins 1 and 2 default setting—the backplane assumes it is operating in an "internal" peripheral bay in the chassis.

When this jumper is in the "EXT" position—jumper on pins 2 and 3—the backplane assumes it is operating in an "external" peripheral bay in a peripheral expansion chassis. *This option is not available.*

SCSI ID Configuration Options

The SCSI chip on the hot-docking backplane uses the SAF-TE protocol to communicate with the system board. This chip uses SCSI ID 6; therefore, other SCSI devices cannot use this address.

J10	J9	Drive 0	Drive 1	Drive 2	Drive 3	Drive 4
2-3	2-3	ID8	ID9	ID2	ID11	ID12
1-2	2-3	ID0	ID1	ID2	ID3	ID4
2-3	1-2	ID8	ID9	ID10	ID11	ID12
1-2*	1-2*	ID0	ID1	ID10	ID3	ID4

* Jumper default setting.

Changing SCSI Device ID Addresses

If you have a wide SCSI device ID conflict, you can resolve it by changing the default ID addresses of the drives in the hot-docking bays. See the jumper table on page 140.

See Figure 5-3.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Turn the system off with system power push-button on/off switch on the front panel, and unplug each AC power cord from the power supply or wall outlet.

3. Remove the right side cover as described in Chapter 4, "Working Inside Your System."

4. The jumpers are parallel with the backplane surface as shown in Figure 5-3. Looking into the right side of the system, between the back of the bay and the backplane, J10 is the top jumper and J9 is the next one down. To remove a jumper, use a jumper removal tool.

5. To install a jumper, position it over the two pins for the desired setting and press down firmly. Be careful not to bend the pins.

6. Replace the right side cover as described in Chapter 4, "Working Inside Your System."

7. Plug the AC power cord of each power supply into a separate wall outlet on a dedicated AC branch circuit to avoid overloading a single branch circuit.
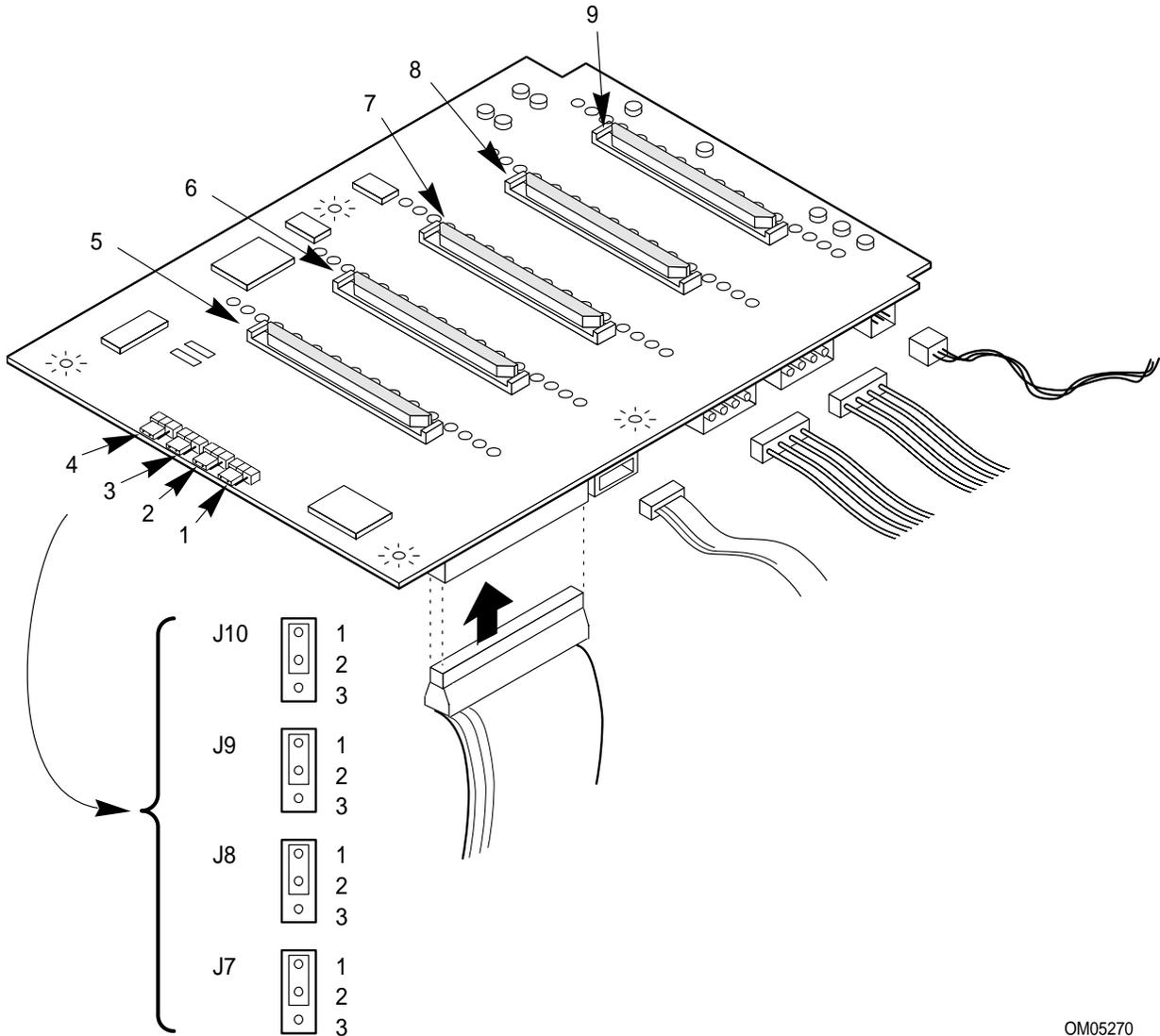
OM05270

Figure 5-3. SCSI Backplane

1   SCSI ID B, J10
2   SCSI ID A, J9
3   Internal/external, J8
4   Normal operation, J7
5   SCSI drive 4
6   SCSI drive 3
7   SCSI drive 2
8   SCSI drive 1
9   SCSI drive 0

SCSI Hot-docking Backplane Connectors

Wide/Fast SCSI 16-Bit Connector

1

68

OM03878

Pin	Signal	Pin	Signal
1-16	GND (ground)	49-50	GND (ground)
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	RESERVED	53	RESERVED
20-34	GND (ground)	54	GND (ground)
35	DB 12_L	55	ATN_L
36	DB 13_L	56	GND (ground)
37	DB 14_L	57	BSY_L
38	DB 15_L	58	ACK_L
39	DB P1_L	59	RST_L
40	DB 0_L	60	MSG_L
41	DB 1_L	61	SEL_L
42	DB 2_L	62	CD_L
43	DB 3_L	63	REQ_L
44	DB 4_L	64	I/O_L
45	DB 5_L	65	DB 8_L
46	DB 6_L	66	DB 9_L
47	DB 7_L	67	DB 10_L
48	DB P_L	68	DB 11_L

Wide/Fast SCA2 SCSI 16-Bit Connectors

OM04855

Pin	Signal	Pin	Signal
1-4	+12 V	25	DB 3_L
5–6	NC	26	DB 2_L
7	DB 11_L	27	DB 1_L
8	DB 10_L	28	DB 0_L
9	DB 9_L	29	DB P_L
10	DB 8_L	30	DB 15_L
11	I/O_L	31	DB 14_L
12	REQ_L	32	DB 13_L
13	C/D_L	33	DB 12_L
14	SEL_L	34-36	+5 V
15	MSG_L	37	SYNC
16	RST_L	38	MTRON_L
17	ACK_L	39	ID0_L
18	BSY_L	40	ID2_L
19	ATN_L	41	DRV PRES_L
20	DB P_L	42–76	GND
21	DB 7_L	77	LEDC, DRV ACT_L
22	DB 6_L	78	DLYDST_L
23	DB 5_L	79	ID1_L
24	DB 4_L	80	ID3_L

Power Connectors

The backplane power connectors are 4-pin shrouded plastic connectors with mechanical keying.

```
1  2  3  4
┌──────────┐
│ ○ ○ ○ ○  │
└──────────┘
   OM04656
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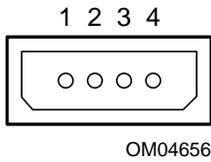
Pin	Signal
1	+12 V
2	Ground
3	Ground
4	+5 V

Fan Connector

This connector provides power to the fan below the top power supply.

```
1 2 3
┌────┐
│ ○○○ │
└────┘
OM05211
```

Pin	Signal
1	GND (ground)
2	Fan sense
3	+12 V

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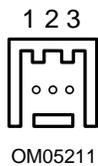
Front Panel Connector

The front panel connector and cable provide the chassis-wide I^2C bus and the electrical path between the drive fault indicators (LEDs) and the SCSI backplane that controls them.
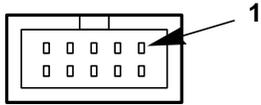
OM04669

Pin	Name	Description
1	GND	Electrical ground (0V)
2	I2C_SDA	I^2C SDA (Serial Data)
3	GND	Electrical ground (0V)
4	I2C_SCL	I^2C Serial Clock
5	RFU	Reserved for future use
6	FAULT1_L	Fault signal for drive 1 (logical drive 0)
7	FAULT2_L	Fault signal for drive 2 (logical drive 1)
8	FAULT3_L	Fault signal for drive 3 (logical drive 2)
9	FAULT4_L	Fault signal for drive 4 (logical drive 3)
10	FAULT5_L	Fault signal for drive 5 (logical drive 4)

❑ ❑ ❑

Server Resources 6

This chapter tells how to upgrade the resources available in your system.

Warnings and Cautions

Before you remove the covers, observe the warnings and cautions provided for your safety on page 3, "Safety Guidelines."

System integration should be done by technically qualified personnel.

Tools and Supplies You Need

- Phillips (cross-head) screwdriver (#1 bit and #2 bit)
- Needle-nosed pliers
- Small flat-bladed screwdriver
- Jumper removal tool
- Tweezers
- IC removal tool for removing video memory DRAM
- Antistatic wrist strap (recommended)
- Rubber gloves
- Pen or pencil

Memory Module Resources

The memory module contains eight DIMM sockets for installing memory. It supports from 16 MB to 1 GB of EDO ECC 3.3 V 60 ns DRAM, mounted on JEDEC DIMMs. You may install mixed sizes and types of DIMMs in the eight memory banks; however, their speeds must be the same. Always install the DIMMs in sequence by starting with bank 0 (socket J1, closest to the system board), then bank 1 (socket J2), and so on with bank 7 (socket J8) as the last one.

To avoid potential memory problems, use only DIMMs from JEDEC-compatible manufacturers that have been tested for compatibility with the memory module. Contact your sales representative or dealer for a list of approved DIMMs.

ECC memory detects and corrects single-bit errors from DRAM in real time, allowing your system to function normally. It detects all double-bit errors but does not correct them; it also detects all three-bit and four-bit adjacent errors in a DRAM *nibble* but does not correct them. When one of these multiple-bit errors occurs, the PMC generates an SERR (system error) which usually halts the system. ECC is calculated on a 64 bit wide memory basis.

The system supports both base (conventional) and extended memory. Base memory is located at addresses 00000h to 9FFFFh (the first 640 KB). Extended memory begins at address 0100000h (1 MB) and extends to FFFFFFFFh (4 GB), which is the limit of addressable memory. The top of physical memory is a maximum of 1 GB.

Some operating systems and application programs use base memory; for example, MS-DOS, OS/2[†], and UNIX. Other operating systems use both conventional and extended memory; for example, OS/2 and UNIX. MS-DOS does not use extended memory; however, some MS-DOS utility programs such as RAM disks, disk caches, print spoolers, and windowing environments use extended memory for better performance.

DIMM 0, J1
DIMM 1, J2
DIMM 2, J3
DIMM 3, J4
DIMM 4, J5
DIMM 5, J6
DIMM 6, J7
DIMM 7, J8

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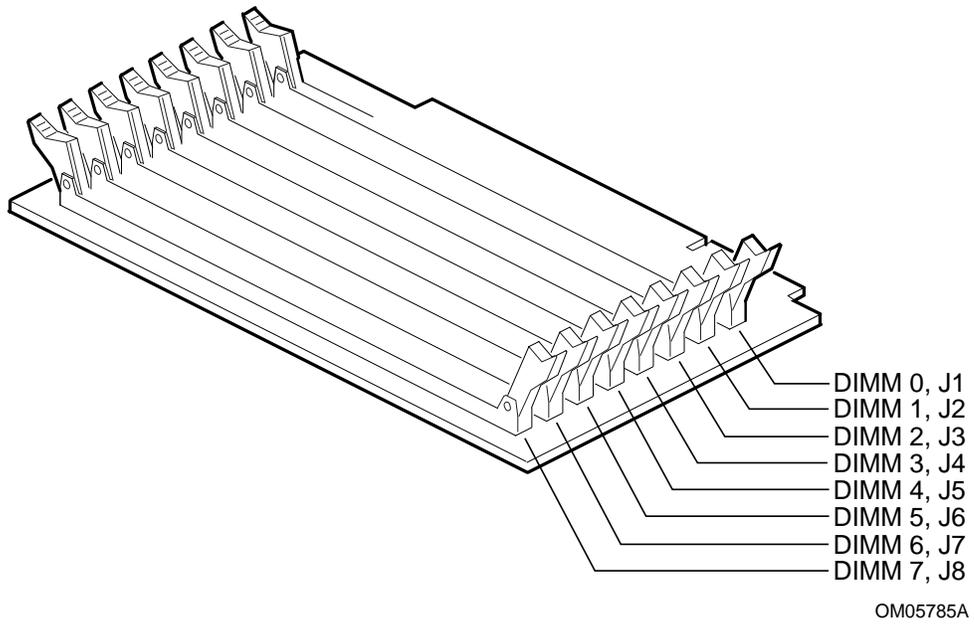
Figure 6-1. Memory Module

Memory Regions

The memory module supports from 16 MB to 1 GB of ECC memory by using fast page mode (FPM) or extended data out (EDO) 64 Mbit DRAMs mounted on JEDEC 3.3 V 60 ns DIMMs.

DOS Compatibility Region

The DOS compatibility region covers 1 MB of memory from addresses 0000_0000h to 000F_FFFFh.

Address Range (hex)	Amount	Function
0000_0000h–0007_FFFFh	512 KB	DOS region, base system memory (fixed)
0008_0000h–0009_FFFFh	128 KB	ISA window memory
000A_0000h–000B_FFFFh	128 KB	PCI/ISA Video or SMM
000C_0000h–000D_FFFFh	128 KB	Add-in card BIOS and buffer area
000E_0000h–00EF_FFFFh	64 KB	Extended system BIOS
000F_0000h–000F_FFFFh	64 KB	System BIOS

Extended Memory Region

The extended memory region covers 4 GB of memory from addresses 010_0000h to FFFF_FFFFh.

Address Range (hex)	Amount	Function
0100_0000h–3FFF_FFFFh	1 GB	Local DRAM space
3FFF_0000h–FFFF_FFFFh	3 GB	PCI memory space

ECC Memory

Table 6-1. ECC Memory Banks

If you fill one bank with	Memory size for that bank will be
8 MB DIMM, 1M x 72	8 MB
16 MB DIMM, 2M x 72	16 MB
32 MB DIMM, 4M x 72	32 MB
64 MB DIMM, 8M x 72	64 MB
128 MB DIMM, 16M x 72	128 MB

Table 6-2. Sample DIMM Size Combinations

Banks Filled								
0, J1	1, J2	2, J3	3, J4	4, J5	5, J6	6, J7	7, J8	Total Memory
8								8 MB
8	16							24 MB
16	32	8						56 MB
16	32	8	8					64 MB
32	64	64	128	128				416 MB
64	16	32	32	8	128			280 MB
8	16	16	32	64	64	128	128	456 MB
64	64	64	64	64	64	64	64	512 MB
128	128	128	128	128	128	128	128	1024 MB

Installing DIMMs

⚠️ **CAUTIONS**

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

Mixing dissimilar metals may cause failures. Install DIMMs with gold-lead alloy plated edge connectors only in gold-lead alloy plated sockets.

See Figures 6-2 and 6-3.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover and memory module as described in Chapter 4, "Working Inside Your System."

3. Hold the module only by its edges, being careful not to touch its components or gold edge connectors, and place it processor-side up on an antistatic surface.

4. Remove a DIMM from its antistatic package by holding the DIMM only by its edges.

5. Beginning with bank 0 (Figure 6-2), socket J1, orient the DIMM so that the two notches in the bottom edge of it align with the keyed DIMM socket.

6. Insert the bottom edge of the DIMM into socket J1, and press down firmly on the DIMM until it seats correctly (Figure 6-3).

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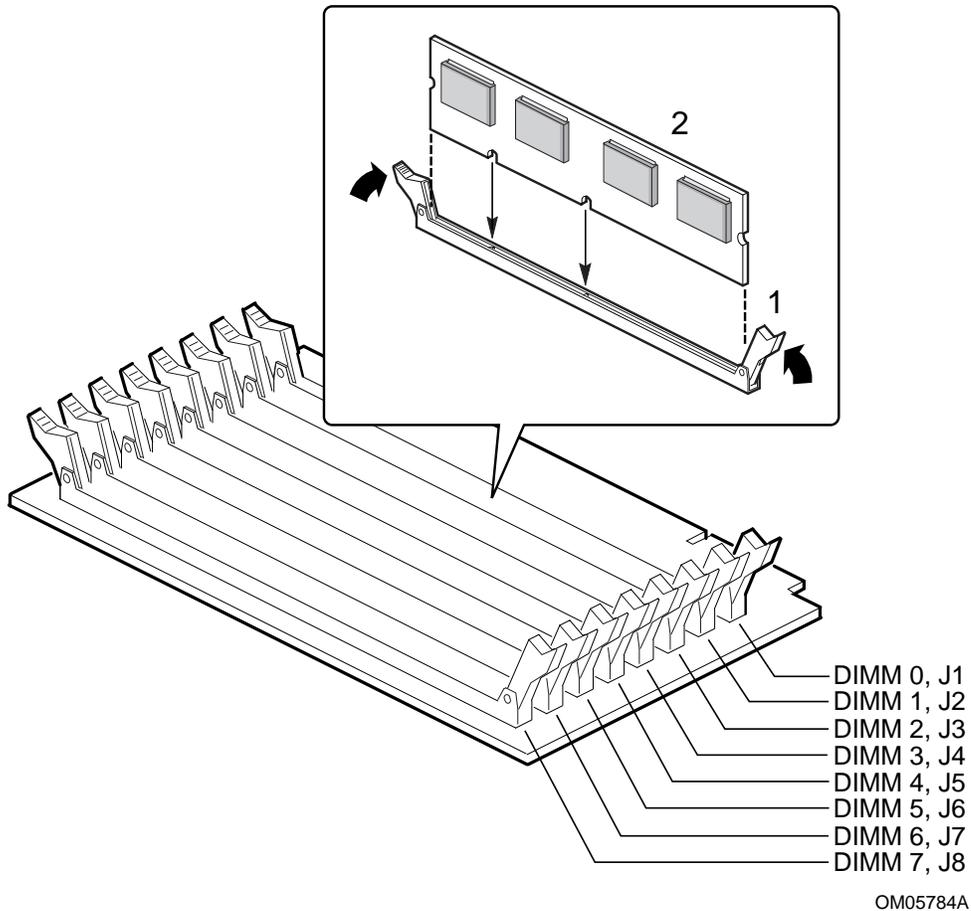
Figure 6-2. DIMM Orientation

1   Bank 0, J1
2   Bank 1, J2
3   Bank 2, J3
4   Bank 3, J4
5   Bank 4, J5
6   Bank 5, J6
7   Bank 6, J7
8   Bank 7, J8
9   Ejector lever

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7. Gently push the plastic ejector levers (Figure 6-3) on the socket ends to the upright position.
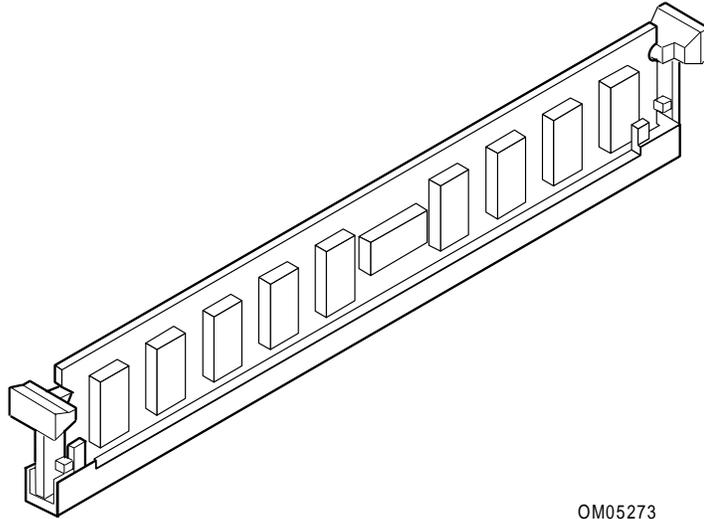
OM05273

Figure 6-3. Properly Seated DIMM

8. Repeat the above steps to install more DIMMs. Always install them in sequence by installing the next DIMM in bank 1, socket J2, and so on with the last one in bank 7, socket J8.

9. Install the memory module and the left side cover as described in Chapter 4, "Working Inside Your System."

10. Connect all external cables and the power cord(s) to the system.

11. Turn on the monitor and then the system.

12. Run the System Configuration Utility (SCU) to configure the system and to properly attribute ECC memory. Failure to do so may degrade the performance of your system. For information about running the SCU, see Chapter 3, "Configuring The System."

Removing DIMMs

See Figure 6-4.

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover and memory module as described in Chapter 4, "Working Inside Your System."

3. Hold the module only by its edges, being careful not to touch its components or gold edge connectors, and place it on an antistatic surface.

4. Starting with the first DIMM-filled socket closest to the top edge of the module, remove the DIMMs one at a time.

⚠ **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.

5. Gently push the plastic ejector levers out and down to eject the DIMM from its socket (Figure 6-4).

6. Carefully lift the DIMM away from the socket and store it in an antistatic package.

7. Repeat the above steps to remove other DIMMs.

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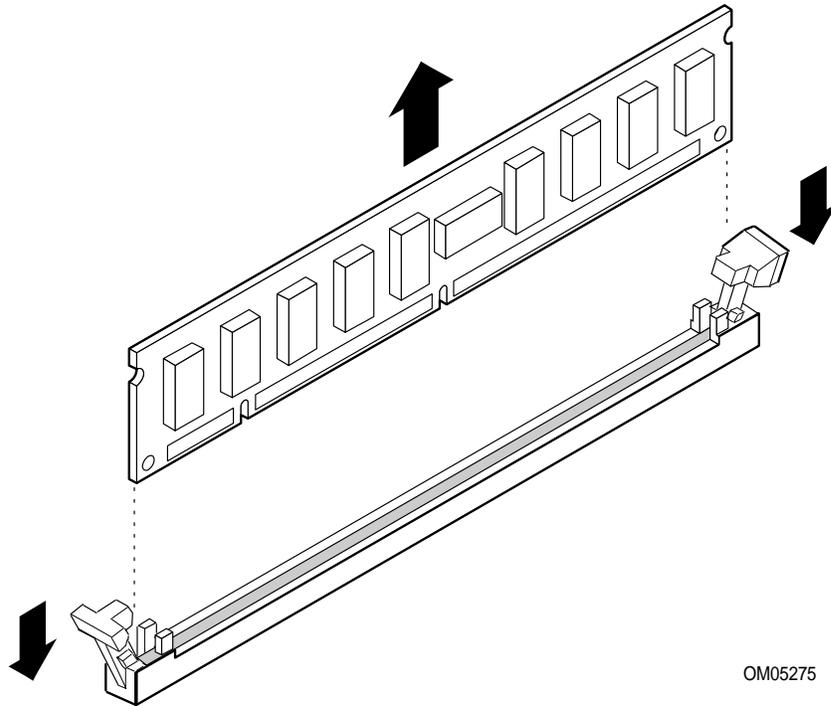
Figure 6-4. Removing ECC Memory DIMMs

8. Install the memory module and the left side cover and as described in Chapter 4, "Working Inside Your System."

9. Connect all external cables and the power cord(s) to the system.

10. Turn on the monitor and then the system.

11. Run the System Configuration Utility (SCU) to configure the system and to properly attribute ECC memory. Failure to do so may degrade the performance of your system. For information about running the SCU, see Chapter 3, "Configuring The System."

System Board Resources

Video Memory DRAM

The system board comes with 512 KB of onboard video memory. Increasing the video memory buffer size to 1 MB with a 40-pin 256 K x 16, 60 ns fast-page DRAM allows the controller to support 132-column text modes and high resolution graphics with 1280 x 1024 x 16 colors. Depending on the environment, the controller displays up to 64,000 colors in some video resolutions.

⟹ **Note**
DRAMs from only certain manufacturers have been tested for compatibility with the system. Contact your dealer or sales representative for a list of approved manufacturers and their devices.

Installing the Video Memory DRAM

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover as described in Chapter 4, "Working Inside Your System."

3. Remove the 256 K x 16, 60 ns DRAM from its protective package, and align the dot on the DRAM with the beveled end of socket U25 (Figure 6-5) on the system board.

4. Press the DRAM down firmly until it is fully seated in the socket.

5. Replace the left side cover as described in Chapter 4, "Working Inside Your System."

Removing the Video Memory DRAM

1. Observe the warnings and cautions on page 3, "Safety Guidelines."

2. Remove the left side cover as described in Chapter 4, "Working Inside Your System."

3. Using an IC removal tool, remove the video memory DRAM from socket U7C1 (Figure 6-5) on the system board, place it on a conductive foam pad, and store it in an antistatic protective package.

4. Replace the left side cover as described in Chapter 4, "Working Inside Your System."
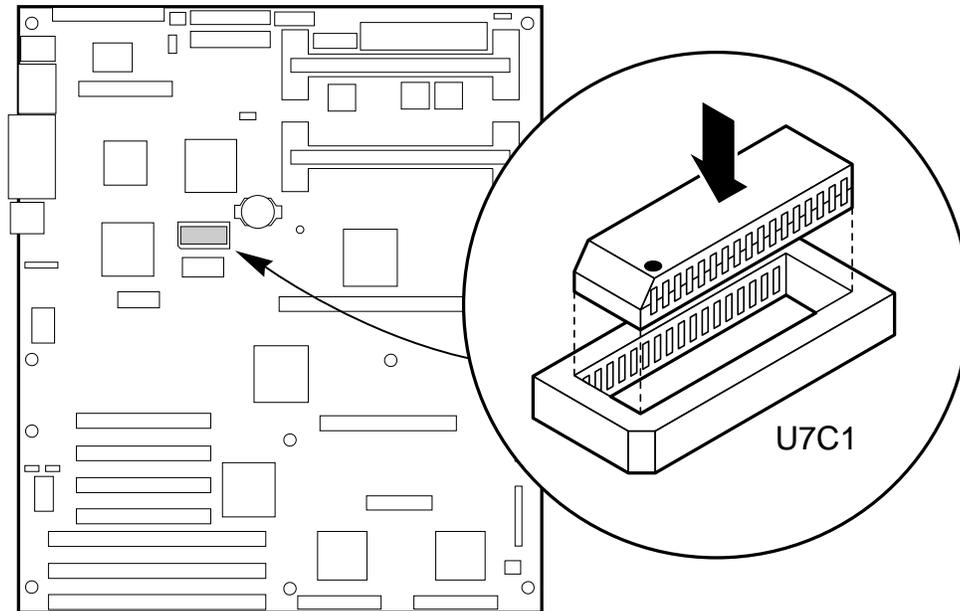
OM05781

Figure 6-5. Video Memory DRAM

⚠️   **WARNING**
**Installing the video DRAM chip incorrectly in the socket
could produce an extremely high case temperature,
destroy the chip, and possibly the system board. Do not
touch the chip after such an occurrence until you
determine that the case is not at an elevated temperature.**

I/O Addresses and Resources

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

Address	Resource
0000h–000Fh	DMA Controller 1
0020h–0021h	Interrupt Controller 1
002Eh–002Fh	Super I/O Index and Data Ports
0040h–0043h	Programmable Timer
0060h, 0064h	Keyboard Controller
0061h	NMI Status & Control Register
0070h	NMI Mask (bit 7) & RTC Address (bits 6:0)
0071h	Real Time Clock (RTC)
0080h–0081h	BIOS Timer
0080h–008Fh	DMA Low Page Register
0092h	System Control Port A (PC-AT[†] control Port)
00A0h–00BFh	Interrupt Controller 2
00C0h–00DFh	DMA Controller 2
00F0h	Clear NPX error
00F8h–00FFh	x87 Numeric Coprocessor
0170h–0177h	Secondary Fixed Disk Controller (IDE)
01F0h–01F7h	Primary Fixed Disk Controller (IDE)
0200h–0207h	Game I/O Port
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 Floppy
0378h–037Fh	Parallel Port 2
03B4h–03BAh	Monochrome Display Port
03BCh–03BFh	Parallel Port 1 (Primary)

Continued

Address	Resource
03C0h–03CFh	Video Display Controller
03D4h–03DAh	Color Graphics Controller
03E8h–03EFh	Serial Port A
03F0h–03F5h	Floppy Disk Controller
03F6h–03F7h	Primary IDE - Secondary Floppy
03F8h–03FFh	Serial Port A (Primary)
0400h–043Fh	DMA Controller 1, Extended Mode Registers
0461h	Extended NMI / Reset Control
0462h	Software NMI
0480h–048Fh	DMA High Page Register
04C0h–04CFh	DMA Controller 2, High Base Register
04D0h–04D1h	Interrupt Controllers 1 and 2 Control Register
04D4h–04D7h	DMA Controller 2, Extended Mode Register
04D8h–04DFh	Reserved
04E0h–04FFh	DMA Channel Stop Registers
0678h–067Ah	Parallel Port (ECP)
0778h–077Ah	Parallel Port (ECP)
07BCh–07BEh	Parallel Port (ECP)
0800h–08FFh	NVRAM
0CA4	PCI to IRQ rerouter control (PCI_INTB_L, PCI_INTA_L)
0CA5	PCI to IRQ rerouter control (PCI_INTD_L, PCI_INTC_L)
0CA6h–0CA7h	Reserved
0CA9h	DISMIC Data Register
0CAAh	DISMIC Control/Status Register
0CABh	DISMIC Flags Register
0C84h	Board Revision Register
0C85h–0C86h	BIOS Function Control
0CF8h	PCI CONFIG_ADDRESS Register
0CF9h	PMC Turbo and Reset control
0CFCh	PCI CONFIG_DATA Register
46E8h	Video Display Controller
xx00–xx1F*	SCSI registers

*   SCSI I/O base address is set using the configuration registers.

Interrupts

The following table shows the logical interrupt mapping of interrupt sources on the system board.

Interrupt	Description (active-low signals have an "_L" symbol following them)
INTR	Processor interrupt.
NMI	NMI from DISMIC to processor.
IRQ0/MIRQ0	System board interrupt request 0 connected to input 2 of the I/O Apic. (For proper operation, the BIOS must set the IRQ0 enable bit in PIIX3 register 70h during initialization.)
IRQ1	RTC.
IRQ3	Serial port A or B interrupt from 87307VUL device, user configurable.
IRQ4	Serial port A or B interrupt from 87307VUL device, user configurable.
IRQ5	Parallel port.
IRQ6	Floppy diskette.
IRQ7	Parallel port.
IRQ8_L	
IRQ9	
IRQ10	
IRQ11	
IRQ12	Keyboard/mouse interrupt from 87307VUL.
IRQ14	Compatibility IDE interrupt from primary IDE devices 0 and 1.
IRQ15	
IDE_IRQ	Tide to IRQ14; hard wired from PIIX3.
The following signals will be rerouted to the above interrupts:	
PCI_INTA_L	PCI Interrupt signal A from PIIX3. Wired to PCI-0 slot 1 INTA_L, PCI-0 slot 2 INTD_L, PCI-0 slot 3 INTC_L, PCI-0 slot 4 INTB_L, PCI-1 slot 1 INTA_L, and PCI-1 slot 2 INTD_L.
PCI_INTB_L	PCI Interrupt signal B from PIIX3. Wired to PCI-0 slot 1 INTB_L, PCI-0 slot 2 INTA_L, PCI-0 slot 3 INTD_L, PCI-0 slot 4 INTC_L, PCI-1 slot 1 INTB_L, and PCI-1 slot 2 INTA_L. This interrupt is also used by the SCSI controller.
PCI_INTC_L	PCI Interrupt signal C from PIIX3. Wired to PCI-0 slot 1 INTC_L, PCI-0 slot 2 INTB_L, PCI-0 slot 3 INTA_L, PCI-0 slot 4 INTD_L, PCI-1 slot 1 INTC_L, and PCI-1 slot 2 INTB_L. This interrupt is also used by the Network controller.
PCI_INTD_L	PCI Interrupt signal D from PIIX3. Wired to PCI-0 slot 1 INTD_L, PCI-0 slot 2 INTC_L, PCI-0 slot 3 INTB_L, PCI-0 slot 4 INTA_L, PCI-1 slot 1 INTD_L, PCI-1 slot 2 INTC_L.
SMI_L	System Management Interrupt. General-purpose error indicator from a control PAL that provides an SMI_L from nontraditional error sources (PERR_L, SERR_L, and others).

Flash ROM

An 8-bit flash memory device provides 512 K x 8 of BIOS and nonvolatile storage space. The device is addressed as 8-bit ISA memory.

You can load a new copy of the BIOS into flash memory by using the Flash Memory Update Utility (FMUP) diskette.

☐ ☐ ☐

Power System 7

This chapter describes the power system and explains how to calculate power consumption.

Power System Configurations

The server contains a modular power system that may be configured with one, two, or three 360 watt power supplies.

Configuration level	Redundancy	Number of supplies
Entry	Nonredundant	1
Entry	Redundant	2
Maximum	Nonredundant	2
Maximum	Redundant	3

An entry level power system typically limits the server configuration to dual processors, 1 GB memory, five hard drives, and total power dissipated. A maximum level power system provides power for fully configured servers.

Each power supply has a built-in fan and its own power cord. For servers with redundant power systems, the loss of a single power supply will not affect the operation of the server.

A redundant power system uses a power share backplane to distribute power to the server. The backplane implements these server management features:

- I^{2}C bus

- Power supply failure

- Maximum current

- Current usage

- Number of power supplies installed in the server's power system

- Redundant mode

- 240 VA limit

The current sensing feature of the power share backplane shuts down the entire power system if any *single output* from the backplane to the system board or peripherals exceeds 240 VA. Current sensing limits the energy supplied by the power share backplane to levels generally accepted as operator accessible areas—less than 240 VA for the CSA Level 3 category—without the use of interlocks.

If a power supply fails in a redundant power system, the yellow power supply failure LED on the front panel starts flashing. The power supply can be easily replaced without shutting down the system. The power supply is inserted through the back of the chassis and held in place with four screws.

Power System Voltages	+3.3V	+5V	+12V	-5V	-12V
One power supply, entry level nonredundant (Total combined output power of +3.3 V and +5 V should not exceed 178W)	13 A	32 A	15.5 A	0.25 A	0.5 A
Two power supplies, entry level redundant	13 A*	30 A	13.5 A	0.25 A	0.5 A
Two power supplies, maximum level nonredundant	18 A **	46 A	29 A	0.5 A	1.0 A
Three power supplies, maximum level redundant	18 A **	46 A	29 A	0.5 A	1.0 A

* No more than 5A to be used by PCI slots.
** No more than 10A to be used by PCI slots.

Power System Control Signals

Power Enable/Disable (PON)

The PON control signal originates on the system board, and it is routed through the power share backplane microcontroller. If the +5 V and +12 V power going to the system board or the peripherals exceeds 240 VA, the backplane microcontroller will disassert the PON control going to each power supply (J4, J6, and J9). This signal is used to enable and disable the power supplies.

Remote Sense Connections

Individual remote sense outputs are provided to each +5 V and +3.3 V power supply section. Remote voltage sense for +5 V and +3.3 V is done on the system board. The +5 V and +3.3 V remote sense lines are routed through the power share backplane and connect to the current sense circuitry.

The +12 V is not sensed remotely. Instead, it is sensed on the power share backplane.

Load Share Connection

In systems with redundant power systems, the +5 V, +3.3 V, and +12 V outputs from each power supply are routed through the power share backplane. The current from each power supply output is monitored with a current monitoring circuit. This current's value is used to adjust the load share of each power supply output.

Output Power Connections

The +12 V, +5 V, and +3.3 V power outputs are routed through J1 to the system board power connector. The +12 V and +5 V power outputs are also routed through J5 to the peripheral power connector.

The -12 V, -5 V, and +5 V standby outputs are joined together through an isolation circuit and connected to the system board through connector J1.

Power Good Circuit

The power good circuit looks at the levels of the power good (PGOOD) signals. When the backplane PGOOD circuit senses a PGOOD signal, a system PGOOD is asserted after an approximately 550 ms delay. Only a single PGOOD signal assertion will cause the assertion of the system PGOOD.

VA Monitor Circuit

The total supply current that forms part of the load sharing circuit monitors +3.3 V as well as +5 V and +12 V on the system board. The microcontroller determines the current supplied to the system board by subtracting the peripheral current from the total current.

If either the system board power or peripheral power exceeds 240 VA, the backplane microcontroller disables the supply outputs by disasserting PON. The following table shows the maximum available current to each of the system connections. Resetting the circuit requires unplugging all of the power supplies.

Connectors	+5 V	+12 V
J1	44 A (+4 A)	16 A (+4 A)
J5	44 A (+4 A)	16 A (+4 A)

The maximum current number shown is the sum of the currents from all supplies.

I²C Communication Circuit

The power share backplane microcontroller communicates with a similar device on the system board through an I^{2}C data link. This link reports the number of power supplies in the server, current and power to the system board and peripherals, and power supply status. The I^{2}C signals are routed through J2 to the system board.

System Current Monitor

The system current monitor on the power share backplane sends a power usage report to the server via the I²C communications bus. The backplane microcontroller contains analog-to-digital converters that monitor DC voltage levels supplied by the current sense circuits. They represent the current load on the +3.3 V output from the system board and the +5 V and +12 V load at both the system board and the peripheral bays.

If either the +5 V or +12 V load from the system board or the peripherals goes beyond the CSA Level 3 requirement of 240 VA, the power is shut off immediately by disserting PON. It is impossible to draw 240 VA from the 3.3 Volt power supply output even when three supplies are installed in the server. The following table shows the maximum current allowed by each voltage output for a server with three 360 watt power supplies.

Voltage	Maximum Current in Amperes	240 VA Limit
+3.3 V	33 A	N/A
+5 V	96 A	48 A
+12 V	36 A (or 48 A for 12 ns maximum)	20 A

A voltage level within the range of 0 to 5 V is supplied by the current sense circuits on the power share backplane. The current limit threshold is set to 44 A ±4 A for each +5 V channel and 16 A +4 A for each +12 V channel.

Power Supply FAULT

Each power supply provides a power good (PGOOD) signal that is asserted high. If a power supply fails, its PGOOD signal goes low. The power supply outputs are enabled through assertion of the PON signal. If the PGOOD signal goes low, indicating a power bad condition while PON is asserted, a FAULT is generated and applied to one of the FAULT inputs of the backplane microcontroller.

Power Supply Presence DETECT

The DETECT signal senses the number of power supplies (operational or not) in the server. Each power supply presents a grounding connection to one of the backplane microcontroller input pins to show that a power supply is present. If a power supply is not present, the backplane microcontroller input pin will be pulled high through a pull-up resistor to +5 V standby.

Power Share Backplane Interconnections

Power Supply to Powershare Board Connections

The following power supply signals connect to input connectors J3, J7, and J11 on the power share backplane.

PIN	SIGNAL	PIN	SIGNAL
1	Power Good	19	PS-ON
2	+5V Standby	20	Remote Sense Return
3	Predictive Failure	21	+5V Remote Sense
4	+3.3V Remote Sense	22	+12V Remote Sense
5	Supply Present (Pwr Gnd)	23	+24VDC
6	-5VDC	24	-12VDC
7	Ground	25	+5VDC
8	Ground	26	+5VDC
9	Ground	27	+5VDC
10	Ground	28	+5VDC
11	Ground	29	+5VDC
12	Ground	30	+5VDC
13	Ground	31	+12VDC
14	Ground	32	+12VDC
15	Ground	33	+12VDC
16	Ground	34	+3.3VDC
17	Ground	35	+3.3VDC
18	Ground	36	+3.3VDC

Backplane to System Board Power Interface

Connector J1 on the backplane provides power to the system board.

Pin	Signal	Color	Pin	Signal	Color
1	+5 V	Red	13	+5 V	Red
2	+5 V	Red	14	+5 V	Red
3	-5 V	White	15	+5 V	Red
4	-12 V	Blue	16	+5 V	Red
5	GND	Black	17	GND	Black
6	GND	Black	18	GND	Black
7	GND	Black	19	GND	Black
8	GND	Black	20	GND	Black
9	GND	Black	21	GND	Black
10	+3.3 V	Orange	22	+3.3 V	Orange
11	+12 V	Yellow	23	+3.3 V	Orange
12	+12 V	Yellow	24	+12 V	Yellow

Backplane to Peripheral Interface

Connector J5 on the backplane supplies +5 VDC and +12 VDC power to the server peripherals.

Pin	Signal	Description	Pin	Signal	Description
1	GND	SCSI Bay #1, Ground	11	GND	SCSI Bay #1, Ground
2	+5 VDC	SCSI Bay #1, +5 V	12	+12 VDC	SCSI Bay #1, +12 V
3	GND	SCSI Bay #2, Ground	13	GND	SCSI Bay #2, Ground
4	+5 VDC	SCSI Bay #2, +5 V	14	+12 VDC	SCSI Bay #2, +12 V
5	GND	Peripheral Bay #1, Ground	15	GND	Peripheral Bay #1, Ground
6	+5 VDC	Peripheral Bay #1, +5 V	16	+12 VDC	Peripheral Bay #1, +12 V
7	GND	Peripheral Bay #2, Ground	17	GND	Peripheral Bay #1, Ground
8	+5 VDC	Peripheral Bay #2, +5 V	18	+12 VDC	Peripheral Bay #1, +12 V
9	GND	Peripheral Bay #3, Ground	19	GND	Peripheral Bay #1, Ground
10	+5 VDC	Peripheral Bay #3, +5V	20	+12 VDC	Peripheral Bay #1, +12 V

Backplane to System Board Control Connections

Connector J2 on the backplane connects I^2C, remote sense, and power supply controls to the system board.

Pin	Connector Designator	Description
1	RS GND	Remote sense ground (-)
2	+5 V RS	+5 VDC remote sense (+)
3	+3.3 V RS	+3.3 VDC remote sense (+)
4	GND	Ground
5	I2C-SCL	I^2C serial clock
6	I2C-SDA	I^2C serial data
7	GND	Ground
8	PGOOD	Power good indication
9	PON	Power ON control
10	GND	Ground
11	+5 V Stdby	+5 VDC standby
12	NC	Key
13	+24 V	+24 VDC
14	24 V RTN	24 VDC return

Power Supply Input Voltages

The server may contain one, two, or three autoranging 360 watt power supplies that are designed to minimize EMI and RFI. The input voltage ranges are

- 100-120 VAC at 50/60 Hertz (Hz); 6.0 A maximum current

- 200-240 VAC at 50/60 Hz; 3.0 A maximum current

Power Supply Output Voltages

The table below lists the total watts available for each voltage. Adjust your loads so that the combined total wattage for your system configuration is less than

- 360 watts for an entry level nonredundant power system

- 318.5 watts for an entry level redundant power system

- 649 watts for a maximum level power system

For information about calculating the power usage for your system configuration, see "Calculating Power Usage" on page 174

Voltage	Maximum Continuous Current	Minimum Load Current	Peak Current	Watts
+3.3 V	13.0 A	0.5 A		39 W
+5.0 V	30.0 A	5.0 A		150.0 W
–5.0 V	0.25 A			1.25 W
5V Standby	0.1 A			
+12.0 V	15.5 A	2.0 A	16.0 A	186.0 W
–12.0 V	0.5 A			6.0 W

Server Current Usage

As an overall current usage limitation on the power supply, do not exceed its maximum output capacity of 32 amperes at +5 volts (160 watts) and 11 amperes at +3.3 volts (36.3 watts). The combined power output for the +5 and +3.3 volt outputs should not exceed 178 watts.

The maximum current allowed at +5 volts for each PCI and ISA slot on the system board is 2 amperes (10 watts).

The cooling efficiency varies per slot; therefore, ensure that adequate cooling is available in the target slot—especially in an expansion slot drawing more than 2.0 amperes.

Device	Current (maximum) at voltage levels:			
	+5 V	+3.3 V	+12 V	−12 V
System board (includes first processor) ➡ **Note** The current usage may vary depending on the processors and the size and number of DIMMs installed on the memory module.	1.8 A	3.0 A	5.5 A	0.05 A
Second processor : ➡ **Note** The current usage may vary depending on the processors and the size and number of DIMMs installed on the memory module.	10 A	0 A	0 A	0
RPX board	3.0 A			
Server monitor module	0.5 A		0.8 A	
3.5-inch diskette drive	0.3 A			
3.5-inch SCSI hard disk drive, 4 GB	0.8 A		0.8 A	
SCSI tape drive	0.3 A		2.0 A	
CD-ROM drive	0.4 A		1.0 A	
ISA bus slot	2.0 A			
PCI bus slot	2.0 A	2.0 A		
Cooling blower 1, 97 mm Cooling blower 2, 97 mm Cooling fan 3, 92 mm Cooling fan 4, 92 mm Cooling fan 5, 92 mm			0.43 A 0.43 A 0.43 A 0.43 A 0.43 A	
SCSI hot-docking backplane	1.0 A			

Calculating Power Usage

Use the worksheets in Tables 7-1 and 7-2 to calculate the total DC power used by your system configuration.

The documentation that comes with each add-in board and peripheral device should specify its current and voltage requirements.

To calculate the total combined wattage for your system, do this:

1. List the current for each board and device in the appropriate voltage level column in Table 7-2.

2. Add the currents in each column of Table 7-2, and enter the total current for each column in Table 7-1.

3. Multiply the voltage by the total current to get the total wattage for each voltage level.

4. Add the total wattage for each voltage level to arrive at a total combined power usage on the power supply.

⟹   **Note**
The total combined wattage for your system configuration must be less than 360 watts.

Table 7-1. Total Combined Power Used by Your System

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**

Table 7-2. Worksheet for Calculating DC Power Usage

Device	Current (maximum) at voltage levels:				
	+3.3 V	+5 V	−5 V	+12 V	−12 V
System board	3.0 A	1.8 A		0.1 A	0.1 A
Second processor	0	10.0 A		0	0
RPX board	0	3.0 A		0	0
3.5-inch diskette drive		0.3 A			
CD-ROM drive		0.4 A		1.0 A	
Cooling fan 1, 92 mm				0.43 A	
Cooling fan 2, 92 mm				0.43 A	
Cooling fan 3, 92 mm				0.43 A	
Cooling fan 4, 92 mm				0.43 A	
Cooling fan 5, 92 mm				0.43 A	
PCI-P slot 1					
PCI-P slot 2					
PCI-P slot 3					
PCI-S slot 1					
PCI-S slot 2					
PCI-S slot 3					
PCI-S slot 4					
ISA slot 1					
ISA slot 2					
ISA slot 3					

Continued

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Table 7-2. Worksheet for Calculating DC Power Usage

Device	Current (maximum) at voltage levels:	
	+5 V	+12 V
1st 3.5-inch SCSI hard disk drive		
2nd 3.5-inch SCSI hard disk drive		
3rd 3.5-inch SCSI hard disk drive		
4th 3.5-inch SCSI hard disk drive		
5th 3.5-inch SCSI hard disk drive		
6th 3.5-inch SCSI hard disk drive		
7th 3.5-inch SCSI hard disk drive		
8th 3.5-inch SCSI hard disk drive		
9th 3.5-inch SCSI hard disk drive		
10th 3.5-inch SCSI hard disk drive		
SCSI tape drive		
CD-ROM drive		
IDE drive		
Total Current		

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System Board Jumpers 8

This chapter tells how to set the system board jumpers for specific operating parameters.

Warnings and Cautions

Before you remove the covers to work inside it, observe the warnings and cautions provided for your safety on page 3, "Safety Guidelines." System integration should be done by a qualified technical person.

Tools and Supplies You Need

- Phillips (cross-head) screwdriver (#1 bit and #2 bit)
- Jumper removal tool or needle-nosed pliers
- Pen or pencil
- Antistatic wrist strap (recommended)

Configuration Jumpers

The jumper is a small plastic-encased conductor (shorting plug) that slips over two jumper pins. To change a jumper setting, use a jumper removal tool, needle-nosed pliers, or your fingers to remove the jumper from its current location. Position the jumper over the two pins for the desired setting, and press it onto them. Be careful not to bend the pins.

The figure below shows the default jumper settings.
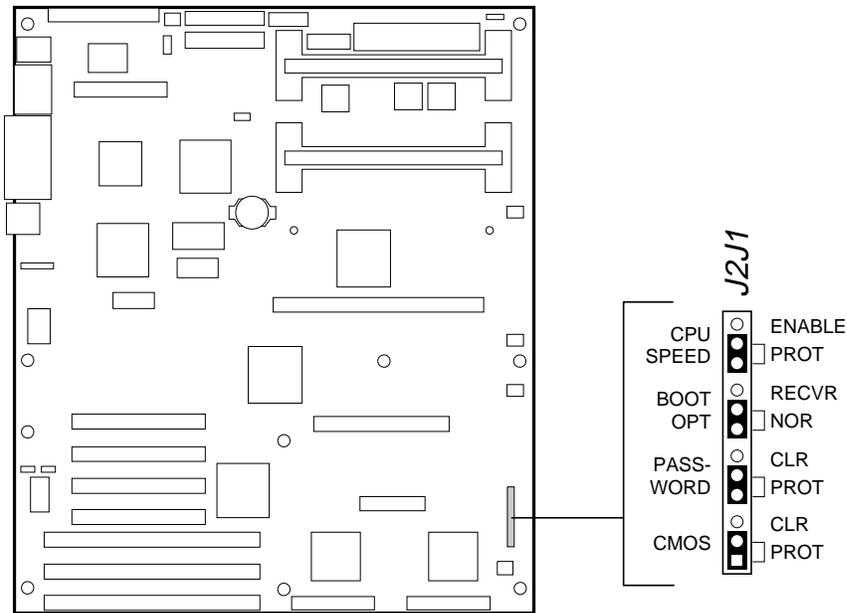
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Figure 8-**1. System Board Jumpers**

Table 8-1. System Board Jumpers

Jumper	Pins (default in bold)	Description
CPU Speed	Enable	Permits changing the processor speed in the BIOS setup program.
	Protect	Prevents changing the processor speed.
Boot Option	Recovery Boot	Prevents inverting address A16. Allows the system to boot from the Recovery BIOS when the normal BIOS gets corrupted—if you are unable to reload a fresh copy from the diskette.
	Normal Boot	Inverts address A16 so the Normal BIOS does not reside at the top of Flash memory where the write-protected Recovery BIOS region is located.
Password	Clear	Clears the password.
	Protect	Maintains the current system password.
CMOS	Clear	Replaces the contents of NVRAM with the manufacturing default settings.
	Protect	Preserves the contents of NVRAM.

Chassis Intrusion Detection

The chassis contains alarm switches that get activated if a cover is removed. To bypass the chassis intrusion switches, do this:

1. Observe the precautions on page 3, "Safety Guidelines."

2. Remove the left side cover as described in Chapter 4, "Working Inside Your System."

3. Move the jumper on J3J1, Chassis INTR Detect from the ENA pins to the DIS pins.

4. Replace the left side cover, and connect the power cord(s) to the system.

5. Turn the system on, and wait for POST to complete; for instructions on running POST, see Chapter 3, "Configuring The System."

6. Run the SCU to configure your system. For information on running the SCU, see Chapter 3, "Configuring The System."

Fault Resilient Booting (FRB)

The jumper on the J3J1 FRB ENA pins allows the system to boot from processor 1 if processor 0 fails. Moving the jumper to the DIS pins lets the system boot only from processor 0.

To boot only from processor 0, do this:

1. Observe the precautions on page 3, "Safety Guidelines."

2. Remove the left side cover as described in Chapter 4, "Working Inside Your System."

3. Move the jumper on the J3J1, FRB from the ENA pins to the DIS pins.

4. Replace the left side cover, and connect the power cord(s) to the system.

5. Turn the system on, and wait for POST to complete; for instructions on running POST, see Chapter 3, "Configuring The System."

6. Run the SCU to configure your system. For information on running the SCU, see Chapter 3, "Configuring The System."

Flash Memory

The jumper on the J3J1, Flash PROG pins applies +12 V power to the VPP pin on the flash memory device. This allows you to update the BIOS in flash memory with a special Flash Memory Update Utility. Moving the jumper to the PROT pins protects the contents of flash memory.

For a copy of the latest system BIOS release, contact your dealer or sales representative.

Updating the BIOS

Before you can update the system BIOS from the Flash Memory Update Utility diskette, you must make it MS-DOS bootable. You must have either MS-DOS version 5.00 or 6.00 (or greater) installed on C:\DOS.

To prevent accidentally installing a BIOS for a different type of system, the update utility insures that the BIOS matches the target system.

⚠ **CAUTION**
To avoid memory conflicts, do not run the update utility
with extended memory managers.

To update the BIOS, do this:

1. Observe the precautions on page 3, "Safety Guidelines."

2. Insert the update diskette into drive A, and turn on the monitor and system. The update process starts automatically when the system boots. Follow the screen prompts.

3. When the update process completes, remove the diskette, and press reset. Wait for POST to complete; for instructions on running POST, see Chapter 3, "Configuring The System."

4. If you want to protect the contents of flash memory, turn the system off and remove the left side cover as described in Chapter 4, "Working Inside Your System."

5. Move the jumper on the J3J1, Flash PROG pins to the PROT pins to write protect the flash memory device.

6. Replace the left side cover, and connect the power cord(s) to the system.

⟹ **Note**
If the system BIOS becomes corrupted during the update process—for example, a power outage occurs—follow the "Recovering the BIOS" procedure on page 182.

CPU Speed

To set the processor speed, do this:

⚠ **CAUTION**
Over-clocking the processor may damage it and your data.

1. Observe the precautions on page 3, "Safety Guidelines."

2. Remove the left side cover as described in Chapter 4, "Working Inside Your System."

3. Move the jumper on the J2J1, CPU Speed PROT pins to the Enable pins to activate the CPU Speed Setting field in the BIOS Setup Utility.

4. Replace the left side cover, and connect the power cord(s) to the system.

5. Run the BIOS Setup Utility as described in Chapter 3, "Configuring The System."

6. Select the proper speed for your processor.

7. Repeat step 2 above.

8. Move the jumper on the J2J1, CPU Speed Enable pins to the PROT pins.

9. Repeat step 4 above.

Boot Option

Moving the boot option jumper on the J2J1, Boot Opt NOR pins to the REC pins enables the BIOS flash memory special recovery mode. The system BIOS can be corrupted, for example, when the update procedure is aborted due to a power outage. However, flash memory contains a protected area that cannot be corrupted. Code in this area is used to boot the computer from drive A when the BIOS has been corrupted. After booting, the Flash Memory Update Utility is used to automatically recover the system BIOS from the BIOS recovery files on the diskette.

⟹ **Note**
If you have mapped the BIOS of an add-in board to any part of the E0000H address range, you must either map it to another area before completing a recovery procedure or physically remove the board from the system. You do not have to remove add-in boards for normal BIOS updates.

Recovering the BIOS

To recover the BIOS, do this:

1. Observe the precautions on page 3, "Safety Guidelines."

2. Remove the left side cover as described in Chapter 4, "Working Inside Your System."

3. Move the jumper from the J2J1, Boot Opt NOR pins to the REC pins to allow the system to boot from the recovery BIOS.

4. Replace the left side cover, and insert the Flash Memory Update Utility diskette in drive A.

5. Connect the power cord(s) to the system, and turn it on. After the system boots, the speaker emits a single beep and the recovery process starts—it 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.

Chapter 8 System Board Jumpers

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.

6. Turn the system off, disconnect the power cord(s) from the system, and remove the left side cover.

7. Move the jumper from the REC pins to the NOR pins to enable the normal boot mode.

8. Replace the left side cover, remove the diskette from drive A, and connect the power cord(s) to the system.

9. After running the special recovery mode, run the SCU to specify a new password. For information on running the SCU, see Chapter 3, "Configuring The System."

Password

The jumper on the J2J1, Password PROT pins protects the system password during system reset. Moving the jumper to the CLR pins clears the system password during system reset.

To clear and enter your password, do this:

1. Observe the precautions on page 3, "Safety Guidelines."

2. Remove the left side cover as described in Chapter 4, "Working Inside Your System."

3. Move the jumper on the J2J1, Password PROT pins to the CLR pins.

4. Replace the left side cover, and connect the power cord(s) to the system.

5. Turn the system on, and wait for POST to complete. This automatically clears the password. For instructions on running POST, see Chapter 3, "Configuring The System."

6. Turn the system off; disconnect the power cord(s), and remove the left side cover.

7. Move the jumper on the J2J1, Password CLR pins to the PROT pins.

8. Replace the left side cover, and connect the power cord(s) to the system.

9. Run the SCU to specify a new password. For information on running the SCU, see Chapter 3, "Configuring The System."

CMOS

The jumper on the J2J1, CMOS PROT pins preserves the CMOS settings during system reset. Moving the jumper to the CLR pins clears CMOS and sets it and the real-time clock (RTC) to the manufacturing default settings during system reset.

To reset the system's CMOS and the RTC to factory default values, do this:

1. Observe the precautions on page 3, "Safety Guidelines."

2. Remove the left side cover as described in Chapter 4, "Working Inside Your System."

3. Move the jumper on the J2J1, CMOS PROT pins to the CLR pins.

4. Replace the left side cover, and connect the power cord(s) to the system.

5. Turn the system on, and wait for POST to complete. This automatically reprograms CMOS and RTC to their default settings. For instructions on running POST, see Chapter 3, "Configuring The System."

6. Turn the system off, disconnect the power cord(s) from the system, and remove the left side cover.

7. Move the jumper on the J2J1, CMOS CLR pins to the PROT pins.

8. Replace the left side cover, and connect the power cord(s) to the system.

9. Run the SCU to configure your system. For information on running the SCU, see Chapter 3, "Configuring The System."

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I/O Ports and Connectors 9
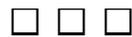
Signal States

In all tables in this chapter, active-low signal names have an "_L" symbol following the name; for example, P_REQ_SLOT0_L. Active-high signal names do not have a "_L" suffix.

Server System Board

The system board contains both PCI and ISA I/O systems with several embedded devices for video, network, and disk control. The board also provides

- server management/monitoring hardware support

- interrupt control (I/O APIC and standard PC)

- a primary PCI bus segment (PCI-0) with four expansion connectors and two embedded devices

- an ISA bus segment with three expansion connectors (one physically shared with PCI-0)

- a National Semiconductor Super I/O chip providing all PC-compatible I/O and Xbus interfaces

System Board Layout

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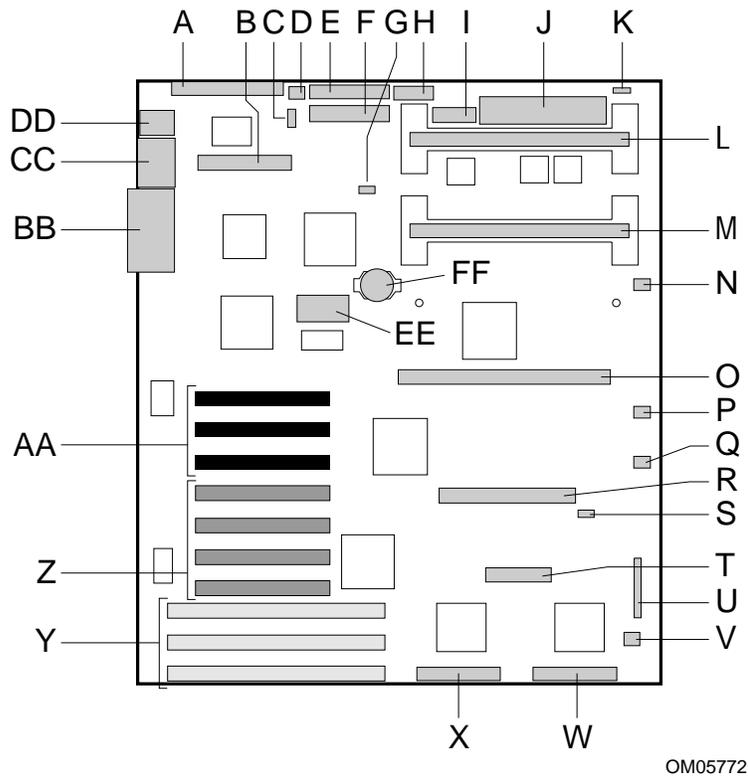
Figure 9-1. System Board Layout

System Board Connector Locations

A	Narrow SCSI connector	Q	Fan 3 connector
B	IDE connector	R	RP connector
C	I^{2}C connector	S	I^{2}C connector
D	Fan 0	T	Server management connector
E	Floppy drive connector	U	Jumper block J2J1
F	Power connector	V	Fan 4 connector
G	Hard disk activity input	W	Wide SCSI channel B
H	Auxiliary power connector	X	Wide SCSI channel A
I	Front panel connector	Y	ISA bus slots
J	VRM connector	Z	Secondary PCI bus slots
K	Speaker connector	AA	Primary PCI bus slots
L	Secondary processor connector	BB	Parallel and Video connectors
M	Primary processor connector	CC	Serial port 1 and Serial port 2 connectors
N	Blower 1 connector	DD	Keyboard and mouse connectors
O	Memory module connector	EE	Video memory upgrade socket
P	Blower 2 connector	FF	Back-up battery

Power Connector

Pin	Signal	Color	Pin	Signal	Color
1	+5 V	Red	13	+5 V	Red
2	+5 V	Red	14	+5 V	Red
3	-5 V	White	15	+5 V	Red
4	-12 V	Blue	16	+5 V	Red
5	GND	Black	17	GND	Black
6	GND	Black	18	GND	Black
7	GND	Black	19	GND	Black
8	GND	Black	20	GND	Black
9	GND	Black	21	GND	Black
10	+3.3 V	Orange	22	+3.3 V	Orange
11	+12 V	Yellow	23	+3.3 V	Orange
12	+12 V	Yellow	24	+12 V	Yellow

Auxiliary Power Connector

Pin	Signal
1	+5 V Remote sense return
2	+5 V Remote sense
3	+3.3 V Remote sense
4	+3.3 V Remote sense return

I^{2}C Connector

Pin	Signal
1	LOCAL_I2C_SCL
2	GND (ground)
3	LOCAL_I2C_SDA

Control Panel Connector

Pin	Signal	Pin	Signal
1	GND	9	Fan failure
2	Hard disk activity	10	Chassis intrusion
3	Reset system	11	Power fault condition
4	Toggle system power	12	5 V standby
5	VCC	13	I^2C-SDA
6	Spare	14	GND
7	NMI to CPU	15	I^2C-SCL
8	VCC	16	GND

Diskette Drive Port

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

Wide/Fast 16-Bit SCSI Connector

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Pin	Signal	Pin	Signal
1–16	GND (ground)	49–50	GND (ground)
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	RESERVED	53	RESERVED
20–34	GND (ground)	54	GND (ground)
35	DB 12_L	55	ATN_L
36	DB 13_L	56	GND (ground)
37	DB 14_L	57	BSY_L
38	DB 15_L	58	ACK_L
39	DB P1_L	59	RST_L
40	DB 0_L	60	MSG_L
41	DB 1_L	61	SEL_L
42	DB 2_L	62	CD_L
43	DB 3_L	63	REQ_L
44	DB 4_L	64	I/O_L
45	DB 5_L	65	DB 8_L
46	DB 6_L	66	DB 9_L
47	DB 7_L	67	DB 10_L
48	DB P_L	68	DB 11_L

IDE Connector

Pin	Signal	Pin	Signal
1	IDERST_L	21	IDEDRQ
2	GND	22	GND
3	ID7	23	DIOW_L
4	ID8	24	GND
5	ID6	25	DIOR_L
6	ID9	26	GND
7	ID5	27	IORDY
8	ID10	28	SPSYNC
9	ID4	29	IDEDAK_L
10	ID11	30	GND
11	ID3	31	IDEIRQ14
12	ID12	32	IDEIO16_L
13	ID2	33	IDESA1
14	ID13	34	PDIAG_L
15	ID1	35	IDESA0
16	ID14	36	IDESA2
17	ID0	37	IDECS0_L
18	ID15	38	IDECS1_L
19	GND	39	IDEHDACT_L/DRVPRES_L
20	Keyed	40	GND

Fan Connectors

These connectors are identical.

Pin	Signal
1	GND (ground)
2	Fan sense
3	+12 V

Blower Connectors

These connectors are identical.

Pin	Signal
1	Boost
2	GND (ground)
3	Tachometer
4	+12 V

SCSI Controller Activity LED Connector

Pin	Signal
1	Return
2	Hard disk active
3	Hard disk active
4	Return

Server Management Connector

Pin	Signal	Description
1	SMI_L (input)	System management interrupt
2	I2CCLK (output	I^{2}C clock (8 MHz)
3	GND (power)	Electrical ground
4	KEY	No connection, pin missing
5	PWROFF_L (output)	Power supply off
6	I2CDATA (I/O)	I^{2}C data signal
7	LPOK (input)	Host line power okay
8	KEYUNLK (input)	Keyboard unlock (*not used*)
9	NMI (input)	Nonmaskable interrupt
10	+3.3 V (input)	+3.3 V power
11	RESET_L (output)	Reset system board
12	GND (power)	Electrical ground
13	GND (power)	Electrical ground
14	KEY	No connection, pin missing
15	SECURE (input)	Host in secure mode
16	GND (power)	Electrical ground
17	INTRUD (input)	Chassis is open
18	RESERVERED	No connection, reserved for future use
19	KEY	No connection, pin missing
20	GND (power)	Electrical ground

ISA Connectors

The system board ISA connectors follow the standard pinout given in the ISA Specification.

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	IOCHK_L	B1	GND	C1	SBHE_L	D1	MEMCS16_L
A2	SD7	B2	RSTDRV	C2	LA23	D2	IOCS16_L
A3	SD6	B3	+5 V dc	C3	LA22	D3	IRQ10
A4	SD5	B4	IRQ9	C4	LA21	D4	IRQ11
A5	SD4	B5	-5 V dc	C5	LA20	D5	IRQ12
A6	SD3	B6	DRQ2	C6	LA19	D6	IRQ15
A7	SD2	B7	-12 V dc	C7	LA18	D7	IRQ14
A8	SD1	B8	SRDY_L	C8	LA17	D8	DACK0_L
A9	SD0	B9	+12 V dc	C9	MEMR_L	D9	DRQ0
A10	IOCHRDY	B10	GND	C10	MEMW_L	D10	DACK5_L
A11	AEN	B11	SMEMW_L	C11	SD8	D11	DRQ5
A12	SA19	B12	SMEMR_L	C12	SD9	D12	DACK6_L
A13	SA18	B13	IOW_L	C13	SD10	D13	DRQ6
A14	SA17	B14	IOR_L	C14	SD11	D14	DACK7_L
A15	SA16	B15	DACK3_L	C15	SD12	D15	DRQ7
A16	SA15	B16	DRQ3	C16	SD13	D16	+5 V dc
A17	SA14	B17	DACK1_L	C17	SD14	D17	Master16_L
A18	SA13	B18	DRQ1	C18	SD15	D18	GND
A19	SA12	B19	REFRESH_L				
A20	SA11	B20	SYSCLK				
A21	SA10	B21	IRQ7				
A22	SA9	B22	IRQ6				
A23	SA8	B23	IRQ5				
A24	SA7	B24	IRQ4				
A25	SA6	B25	IRQ3				
A26	SA5	B26	DACK2_L				
A27	SA4	B27	TC				
A28	SA3	B28	BALE				
A29	SA2	B29	+5 V dc				
A30	SA1	B30	+OSC				
A31	SA0	B31	GND				

PCI Connectors

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	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	CLK	A47	AD11	B47	AD12
A17	GNT	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

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Keyboard and Mouse Connectors

These identical PS/2 compatible connectors share a common housing. The top one is the mouse, and the bottom one is the keyboard.
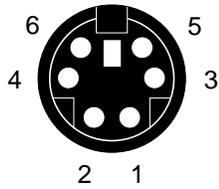
OM00951A

Mouse		Keyboard	
Pin	**Signal**	**Pin**	**Signal**
1	MSEDAT (mouse data)	1	KEYDAT (keyboard data)
2	NC (not connected)	2	NC (not connected)
3	GND (ground)	3	GND (ground)
4	FUSED_VCC (+5 V)	4	FUSED_VCC (+5 V)
5	MSECLK (mouse clock)	5	KEYCLK (keyboard clock)
6	NC (not connected)	6	NC (not connected)

Parallel Port

The IEEE 1284-compatible parallel port—used primarily for a printer—sends data in parallel format.

13   1

25   14
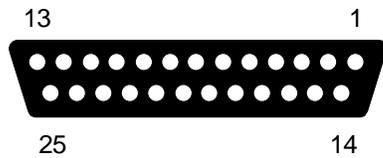
OM00933A

Pin	Signal	Pin	Signal
1	Strobe	10	ACK_L (acknowledge)
2	Data bit 0	11	Busy
3	Data bit 1	12	PE (paper end)
4	Data bit 2	13	SLCT (select)
5	Data bit 3	14	AUFDXT_L (auto feed)
6	Data bit 4	15	Error_L
7	Data bit 5	16	INIT_L (initialize printer)
8	Data bit 6	17	SLCTIN_L (select input)
9	Data bit 7	18–25	GND (ground)

VGA Video Port
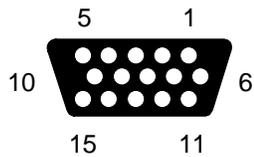
OM00936A

Pin	Signal
1	Red (analog color signal R)
2	Green (analog color signal R)
3	Blue (analog color signal R)
4	NC (not connected)
5–8	GND (video ground)
9	NC (not connected)
10	GND (video ground)
11–12	NC (not connected)
13	HSYNC (horizontal sync)
14	VSYNC (vertical sync)
15	NC (not connected)

Serial Ports

These ports support external devices such as modems and scanners that require serial data transmission.

```
1        5
 ● ● ● ● ●
  ● ● ● ●
6        9
```
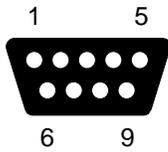
OM00932A

Pin	Signal
1	DCD (data carrier detect)
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 indicator)

□ □ □
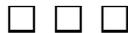
Solving Problems 10

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

Resetting the Server

You can reset the server in a variety of ways.

Manually

Press	To
<Ctrl+Alt+Del>	Clear system memory and reload the operating system. This is a "soft boot" reset.
Reset button	Clear system memory, restart POST, and reload the operating system.
Power off/on	Turn the system power off and then on. This is a "cold boot" reset; it has the same effect as pushing the reset button except that power is halted to all peripherals.

Programmed

You can reset the server with software.

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 processor modules fully seated in their slots on the system board?

❑ Are all add-in ISA and PCI boards fully seated in their slots on the system board?

❑ Are all jumper settings on the system board correct? For information, see Chapter 8, "System Board Jumpers."

❑ 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 on the memory module installed correctly? Refer to Chapter 6, "Server Resources," for installation instructions.

❑ Are all add-in boards and peripheral devices installed correctly? Refer to Chapter 4, "Working Inside Your System."

❑ If the system has a hard disk drive, is it properly formatted or defined?

❑ Is the SCSI hot-docking backplane configured and terminated correctly? For information about the board, see Chapter 5, "SCSI Backplane and Drives: Hot-swapping and Configuring ."

❑ Are all device drivers properly installed? For information about installing drivers, see Chapter 3, "Configuring The System."

❑ Are the configuration settings made with the SCU correct? For information about running the SCU, see Chapter 3, "Configuring The System."

❑ Is the operating system properly loaded? Refer to the operating system documentation.

❑ Did you press the power button on the front panel to turn the server on (power-on light should be lit)?

❑ Is the system power cord properly connected to the system and plugged into a NEMA 5-15R outlet for 100-120 VAC or a NEMA 6-15R outlet for 200-240 VAC? See "Connecting the Power Cord" in Chapter 2, "Installing The System."

❑ Is AC power available at the wall outlet?

If these items are correct, but the problem recurs, refer to "Additional Troubleshooting Procedures" on page 205.

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? Refer to 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 disc, is the disc 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.

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 disc, try a different disc to see if the problem occurs on all discs.

❑ 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 drive, and try running it again. Make sure all the necessary files are installed.

❑ If a software application does not run correctly with the "Boot Speed" set to turbo, try setting it to deturbo with Setup.

❑ 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**
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 suppresser between the power outlet and the server power cord.

❑ If the problem recurs after you have checked and corrected all the above items, refer to "Additional Troubleshooting Procedures" on page 205.

❑ If you receive any error messages, refer to "Error and Informational Messages" on page 213 for an explanation of the messages and suggested corrective actions.

Additional Troubleshooting Procedures

This section provides a more detailed approach to identifying a problem and locating its source.

Preparing the System for Diagnostic Testing

⚠️ **CAUTION**

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 cord is plugged into a properly grounded AC outlet. Refer to Chapter 2, "Installing The System."

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 (refer to 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, refer to "Power Light Does Not Light" on page 207.

Monitoring POST

See Chapter 3, "Configuring The System."

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, refer to "Diskette Drive Activity Light Does Not Light" on page 210.

❑ If a second diskette drive is installed, does its activity light turn on briefly? If not, refer to "Diskette Drive Activity Light Does Not Light" on page 210.

❑ If there is a hard disk drive or a SCSI device installed in the system, does the drive activity light on the front panel turn on briefly? If not, refer to "Hard Disk Drive Activity Light Does Not Light" on page 211.

⟹ **Note**
See "Controls and Indicators" in Chapter 2, "Installing The System."

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, refer to "Initial System Startup" on page 202.

Specific Problems and Corrective Actions

This section provides possible solutions for the following specific problems:

- Power light does not light.

- System cooling fans do not rotate or rotate slowly.

- No characters appear on screen.

- Characters on the screen appear distorted or incorrect.

- No beep or incorrect beep pattern.

- Diskette drive activity light does not light.

- Hard disk drive activity light does not light.

- Tape drive activity light does not light.

- The SCU does not boot.

- Problems with application software.

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:

❑ Is the system operating normally? If so, the power LED is probably defective or the cable from the front panel to the system board is loose.

❑ Are there other problems with the system? If so, check the items listed under "System Cooling Fans Do Not Rotate Properly."

❑ Is the yellow power supply failure LED flashing? If so, a power supply has failed.

If all items are correct and problems persist, 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 will be damaged.

> ⟹ **Note**
> The system has up to seven cooling fans—three of them are integral parts of the power supplies. There are no serviceable components in the power supply. If the power supply is opened, the warranty is voided.

Check the following:

❑ Is AC power available at the wall outlets?

❑ Are the system power cords properly connected to the system and the wall outlets?

❑ If present, are the fuses in the system AC power cord plugs okay?

❑ Did you press the power button?

❑ 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 system board?

❑ Is the cable from the front panel board connected to the system board?

❑ Are the power supply cables properly connected to the power share backplane?

❑ Are the power share backplane cables properly connected to the system board?

❑ 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 outlets, contact your service representative or authorized dealer for assistance.

No Characters Appear on Screen

Check the following:

❑   Is the keyboard working?

❑   Is the video monitor plugged in and turned on?

❑   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 system board connector.

2.   Run the SCU to disable the onboard video controller and specify that an offboard VGA/EGA adapter is installed.

3.   Reboot the system for changes to take effect.

4.   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 Beep Codes" on page 213.

5.   If you do not receive a beep code and characters do not appear, the video display monitor or video controller may have failed. 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? Refer to the manufacturer's documentation.

❑   Are the video monitor signal and power cables properly installed?

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.

Incorrect or no Beep Codes

If the system operates normally, but there was no beep, the speaker may be defective. Verify that the speaker is enabled by running the SCU. For information about running the SCU, see Chapter 3, "Configuring The System." If the speaker is enabled, but not functioning, contact your service representative or authorized dealer for assistance.

Record the beep code emitted by POST, and refer to "Error and Informational Messages" on page 213 for information about beep codes and error messages.

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 SCU 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." For information about running the SCU, see Chapter 3, "Configuring The System."

If the problem persists, there may be a problem with the diskette drive, system board, 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 hard disk drive properly installed?

❑   If your system contains a SCSI host adapter controller board, is it fully seated in the system board connector?

❑   Are all relevant switches and jumpers on the hard disk drive and controller board set correctly?

❑   Is the onboard IDE controller enabled?

> ➡️   **Note**
> The hard disk drive activity light on the front panel lights when either an IDE hard disk drive or SCSI device is in use.

❑   Is the hard disk drive properly configured?

❑   If your system contains a SCSI host adapter controller board, is the hard disk activity LED cable connector plugged into the controller board and the system board?

If you received error messages, refer to "Error and Informational Messages" on page 213 for information about error messages.

If you did not receive error messages, run the SCU and make sure that the hard disk drive is configured with the correct parameters. For information about running the SCU, see Chapter 3, "Configuring The System."

If the problem persists, there may be a problem with the hard disk drive, the add-in controller board, system board, drive signal cable, or LED connector. Contact your service representative or authorized dealer for assistance.

Problems With Application Software

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

1. Verify that the software is properly configured for the system. Refer to the software installation and operation documentation for instructions on setting up and using the software.

2. Try a different copy of the software to see if the problem is with the copy you are using.

3. Make sure all cables are installed correctly.

4. Verify that the system board jumpers are set correctly.

5. Try running the software in a different speed mode. Refer to Chapter 3, "Configuring The System."

6. 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.

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 Beep Codes

Beep codes are a series of individual beeps, each one equal in length. Write down the beep code you hear; this information is useful for your service representative.

Table 10-1. POST Beep Codes

Beeps	Error Message and Conditions
1-2	ROM checksum error; ROM checksum value does not match encoded value in BIOS
1-2-2-3	ROM checksum error; ROM checksum value does not match encoded value in BIOS
1-3-1-1	Refresh failure; memory refresh circuitry on the baseboard is faulty
1-3-1-3	Keyboard controller gate A20 is off; BIOS cannot switch to protected mode
1-3-4-1	Memory error
1-4-1-1	Memory error
2-1-2-3	ROM copyright notice failure
2-2-3-1	Unexpected interrupt

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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 card is installed, it displays this 2-digit code on a pair of hex display LEDs.

Normal Port-80 Codes

These are the port-80 codes and countdown codes displayed during the normal BIOS POST process.

Table 10-2. Port-80 Codes

Port 80 Code	Reason
02	Verify Real Mode
04	Get CPU type
06	Initialize system hardware
08	Initialize chipset registers with initial POST values
09	Set in POST flag
0A	Initialize CPU registers
0B	Enable CPU cache
0C	Initialize caches to initial POST values
0E	Initialize I/O
0F	Initialize the local bus IDE
10	Initialize Power Management
11	Load alternate registers with initial POST values new
12	Restore CPU control word during warm boot
14	Initialize keyboard controller
16	BIOS ROM checksum

Continued

Chapter 10 Solving Problems

Table 10-2. Port-80 Codes (continued)

Port 80 Code	Reason
18	8254 timer initialization
1A	8237 DMA controller initialization
1C	Reset Programmable Interrupt Controller
20	Test DRAM refresh
22	Test 8742 Keyboard Controller
24	Set ES segment register to 4GB
28	Autosize DRAM
2A	Clear 512K base RAM
2C	RAM failure on address line xxxx*
2E	RAM failure on data bits xxxx* of low byte of memory bus
30	RAM failure on data bits xxxx* of high byte of memory bus
32	Test CPU bus-clock frequency
34	Test CMOS
35	RAMInitialize 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

Continued

Table 10-2. Port-80 Codes (continued)

Port 80 Code	Reason
40	Set Initial CPU speed new
42	Initialize interrupt vectors
44	Initialize BIOS interrupts
46	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
4E	Display copyright notice
50	Display CPU type and speed
51	Initialize EISA board
52	Test keyboard
54	Set key click if enabled
56	Enable keyboard
58	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

Continued

Table 10-2. Port-80 Codes (continued)

Port 80 Code	Reason
68	Enable external and CPU 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
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
94	Disable A20 address line

Continued

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Table 10-2. Port-80 Codes (continued)

Port 80 Code	Reason
95	Install CD ROM for boot
96	Clear huge ES segment register
98	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	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

Continued

Table 10‑2. Port‑80 Codes (continued)

Port 80 Code	Reason
C0	Try to boot with INT 19
DO	Interrupt handler error
D2	Unknown interrupt 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 table defines POST error codes and associated messages. These codes may change in the future as the Phoenix BIOS matures and includes the support for POST error code display.

Table 10‑3. POST Error Codes and Messages

Code	Error message
0002	Primary Boot Device Not Found
0010	Cache Memory Failure, Do Not Enable Cache
0015	Primary Output Device Not Found
0016	Primary Input Device Not Found
0042	ISA Config contains invalid info
0050	PnP Memory Conflict:
0051	PnP 32-bit Memory Conflict:
0052	PnP IRQ Conflict:
0053	PnP DMA Conflict:

Continued

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Table 10-3. POST Error Codes and Messages (continued)

Code	Error message
0054	PnP Error Log is Full
0055	Bad PnP Serial ID Checksum:
0056	Bad PnP Resource Data Checksum:
0060	Keyboard Is Locked ... Please Unlock It
0070	CMOS Time & Date Not Set
0080	Option ROM has bad checksum
0083	Shadow of PCI ROM Failed
0085	Shadow of ISA ROM Failed
0131	Floppy Drive A:
0132	Floppy Drive B:
0135	Floppy Disk Controller Failure
0140	Shadow of System BIOS Failed
0170	Disabled CPU slot #
0171	CPU Failure – Slot 1, CPU # 1
0172	CPU Failure – Slot 1, CPU # 2
0173	CPU Failure – Slot 2, CPU # 1
0174	CPU Failure – Slot 2, CPU # 2
0175	CPU modules are incompatible or one is not present.
0176	Previous CPU Failure – CPU # 1
0177	Previous CPU Failure – CPU # 2
0180	Attempting to boot with failed CPU
0181	BSP switched, system may be in uniprocessor mode
0191	CMOS Battery Failed

Continued

Chapter 10 Solving Problems

Table 10-3. POST Error Codes and Messages (continued)

Code	Error message
0195	CMOS System Options Not Set
0198	CMOS Checksum Invalid
0289	System Memory Size Mismatch
0295	Address Line Short Detected
0297	Memory Size Decreased
0299	ECC Error Correction failure
Code	Error message
0301	ECC Single-bit correction failed, Correction Disabled
0302	ECC Double-bit Error
0303	ECC DIMMs incompatible
0310	ECC Address failure, Partition #
0313	ECC Memory Size Decreased, Bank #
0370	Keyboard Controller Error
0373	Keyboard Stuck Key Detected
0375	Keyboard and Mouse Swapped
0380	ECC DIMM failure, Board in slot 1 DIMM #
0392	ECC DIMM failure, Board in slot 2 DIMM #
0430	Timer Channel 2 Failure
0440	Gate-A20 Failure
0441	Unexpected Interrupt in Protected Mode
0445	Master Interrupt Controller Error
0446	Slave Interrupt Controller Error
0450	Master DMA Controller Error

Continued

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Table 10-3. POST Error Codes and Messages (continued)

Code	Error message
0451	Slave DMA Controller Error
0452	DMA Controller Error
0460	Fail-safe Timer NMI Failure
0461	Software Port NMI Failure
0465	Bus Time-out NMI in Slot
0467	Expansion Board NMI in Slot
0501	PCI System Error
0510	PCI Parity Error
0511	PCI System Error
0710	System Board Device Resource Conflict
0711	Static Device Resource Conflict
0780	PCI Segment 1 memory request exceeds 998 MB
0781	PCI Segment 1 I/O requests exceeds 12K
0782	PCI I/O request exceeds amount available
0783	PCI memory request exceeds amount available
0784	Illegal bus for memory request below 1 MB
0785	Memory request below 1 MB exceeds 1 MB
0800	PCI I/O Port Conflict
0801	PCI Memory Conflict
0802	PCI IRQ Conflict
0803	PCI Error Log is Full
0804	PCI ROM not found, May Be OK For This Card:
0805	Insufficient Memory to Shadow PCI ROM:

Continued

Table 10-3. POST Error Codes and Messages (continued)

Code	Error message
0806	Memory Allocation Failure for Second PCI Segment
0809	PCI Error Log is Full
0810	Floppy Disk Controller Resource Conflict
0811	Primary IDE Controller Resource Conflict
0812	Secondary IDE Controller Resource Conflict
0815	Parallel Port Resource Conflict
0816	Serial Port 1 Resource Conflict
0817	Serial Port 2 Resource Conflict
0820	Expansion board Disabled in Slot
0900	NVRAM Checksum Error, NVRAM Cleared
0903	NVRAM Data Invalid, NVRAM Cleared
0905	NVRAM Cleared By Jumper
0906	Password Cleared by Jumper
0982	I/O Expansion Board NMI in Slot
0984	Expansion Board Disabled in Slot
0985	Fail-safe Timer NMI
0986	System Reset caused by Watchdog Timer
0987	Bus Time-out NMI in Slot

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Regulatory Specifications A

Declaration of the Manufacturer or Importer

The Intel Corporation hereby certifies that this product is in compliance with EU EMC Directive 89/336/EEC, using standards EN55022 Class B, EN50082-1, and EN61000-3-2 (some server configurations are not equipped to comply with this standard); EU low voltage directive, 73/23/EEC, using standard EN60950 and applicable amendments

Safety Compliance

USA:	UL 1950, 3rd Edition
Canada:	UL to CSA C22.2 No. 950-95
Europe:	TUV to EN60950, ZH1/618, and ISO 9241
International:	NEMKO to IEC950 (A1 + A2 + A3)
	NEMKO to EN60950 (A1 + A2),
	NEMKO to EMKO-TSE(74-SEC) 207/94
	AS3260-1988

Electromagnetic Compatibility (EMC)

USA:	FCC 47 Class B CFR Parts 2 and 15, Class B via declaration
Canada:	Industry Canada (IC) ICES-003 Class B
Europe:	EN55022
	EN50082-1
	IEC 801-2 ESD Susceptibility
	IEC 801-3 Radiated Immunity
	IEC 801-4 Electrical Fast Transient
	EN61000-3-2
International:	CISPR 22/93, Class B
Japan:	VCCI Class 2 ITE
Australia:	AS/NZS 3548, AS/NZS 4252.1

CE Mark

The CE marking on this product indicates that it is in compliance with the European community's EMC directive and Low Voltage directive.

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.) which 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, which are not shielded and grounded may result in interference to radio and TV reception.

The following pertains to certified processor modules:

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.

➡ **Note**

If a Class A device is installed within this system, then the system is to be considered a Class A system. For example, a connection to a Local Area Network (LAN) may cause this system to operate as a Class A device. In this configuration, operation of this equipment in a residential area is likely to cause harmful interference.

Electromagnetic Compatibility Notices (International)

　この装置は、第二種情報装置（住宅地域又はその隣接した地域にお
いて使用されるべき情報装置）で住宅地域での電波障害防止を目的と
した情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）基準に適合
しております。

　しかし、本装置をラジオ、テレビジョン受信機に近接してご使用に
なると、受信障害の原因となることがあります。

　取扱説明書に従って正しい取り扱いをして下さい。

English translation of the notice above:

This equipment is in the Class II category (information equipment to be used in a residential area or an area adjacent thereto) and conforms to the standards set by the Voluntary Control Council For Interference (VCCI) by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in such residential area.

When used near a radio or TV receiver, it may become the cause of radio interference.

Read the instructions for correct handling.

This equipment has been tested for radio frequency emissions and has been verified to meet CISPR 22/93 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.

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.

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Equipment Log B

Use this equipment log to record pertinent information about your server system. You will need some of this information when you run the System Configuration Utility (SCU).

Record the model and serial numbers of the server system and the system board. They are on the back panel of the server and along the left side of the system board near the expansion slots.

Record the model and serial numbers of the system components, dates of component removal or replacement, and the vendor's name. Be sure to record the same information for any components added to the system, such as hard disk drives, add-in boards, or printers.

The location of serial numbers on add-in boards, hard disk drives, and external equipment, such as video displays or printers, varies from one manufacturer to another.

Equipment Log

Component	Manufacturer Name and Model Number	Serial Number	Date Installed
System			
System Board			
Primary Processor Module			
Secondary Processor Module			
Memory Module			
RPX Module			
Power Share Backplane			
SCSI Hot-docking Backplane #1			
SCSI Hot-docking Backplane #2			
Keyboard			
Mouse			
Floppy Disk Drive A			

Continued

Equipment Log (continued)

Component	Manufacturer Name and Model Number	Serial Number	Date Installed
Floppy Disk Drive B			
Tape Drive			
CD-ROM Drive			
Hard Disk Drive 1			
Hard Disk Drive 2			
Hard Disk Drive 3			
Hard Disk Drive 4			
Hard Disk Drive 5			
Hard Disk Drive 6			
Hard Disk Drive 7			
Hard Disk Drive 8			
Hard Disk Drive 9			
Hard Disk Drive 10			

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