Intel RC440LX Server System

Server Installation Guide

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

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System Description 1

Introduction

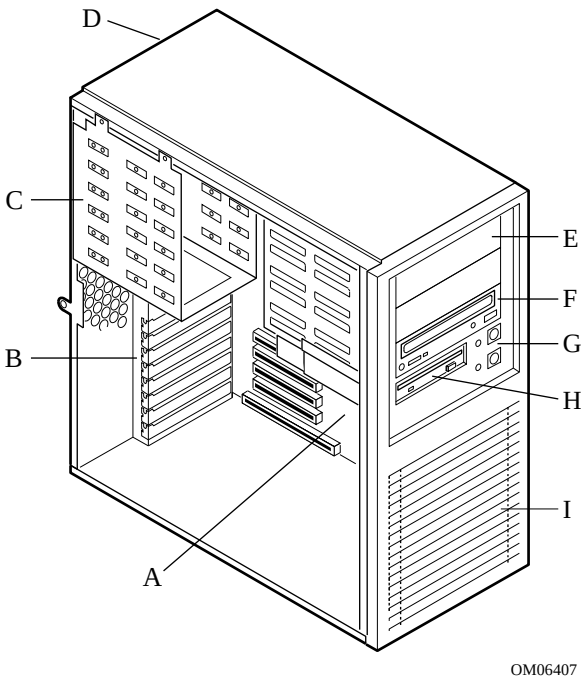
This system provides an entry-level path to server/client performance based on the Pentium®II processor. The system is designed to let you upgrade the processor, add RAM, add boards (four PCI, one ISA), and install peripherals. The system board has standard AT† form factor.

The system contains a 3.5-inch diskette drive and one 5.25-inch IDE CD-ROM drive. In addition, empty bays are available for you to add more drives:

- An internal peripheral bay designed for hard disk drives that are 3.5 inches wide and either 1 inch or 1.6 inches high. The possible combinations (height and quantity) are as follows:
  - — Up to a total of six drives, each 1 inch high
  - — Up to a total of three drives, each 1.6 inches high
  - — Up to a total of four drives, two that are 1.6 inches high plus two that are 1 inch high
- Three 5.25-inch bays are externally accessible. They are designed to hold devices that use removable media, such as tape drives for backup, diskette, or CD-ROM drives. The lower bay contains a CD-ROM drive, leaving two bays available for more devices. Because of the possibility of electromagnetic interference (EMI), we recommend that you do not install hard drives in these bays.

Chassis Feature Summary

The system's electro-galvanized metal chassis minimizes EMI and radio frequency interference (RFI). The removable side cover is attached to the chassis with three screws and provides easy access to the internal peripheral bay, system board, and power supply. You can secure this cover to the chassis with a padlock (not provided). The removable front panel, attached to the chassis with one screw, provides access to the 3.5- and 5.25-inch peripheral bays in the front of the chassis.

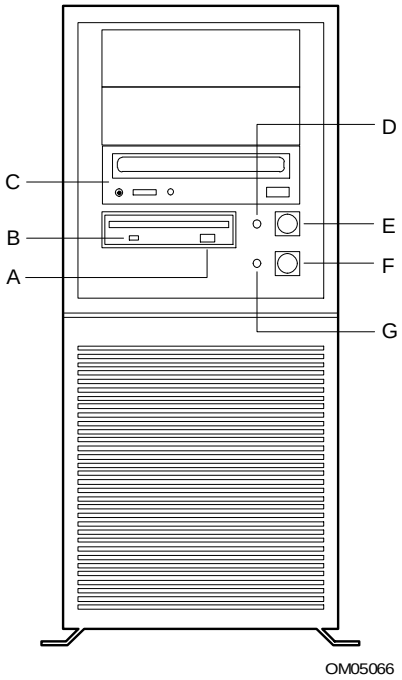


System features

A	System board
B	Add-in board slots
C	3.5-inch internal drive bay (shown without drives installed)
D	275 watt power supply (located beside internal drive bay)
E	5.25-inch external bays
F	CD-ROM drive
G	Front panel controls and indicators
H	3.5-inch diskette drive
I	Plastic front cover

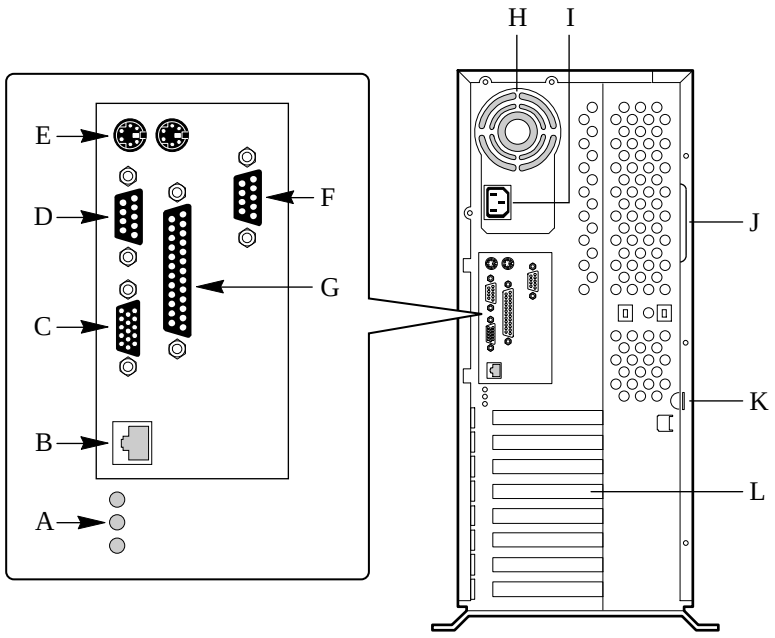
Feature	Description
Five expansion slots for add-in boards	Four PCI expansion slots. One ISA expansion slot (nonshared).
Drives	Installed: 1.44 MB, 3.5-inch diskette drive, accessible from front. Installed: 5.25-inch half-height IDE CD-ROM drive, accessible from front. May be installed: 3.5-inch by 1-inch-high hard drive, internal bay. Expansion capacity: • Two 5.25-inch-wide bays that are externally accessible, designed to hold half-height standard removable media devices; any two adjacent bays can be converted into a single full-height bay; the third bay holds a CD-ROM drive. • Internal bay for 3.5-inch hard disk drives: space for up to six 1-inch-high drives or up to three 1.6-inch-high drives.
System I/O	PS/2† -compatible keyboard and mouse ports, 6-pin DIN. Advanced parallel port, supporting Enhanced Parallel Port (EPP) level 1.7 and 1.9, ECP, compatible 25-pin. VGA† video port,15-pin. Two serial ports, 9-pin (serial port B is connected from the system board to the back panel via a ribbon cable). Network: RJ45 Ethernet† port.
Expansion slot covers	Up to eight slot covers can be used; every slot opening that does not have an add-in board installed must have a slot cover installed.
System board	Server AT form-factor, 12 × 13 inches, ATX I/O.
Power supply	275-watt power supply, integrated cooling fan. Detachable AC power cord.
Cooling	Two system fans inside the chassis and one power supply fan provide cooling and airflow.

Chassis Front Controls and Indicators



A	Diskette ejector button	Press to eject diskette.
B	Diskette drive activity LED	When lit, drive is being accessed.
C	CD-ROM drive	Example drive shown.
D	System power on LED	When lit continuously, indicates presence of DC power in the system. LED goes out when the power is turned off or the power source is disrupted.
E	System push-button power on/off switch	When pressed momentarily, turns the system DC power on or off. Does NOT remove AC power from the system.
F	Reset push-button switch	When pressed momentarily, resets the system and causes power-on self test (POST) to run.
G	Hard drive green LED	When lit, a SCSI or IDE hard drive is being accessed.

Chassis Back Controls and Features



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A Network controller status LEDs, top to bottom as viewed from back: Activity, Link, Speed of data transfer (see table that follows)

B Network connector port

C VGA monitor connector

D Serial port A, COM1

E Mouse and keyboard connectors (interchangeable)

F Serial port B, COM2 (extended via ribbon cable from back panel to system board)

G Parallel port

H Power supply fan

I AC input power connector

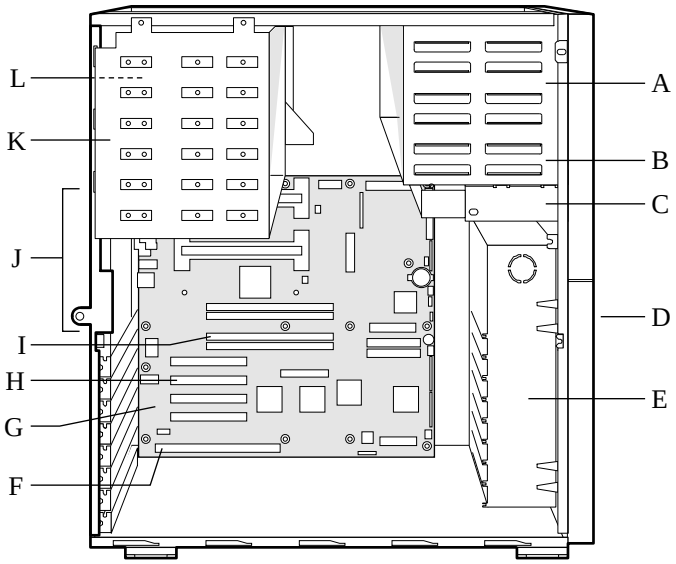
J Side cover grip handle

K Loop for padlock (padlock not supplied)

L Eight slot covers (five slot connectors provided on system board)

Network status LED (top to bottom)	What to look for	Description of LEDs
DS3, Activity (Act)	● On or ❋ blinking	The network controller is sending or receiving data over the network. The frequency of flashes varies with the amount of network traffic.
	❍ Off	The network controller is *not* sending or receiving data over the network.
DS2, Link	● On	Valid link to the LAN: The network controller and hub are receiving power; the cable connection between the controller and hub are good.
	❍ Off	The controller and hub are *not* receiving power; the cable connection between the controller and hub is faulty; or there is a driver configuration problem.
DS1, Speed	● On	Network controller is operating at 100 Mbps transfer speed.
	❍ Off	Network controller is operating at 10 Mbps transfer speed.

Chassis Side View



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A 5.25-inch external bays

B CD-ROM drive in lower bay

C 3.5-inch diskette drive

D Plastic front bezel

E Plastic fan housing and card guide assembly

F ISA add-in board expansion slot

G System board

H PCI add-in board expansion slots

I DIMM sockets

J I/O connectors at back panel (not shown: flexible EMI shield that fits over connectors)

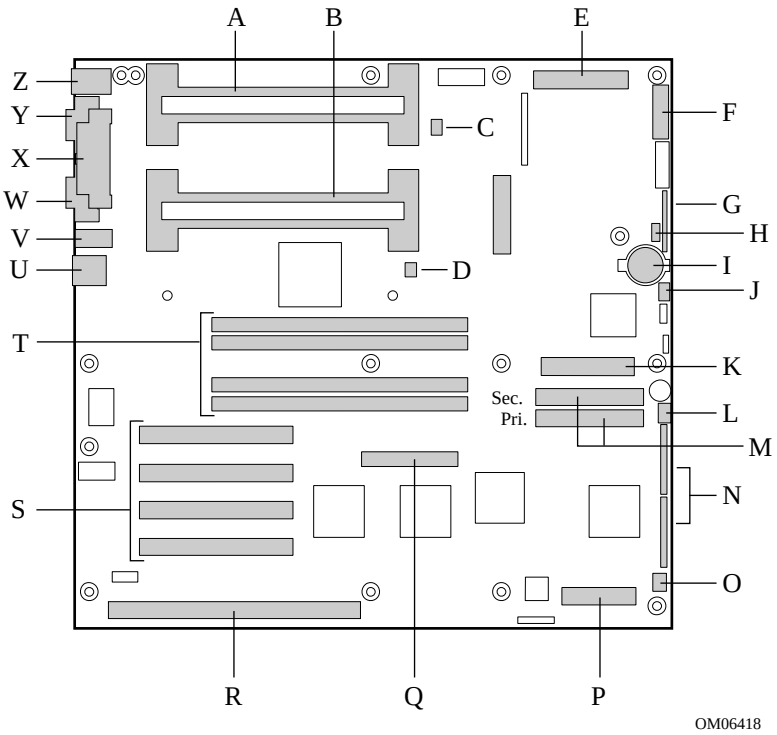
K 3.5-inch internal peripheral bay

L Power supply (behind the 3.5-inch peripheral bay)

System Board Features

Feature	Description
Processor	Installed: Up to two Pentium II processors, packaged in single edge contact (S.E.C.) cartridges and installed in 242-pin Slot 1 processor connectors, operating at 1.8 V to 3.5 V. The system board's voltage regulator is automatically programmed by the processor's VID pins to provide the required voltage.
Memory, dynamic random access (DRAM)	Four 72-bit sockets for SDRAM dual inline memory modules (DIMM) Installed: 32 to 512 MB
Video memory (DRAM)	Installed: 1 MB of 60 ns video memory
Read-only memory (ROM)	512 KB of flash read-only memory to store BIOS and other information that must be in nonvolatile memory
PCI bus	Four PCI expansion slots for add-in boards. 1x32 bit PCI bus. Embedded devices: video controller, Network Interface Controller (NIC), and SCSI controller
ISA bus	One ISA expansion slot for add-in boards. Embedded PC-compatible support (serial, parallel, mouse, keyboard, diskette, and Plug and Play features)
Server Management	Thermal/voltage monitoring and error handling Real-time clock/calendar (RTC) Front panel controls and indicators (LEDs) System Configuration Utility (SCU) Basic Input/Output System (BIOS), POST, and Setup stored in flash memory
Graphics	Integrated onboard Cirrus Logic CL-GD5446 super video graphics array (SVGA) controller; 1 MB video memory
SCSI	Adaptec† AIC-7880 Wide, Fast-20, PCI 2.1-compliant SCSI controller
Network	Integrated onboard NIC, an Intel 82557 PCI LAN controller for 10 or 100 Mbps TX Fast Ethernet networks. RJ45 Ethernet connector and indicator LEDs at I/O back panel.

System Board Connector and Component Locations



A Slot 1 primary connector

B Slot 1 secondary connector

C Fan heat sink connector 2

D Fan heat sink connector 1

E Main power connector (from power supply), 24 pin

F Front panel connector, 16 pin

G AT front panel connector

H Local I^2C connector

I Lithium backup battery

J Hard drive LED connector

K Diskette drive connector

L System fan 1 connector

M IDE connectors, primary (labeled IDE1) and secondary (labeled IDE2)

N Configuration jumper blocks

O System fan 2 connector

P Server monitor module (SMM) connector

Q Wide SCSI connector

R ISA slot for add-in board (one)

S PCI slots for add-in boards (four); slot 1 is closest to ISA slot

T Memory sockets for four DIMM components; socket 4 is closest to PCI slots

U RJ45 network controller

V Serial port B (COM 2)

W VGA monitor port

X Parallel port

Y Serial A (COM 1)

Z Keyboard and Mouse PS/2 compatible connectors (interchangeable)

Processor

Each Pentium II processor is packaged in a Single Edge Contact (S.E.C.) cartridge. The cartridge includes the processor core operating at 233 or 266 MHz with an integrated 8 KB primary (L1) cache; the secondary (L2) cache; a thermal plate; and a back cover.

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

Each processor in the S.E.C. cartridge connects to the system board through a 242-pin edge connector. The cartridge is secured by a retention module attached to the system board. Depending on configuration, your system may have one or two processors.

The processor external interface (GTL+ Pentium II processor bus) is MP-ready and operates at 66 MHz. The processor contains a local APIC section for interrupt handling in MP and UP environments.

The second-level cache is located on the substrate of the S.E.C. cartridge. The cache includes burst pipelined synchronous static RAM (BSRAM). The L2 cache is offered in 512 KB configurations only, with error correcting code (ECC) that operates at half the core clock rate.

Memory

Only SDRAM is supported by the system board. Memory is partitioned as four banks of SDRAM DIMMs, each providing 72 bits of noninterleaved memory (64-bit main memory plus ECC):

- Install from 32 MB to 1 GB of memory, using up to four double-banked DIMMs.
- Install from 8 MB to 512 MB of memory, using up to four single-banked DIMMs.

Dual address strobe (RAS) signals are provided for each DIMM. When single-banked DIMMs are used, one of the RAS lines is connected to both 36-bit "halves" of the DIMM. When double-banked DIMMs are used (known as Dual RAS), both RAS lines are connected to two 36-bit "quarters" of the DIMM.

System memory begins at address 0 and is continuous (flat addressing) up to the maximum amount of DRAM installed (exception: system memory is

noncontiguous in the ranges defined as memory holes using configuration registers). The system supports both base (conventional) and extended memory.

- Base memory is located at addresses 00000h to 9FFFFh (the first 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 (to 3FFFFFFFh).

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.

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

DIMM sizes and compatibility

We do not test every possible combination of DIMM sizes and vendors. To avoid potential memory problems, use DIMMs that have been tested for compatibility with the system board. The table below lists some sample size combinations. Contact your sales representative or dealer for more information about your system

Sample DIMM Component Combinations

Bank 0 (slot J1)	Bank 1 (slot J2)	Bank 2 (slot J3)	Bank 3 (slot J4)	Total memory
32				32 MB
32	32			64 MB
32	32	128		192 MB
32	32	128	128	320 MB
32	128	128	128	416 MB
128	128	128	128	512 MB

Peripherals

Super I/O Chip: Compatibility I/O Controller

The 87307 device supports two serial ports, one parallel port, diskette drive, PS/2-compatible keyboard and mouse, and integrated Real Time Clock (RTC). The system provides the connector interface for each port.

Serial Ports

Both serial ports are relocatable. By default, port A appears at the onboard DB9 connector, port B on the 10-pin header. Each serial port can be set to one of four different COMx ports and can be enabled separately. When enabled, each port can be programmed to generate edge- or level-sensitive interrupts. When disabled, serial port interrupts are available to add-in boards.

Parallel Port

The 87307 provides one IEEE 1284-compatible 25-pin bidirectional EPP (supporting levels 1.7 and 1.9). BIOS programming of the 87307 registers enable the parallel port and determine the port address and interrupt. When disabled, the interrupt is available to add-in boards.

Diskette Port

The FDC on the 87307 is functionally compatible with 82077SL, 82077AA, and 8272A diskette drive controllers. The system board provides the 24 MHz clock, termination resistor package, and chip selects. All other FDC functions are integrated into the 87307, including PLL separator and 16-byte first-in, first-out (FIFO).

3.5-inch Diskette Drive

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

Internal Bay for 3.5-inch Drives

An internal bay is provided for drives that are 3.5 inches wide and either 1 inch or 1.6 inches high. The possible combinations (height and quantity) are as follows:

- Up to a total of six drives, each 1 inch high
- Up to a total of three drives, each 1.6 inches high
- Up to a total of four drives, two that are 1.6 inches high plus two that are 1 inch high

The side cover provides easy access to drives in the internal bay. The bay swings out and can be removed.

Drives can consume up to 11 watts of power. Drives must be specified to run at a maximum ambient temperature of 50 °C.

The system was designed to allow the user to install a Redundant Array of Independent Disks (RAID). A software implementation with onboard SCSI or an add-in board can be used to set up RAID applications.

External Bays for 5.25-inch Removable Media Devices

The chassis has three 5.25-inch half-height bays that are accessible from the front of the system. These bays are intended to provide space for tape backup or other removable devices. As shipped, a CD-ROM drive may be installed in the lowest of the three bays.

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.

Add-in Board Slots

The system board has one full-length dedicated ISA bus slot, which can have a bus master in it. ISA features:

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

The system board also has four dedicated full-length PCI slots. PCI features:

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

Video

The onboard, integrated Cirrus Logic CL-GD5446 32-bit VGA contains an SVGA controller that is fully compatible with these video standards: CGA†, EGA†, Hercules† Graphics, MDA†, and VGA. The standard system configuration comes with 1 MB of 60 ns onboard video memory. The video controller supports pixel resolutions of up to 1280 x 1024 and up to 64 K 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.

You cannot add memory to this system. Depending on the environment, the controller displays up to 64 K colors in some video resolutions. It also provides hardware-accelerated bit block transfers (BITBLT) of data.

Redwood has a Cirrus Logic CL-GD5446 integrated video controller and support circuitry on the PCI bus. The CL-GD5446 32-bit VGA Graphics Accelerator chip contains a SVGA video controller, Clock Generator, and 80 MHz RAMDAC in a 208-pin PQFP. Standard video memory consists of two 256 K x 16 DRAM chips providing 1 MB of 60 ns video memory. The 5446 supports a variety of modes: up to 1280 x 1024 resolution, and up to 64 K colors.

This SVGA subsystem supports analog VGA monitors, single and multi-frequency, interlaced and non-interlaced, up to 87 Hz vertical retrace frequency. The connector is a standard 15 pin VGA connector.

SCSI Controller

The system board includes an Adaptec AIC-7880 wide/fast-20, SCSI III compatible controller chip that is integrated as a PCI bus master. The adapter supports 8- or 16-bit Fast SCSI that provides 10 or 20 MB/sec throughput, or Fast-20 Wide SCSI that can burst data at 20 or 40 MB/sec. The SCSI controller provides active negation outputs, controls for external differential transceivers, and a disk activity output.

In the internal bay, the system supports up to six SCSI hard disk drives, plus, in the 5.25-inch removable media bays, two SCSI devices (the controller itself supports more devices, but the chassis can contain a maximum of eight). A wide SCSI cable provides two connectors for Ultra SCSI devices. However, SCSI devices do not need to operate at the ultra transfer rate.

No logic, termination, or resistor loads are required to connect devices to the SCSI controller other than termination in the device at the end of the cable. The SCSI bus is terminated on the system board with active terminators that cannot be disabled. The onboard device must always be at one end of the bus.

IDE Controller

IDE is a 16-bit interface for intelligent disk drives with AT disk controller electronics onboard. The PCI/ISA/IDE Accelerator, also known as PIIX4, is a multifunction device on the system board that acts as a PCI-based Fast IDE controller. The device controls:

- PIO and IDE DMA/bus master operations
- Mode 4 timings
- Transfer rates up to 22 MB/sec
- Buffering for PCI/IDE burst transfers
- Master/slave IDE mode
- Up to two drives per channel; two channels, IDE0 and IDE1

18-inch maximum length of IDE cable on each channel
You can connect an IDE signal cable, up to a maximum of 18 inches each, to each IDE connector on the system board. Each cable can support two devices, one at the end of the cable and one 6 inches from the end of the cable.

Network Controller

The system board includes an integrated NIC, which is the Intel 82557 PCI LAN Controller for 10 or 100 Mbps TX Fast Ethernet networks. The network ID is stored in an EEPROM on the system board. As a PCI bus master, the controller can burst data at up to 133 MB/sec. The controller contains two receive and transmit FIFO buffers that prevent data overruns or underruns while waiting for access to the PCI bus. The controller has the following:

- 32-bit PCI bus master interface (direct drive of bus), compatible with *PCI Bus Specification, Revision 2.1*
- Chained memory structure with improved dynamic transmit chaining for enhanced performance
- Programmable transmit threshold for improved bus utilization
- Early receive interrupt for concurrent processing of receive data
- On-chip counters for network management
- Autodetect and autoswitching for 10 or 100 Mbps network speeds
- Support for both 10 Mbps and 100 Mbps networks, capable of full or half duplex, with back-to-back transmit at 100 Mbps

The network status LEDs on the system board indicate:

- Transmit/receive activity on the LAN
- Valid link to the LAN
- 10/100 Mbps transfer mode

For details about the LEDs, see the table on page 17.

Keyboard and Mouse

The keyboard/mouse controller is PS/2-compatible. The system may be locked automatically if there is no keyboard or mouse activity for a predefined length of time, if specified through the SCU. Once the inactivity (lockout) timer has expired, the keyboard or mouse does not respond until the previously stored password is entered.

Power Supply

The 275 watt universal-type power supply is designed to minimize EMI and RFI. The supply operates within the following voltage ranges and is rated as follows:

- 100-120 V~ at 50/60 Hertz (Hz); 6.3 A maximum
- 200-240 V~ at 50/60 Hz; 3.15 A maximum

The DC output voltages of the power supply are +5 V, +12 V, +3.3 V, -5 V, -12 V, and +5 V standby. Power is sourced through the power cable to the 24-pin main connector on the system board. Remote sensing signals are provided through the cable to the 14-pin Auxiliary connector on the system board.

System Cooling

The chassis includes three fans for cooling and airflow. One of these is the integrated fan in the power supply. The system board has four fan connectors (two for the optional fan heat sinks, and two for the system) that are monitored by server management software.

⇒ **Side cover must be in place for proper cooling**
The side cover must be on the system for proper cooling.

Server Management

Server Management features are implemented using three microcontrollers and one PLD:

- System Board Management Controller (BMC)
- Front Panel Controller (FPC)
- Processor Board Controller (PBC)
- Distributed Integrated Server Management Interface Controller (DISMIC)

System Board Management Controller (BMC)— The BMC is an 8051-compatible microcontroller located on the system board. The BMC monitors system board power supply and SCSI termination voltages using

an external Analog to Digital Converter (ADC); the BMC checks the status of the fan failure indicators. The BMC also monitors system temperature sensors on the intelligent management bus. When any monitored parameter is outside defined thresholds, the BMC generates a system management interrupt (SMI). The BMC also provides general-purpose I/O (GPIO) functions and acts as the primary communications gateway to the FPC, PBC, and DISMIC by providing support routines for I^2C and ISA communications

An EEPROM associated with the secondary system board temperature sensor contains the values for the chassis ID, system board ID, power state, and system board temperature during power off conditions. The BMC manages these values via I^2C.

Front Panel Controller (FPC)— The FPC, located on the system board, manages system power on/off control, system reset, and front panel NMI buttons, along with an external I^2C interface. The +5V standby power supply powers the device so that it retains power even when system power is off. The FPC controls main power to the system board and is responsible for monitoring all sources of power control both on and off the system board, including the Front Panel, Server Monitor Module, PIIX4, and RTC power control signals. The FPC also detects chassis intrusion by monitoring an external switch and remembers the last power state if AC power is unterrupted.

Processor Board Controller (PBC)— The PBC monitors processor voltage levels, processor thermal trip and internal error signals, and provides the interface to the board ID information. The PBC can be polled for current status or configured to automatically send an alert message when an error condition is detected.

The PBC implements Fault Resilient Booting (FRB) levels 1, 2, and 3. If two processors are installed and the processor designated as the bootstrap processor fails to complete the boot process, FRB attempts to boot the system using the alternate processor.

- FRB level 1 is for recovery from a BIST failure detected during POST. This FRB recovery is fully handled by BIOS code.
- FRB level 2 is for recovery from a Watchdog timeout during POST. The Watchdog timer for FRB level 2 detection is implemented in the PBC.
- FRB level 3 is for recovery from a Watchdog timeout on hard reset / power up. Hardware functionality for this level of FRB is managed by the PBC on the processor subsystem.

Distributed Integrated Server Management Interface Controller (DISMIC)— The two microcontrollers on the system board communicate using the I^2C bus. The BMC and DISMIC manage communication between this distributed controller network, SMI handler, and Systems Management

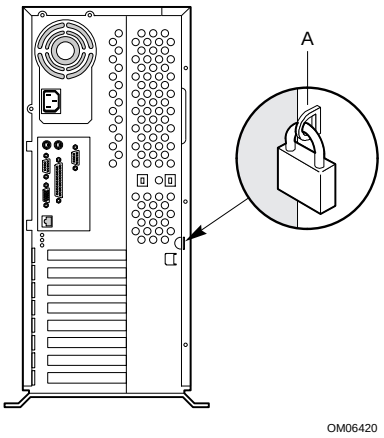
Software (SMS) running on the server. The DISMIC functions as a bridge between the BMC and ISA bus.

System Security

To help prevent unauthorized entry or use of the system, the system includes a physical padlock loop and Server Management software that monitors the system intrusion switch.

Security with Mechanical Locks and Monitoring

- Secure the side cover to the chassis by inserting a padlock (not provided) through the metal loop protruding through the slot in the back edge of the side cover.
- Activate the side cover intrusion alarm switch. When the side door is opened, the switch transmits an alarm signal to the system board, where server management software processes the signal. The system can be programmed to respond to an intrusion by powering down or by locking the keyboard, for example.



System security

A Padlock loop

Software Locks via the SCU

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

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

Using Passwords

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

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

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

Secure Mode

Configure and enable the secure boot mode by using the SCU. When secure mode is in effect:

- You can boot the system, and the operating system will run, but you must enter the user password to use the keyboard or mouse.
- You cannot turn off system power or reset the system from the front panel switches.

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

Taking the system out of secure mode does not change the state of system power. That is, if you press and release the power switch while secure mode is in effect, the system will not be powered off when secure mode is

later removed. However, if the front panel power switch remains depressed when secure mode is removed, the system will be powered off.

Summary of Software Security Features

The table below lists the software security features and describes what protection each offers. In general, to enable or set the features listed here, you must run the SCU and go to the Security Subsystem Group, menu. The table also refers to other SCU menus and to the Setup utility.

Feature	Description
Put the system into secure boot mode	**How to enter secure mode:** • Setting and enabling passwords automatically places the system in secure mode. • If you set a hot-key combination (through the SCU or Setup), you can secure the system simply by pressing the key combination. This means you do not have to wait for the inactivity time-out period. **When the system is in secure mode:** • The system can boot and run the operating system, but mouse and keyboard input is not accepted until the user password is entered. • At boot time, if a CD is detected in the CD-ROM drive or a diskette in drive A, the system prompts for a password. When the password is entered, the system boots from CD or diskette and disables the secure mode. • If 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. **To leave secure mode:** Enter the correct password(s).
Disable writing to diskette	In secure mode, the system will not boot from or write to a diskette unless a password is entered. To set this feature, use the SCU Security Subsystem Group. To write-protect access to diskette whether the system is in secure mode or not, use the Setup main menu, Floppy Options, and specify Floppy Access as read only.

Continued

Feature	Description
Disable the power and reset buttons	Enable the feature through the SCU. Then the power and reset buttons are disabled when the system is in secure mode.
Set a time-out period so that keyboard and mouse input are not accepted Also, screen can be blanked, and writes to diskette can be inhibited	Specify and enable an inactivity time-out period of from 1 to 120 minutes. • If no keyboard or mouse action occurs for the specified period, attempted keyboard and mouse input will not be accepted. • The monitor display will go blank, and the diskette drive will be write-protected (if these security features are enabled through Setup or the SCU). **To resume activity:** Enter the correct password(s).
Control access to using the SCU: set administrative password	To control access to setting or changing the system configuration, set an administrative password and enable it through Setup or the SCU. If both the administrative and user passwords are enabled, either can be used to boot the system or enable the keyboard and/or mouse, but only the administrative password will allow Setup and the SCU to be changed. **To disable a password, change it to a blank entry or press CTRL-D in the Change Password menu of the Administrative Password Option menu found in the Security Subsystem Group.** **To clear the password if you cannot access Setup or the SCU, change the Clear CMOS jumper (see Chapter 5).**
Control access to the system other than SCU: set user password	To control access to using the system, set a user password and enable it through Setup or the SCU. **To disable a password, change it to a blank entry or press CTRL-D in the Change Password menu of the User Password Option menu found in the Security Subsystem Group.** **To clear the password if you cannot access Setup or the SCU, change the Clear CMOS jumper (see Chapter 5).**
Boot without keyboard	The system can boot with or without a keyboard. During POST, before the system boots, the BIOS automatically detects and tests the keyboard if it is present and displays a message. There is no entry in the SCU to enable or disable a keyboard. Do not plug in a keyboard while there is power applied to the system.

Continued

Feature	Description
Specify the boot sequence	The sequence that you specify on the menu in the SCU Multi-Boot Group will determine the boot order. If secure mode is enabled (a user password is set), then you will be prompted for a password before the system fully boots. If secure mode is enabled and the “Secure Boot Mode” option is also enabled, the system will fully boot but will require a password before accepting any keyboard or mouse input.

❒ ❒ ❒

Getting Started 2

Summary

This chapter includes the information found in the server *Quick Start Guide*, plus a little additional text. The tasks include how to do basic set-up and how to boot from the Configuration Software CD:

1. Check your shipment
2. Select a site: requirements
3. Check the power cord
4. Add to the system
5. Connect external devices
6. Turn on the video monitor and the server
7. Run the Power-on Self Test (POST)
8. Boot from the Configuration Software CD and copy configuration software to diskettes

1. Check Your Shipment

WARNING
The minimum server configuration weighs 17.1 kg (38 lbs) and the maximum configuration weighs 22.9 kg (51 lbs). To avoid injury, have someone help you move the server.

After unpacking the server, inspect the shipping carton for evidence of mishandling during transit. If the carton is damaged, photograph it for reference. After removing the contents, keep the damaged carton and the packing materials. If the contents appear damaged, file a damage claim with the carrier immediately. Save the shipping carton(s) and packing materials to repackage the server if you need to move it to another site.

Make sure the following items are present and in good condition. If any item is damaged or missing, contact your service representative.

- Configuration Software media with these contents: System Configuration Utility (SCU); device drivers; diagnostics; *Product Guide* files
- Other diskettes and related manuals per your configuration
- Hardware: rails for mounting a drive in the 5.25-inch bay

2. Select a Site: Requirements

Site requirement	Description
Near a properly earthed, grounded, power outlet	In the United States and Canada: NEMA 5-15R outlet for 100-120 V~ or a NEMA 6-15R outlet for 200-240 V~. In other geographic areas: a properly earthed, grounded outlet in accordance with the local electrical authorities and electrical code of the region. Anticipated overcurrent is 13 A or less for 100-120 V~and 6.5 A or less for 200-240 V~. **CAUTION, use grounded outlet** The power service connection must be through a properly grounded outlet.
Meets specified environmental limits	The server operates reliably within normal office environmental limits. Select a site that meets these criteria: • Clean and relatively free of excess dust. • Well ventilated and away from sources of heat. • Away from sources of vibration or physical shock.
Isolated from electromagnetic fields and electrical noise	The server should be isolated from strong electromagnetic fields and electrical noise produced by electrical devices such as elevators, copy machines, air conditioners, large fans, large electric motors, radio and TV transmitters, and high-frequency security devices.

Continued

Site requirement	Description	
Provides sufficient clearance for cooling and airflow	The site should provide sufficient clearance behind and around the server to ensure proper cooling and airflow. Keep ventilation openings on the server free of obstructions. Allow about 31 centimeters (12.2 inches) of clearance in back of the server, 60 centimeters (23.6 inches) on the sides, and 22 centimeters (9 inches) in front.	
Provides access space for maintenance and to disconnect the AC power cord	Plan access space for server maintenance. Make sure there is convenient access to disconnect the AC power cord from the wall outlet or from the back of the server, because disconnecting the cord is the only way to remove AC power from the server before doing maintenance or upgrade procedures. Pressing the DC push-button on/off switch on the front panel does NOT remove server AC power.	
Provides adequate space for server physical specifications	Height	49.02 cm (19.3 inches)
	Width	21.04 cm (8.3 inches)
	Depth	44.96 cm (17.7 inches)
	Weight	17.1 kg (38 lbs) minimum configuration 22.9 kg (51 lbs) maximum configuration

3. Check the Power Cord

WARNING

Do not modify or use a supplied AC power cord if it is not the exact type required in the region where the server will be installed and used. Replace the cord with the correct type. Refer to the cord requirements described below.

Do not plug in the server power cord yet if you will be adding internal parts (boards, dual in-line memory modules, removable media drives).

Power cord requirements	Description
Rating	Cord must be rated for available AC voltage and have a current rating at least 125% of current rating of server.
Connector, wall outlet end	Cord must be terminated in grounding-type male plug designed for use in your region. It must have certification marks showing certification by an agency acceptable in your region.
Connector, power supply end	The connector that plugs into the AC receptacle on the server power supply must be an IEC 320, sheet C13, type female connector.
Cord length and flexibility	Cord must be less than 4.5 meters (14.76 feet) long, and it must be flexible <harmonized (HAR)> cord or VDE-certified cordage to comply with server's safety certifications.

Notes

Surge suppressor recommended: In geographic regions that are susceptible to electrical storms, we highly recommend that you plug the server into a surge suppressor.

For EMI information: For information about complying with electromagnetic interference regulations, see "Electromagnetic Compatibility" in Chapter 8.

4. Add to the System

WARNING

Before adding internal parts to your server, verify that the server is not plugged in. The power cord must be disconnected.

Add drives, add-in boards, and memory to your server. Make any internal changes, and replace all server covers.

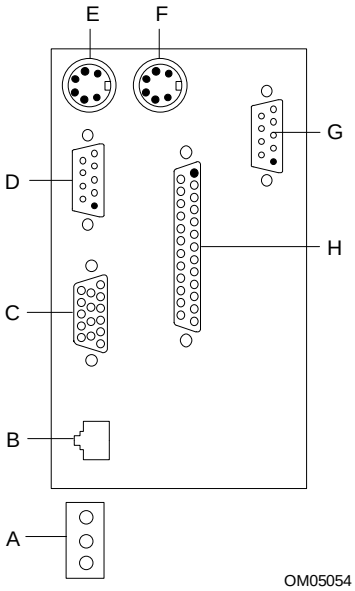
5. Connect External Devices

⚠ **CAUTION, make sure server is not plugged in**
Before connecting external devices, make sure the server is not plugged in, or equipment may be damaged.

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

You must install a monitor and keyboard to configure the server. If your server normally will operate without a monitor or keyboard as a network server, you still must install them to configure the server. You can choose to remove them after running the SCU.

Connect other external devices— for example, a printer or an external modem— by following the instructions in the documentation included with the device. Use serial ports A and B and the parallel port on the back panel.



Connectors, back panel

A Network controller LEDs
- Activity (top)
- Link (middle)
- Speed (bottom)

B RJ45 network connector port

C VGA, 15-pin video connector

D Serial port A, 9-pin connector (COM1)

E PS/2-compatible keyboard port, 6-pin miniature Deutsche Industrie Norm (DIN) connector (interchangeable with mouse port)

F PS/2-compatible mouse port, 6-pin DIN connector (interchangeable with keyboard port)

G Serial port B, 9-pin connector (COM2)

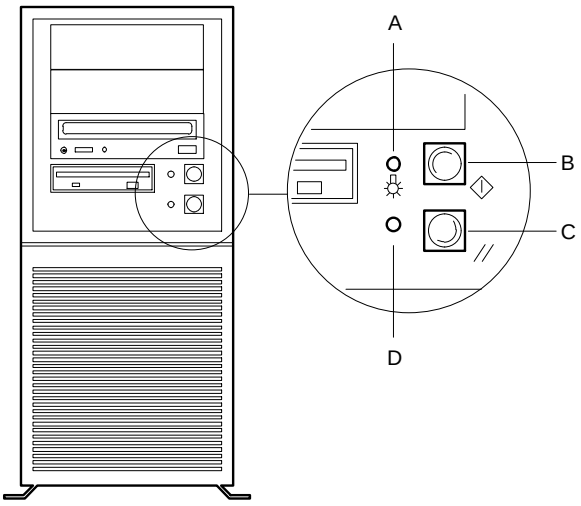
H Parallel port (LPT1), 25-pin connector

6. Turn on the Video Monitor and the Server

WARNINGS

The push-button on/off power switch on the front panel of the server DOES NOT turn off the AC power. To remove AC power from the server, you must unplug the AC power cord from the power supply or wall outlet.

1. Make sure all external devices, such as a monitor, keyboard, and mouse, have been connected.
2. Remove drive protection card (if present) from the diskette drive.
3. Turn on the video monitor.
4. Plug the female end of the AC power cord into the power supply input receptacle on the back of the chassis.
5. Plug the male end of the cord into a wall outlet (a grounded, three-pronged AC power outlet; see page 36 for outlet information).
6. If the server does not power on when you plug it into the AC outlet, press the power push-button on/off switch on the front panel.
7. Verify that the power-on light on the front panel is lit. After a few seconds, the POST begins. See "Run the Power-on Self Test (POST)" on page 42. When a hard drive is accessed during POST, the drive activity LED lights.



Power and reset switches, front panel

A Power-on light (LED)

B Push-button power on/off switch

C Push-button reset switch

D Hard disk drive activity (LED)

Handy hint

Power switch is rounded outward (convex).

Reset switch is recessed (concave).

7. Run the Power-on Self Test (POST)

Each time you turn on the server, the power light on the front panel illuminates, and the power-on self test (POST) runs. POST checks the system board, keyboard, and most installed peripheral devices.

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

Various screen prompts and messages appear after the memory test. The "Press F2 key" prompt displays if the prompt is enabled in Setup:

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


Keyboard.....Detected
Mouse........Detected
```

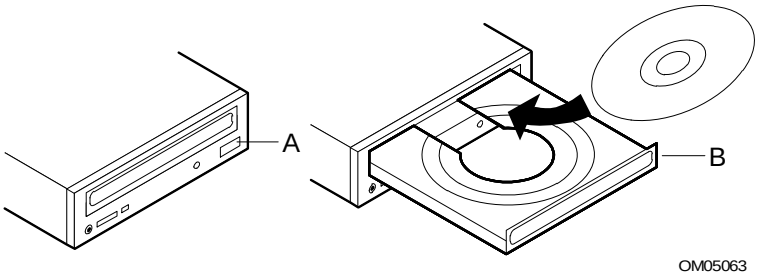
At this point, do not yet press <F2>.

The above message remains for a few seconds while the boot process continues, and the server beeps once. Then this message appears:

```
Insert bootable media in the appropriate drive
```

Go on to step 8 to boot from the Configuration Software CD.

8. Boot from CD and Copy Configuration Software to Diskettes



Typical CD-ROM drive

A Open/close push-button switch

B CD tray, CD with label side up

⚠ **CAUTION, handle CD only by the edges**
Handle the CD only by its inner and outer edges. Do not touch the side without the label (the data side).

1. Open the CD tray by pressing the open/close button on the front panel of the CD-ROM drive. The tray will slide out of the drive.
2. Open the CD case. Press down on the center hub of the case to release the CD.
3. Gently grasp the center hole and outer edge of the CD. Remove it from the case, and place it label-side up in the CD tray.
4. Press the open/close button or gently push on the CD tray— it will automatically slide into the drive.
5. Push the reset switch on the front panel to restart the server.
6. When POST completes, the server boots from the CD and displays the CD-ROM menu bar. Browse to see the tasks available (create diskettes, diagnostics, read and print manuals, quit to DOS). If the following message appears,

   ```
   Insert bootable media in the appropriate drive
   ```

   you may need to change the BIOS setup to boot from CD. See the "Boot Options" section of "Using Setup" in Chapter 3 of this manual. Set the first boot device to CD-ROM, the second to diskette, and the third to hard disk.
7. Select the option Create Diskettes. Make sure you have several diskettes on hand.

8. Follow the prompts to copy the SCU software from CD onto diskettes. You must have the SCU on diskette when you start to configure the server.
9. Repeat the process to copy other menu choices onto diskettes.
10. After creating diskettes, quit to DOS.
11. When finished, remove the CD from the server.

When you copy software from CD onto diskettes, device drivers suitable for several different operating systems are copied onto the diskettes. However, your operating system will read only those drivers it can recognize, so you cannot usually check the directory of a diskette that is not formatted for your operating system (instead, you may get a message to the effect, "disk not formatted, do you want to format it now?"). Don't worry; the drivers for YOUR operating system should be present on the diskette and available for you to load on your system.

Other Tasks You Can Do from the CD Menu

- Copy diagnostic programs onto diskette to run from diskette
- Create diskettes (copy drivers from CD to diskette)
- Read and Print Manuals
- Quit to DOS

Scroll to select the task you want. Follow the prompts to complete the task.

Regarding the diagnostic programs, a diagnostics package for the system is contained in the DISK 1 image on the CD. For documentation about the test modules, see the two PCDiagnostic help files that end with the extension .HLP. They are ASCII files that you can print to create a manual about the tests in the diagnostic package. While running the tests, you can access help by pressing the <F1> key. You will be prompted to insert the help disks into the diskette drive, and the help information for the desired test will be displayed. For more information about PCDiagnostics, see Chapter 7 in this manual.

Access the Server Product Guide

The Configuration Software CD contains files for the server *Product Guide*, which is this server manual. If you are reading this page, you have already been able to boot from the CD and read or print the manual files (Adobe† Acrobat .PDF files or PostScript† .PS files.

□ □ □

Configuring the System 3

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

Utility	Description and brief procedure	Page	How provided
System Configuration Utility (SCU)	To use the SCU, the system must have a working, enabled diskette drive, and you must have a copy of the SCU on a DOS-bootable diskette (copied from the Configuration Software CD; see Chapter 2 to make the copy): • To enable and configure a diskette drive, use BIOS Setup first. Then use the SCU. Information entered via the SCU overrides information entered via Setup. • To copy the SCU from the source CD onto diskette, see the “Getting Started” chapter.	48	On the Configuration Software CD shipped with the system
BIOS Setup	If the system does not have a diskette drive, or the drive is disabled or misconfigured, use Setup to enable it. Or, you can move the CMOS jumper on the system board from the default setting (Protect CMOS memory) to the Clear setting; this will allow most system configurations to boot. For the procedure to do this, see the section “CMOS Jumper” in Chapter 5 in this manual. Then run the SCU to configure the system.	70	Stored in flash memory and in battery-backed memory on the system board

Continued

SCSI*Select*† Utility	Use to configure or view the settings of the AIC-7880 *Ultra*SCSI host adapters and onboard SCSI devices in the system.	90	Enabled in Setup (option on Advanced Chipset Configuration menu). Supplied with system BIOS
Configuring the Network Interface Controller (NIC)	Use to configure the PCI LAN Bus Controller on the system board.	100	Supplied on CD with the system

Hot Keys

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

To do this:	Press these keys
Clear memory and reload the operating system—this is a system reset.	<Ctrl+Alt+Del>
Run system at full speed. Depending on configuration, this option may not be available. See Chapter 5.	<Ctrl+Alt> and <+>
Decrease the system speed (enter deturbo mode).	<Ctrl+Alt> and <->
Secure your system immediately.	<Ctrl+Alt>+hotkey (Set your hot-key combination with the SCU or Setup.)

Power-on Self Test (POST)

Each time you turn on the system, POST starts running. POST checks the system board, processor, memory, keyboard, and most installed peripheral devices. During the memory test, POST displays the amount of memory that it is able to access and test. The length of time needed to test memory depends on the amount of memory installed. POST is stored in flash memory.

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

   ```
   Press <F2> key if you want to run SETUP
   Keyboard.....Detected
   Mouse........Detected
   ```

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

   ```
   Insert bootable media in the appropriate drive
   ```

   (To create software installation diskettes, see the "Getting Started" chapter in this manual.)

   If you do not press <F2> and DO have an operating system loaded, the boot process continues, and this message appears:

   ```
   Press <Ctrl><A> for SCSISelect(TM) Utility!
   ```

4. Press <Ctrl+A> if there are SCSI devices installed. When the utility opens, follow the displayed instructions to configure the onboard Adaptec AIC-7880 *Ultra*SCSI host adapter settings and to run the SCSI utilities. Also see "Using SCSI*Select*" on page 90.

   If you choose not to press <Ctrl><A> (SCSI*Select* Utility), the boot process continues. After POST completes, the system beeps once.

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

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

Note the screen display and write down the beep code you hear; this information is useful for your service representative. For a listing of beep codes and error messages that POST can generate, see the "Solving Problems" chapter in this manual.

Using the System Configuration Utility (SCU)

The System Configuration Utility (SCU) is the main tool to configure the system or to check or change the configuration. Many system settings can be entered from either the SCU or Setup, but the SCU provides conflict resolution as well as access to information about ISA, ISA Plug and Play, and PCI adapters. The SCU is PCI-aware, and it complies with the ISA Plug and Play specifications. The SCU works with any compliant configuration (.CFG) or overlay (.OVL) files supplied by a peripheral device manufacturer.

System must have a diskette drive
The system must have a diskette drive present and enabled to use the SCU. If a diskette drive is present but is disabled or misconfigured, use the BIOS Setup utility to enable or configure the drive.

Where the SCU Gets Information

Source	Description
Configuration (.CFG) and overlay (.OVL) files	For the system board, we provide a .CFG file and an .OVL file with the SCU. These files describe the board's characteristics and the system resources required. Some ISA adapters come with a diskette that contains a .CFG file (and an optional .OVL file).
Configuration registers	Information and required resources for PCI and Plug and Play adapters are derived from the adapter's configuration registers.
User selected options	The SCU displays the exact system configuration and the user's current settings by reading ISA CMOS and system nonvolatile storage (NVRAM or flash memory).

Using information from the sources listed above, the SCU stores the system configuration in ISA CMOS and system nonvolatile storage (NVRAM or flash memory).

At power-on or rebooting, the BIOS POST routines and the Plug and Play Auto Configuration Manager check and configure the hardware. If possible, POST will program the hardware according to the configuration stored by the SCU; if conflicts exist, an error message will be generated. You must then use the SCU to correct the conflict before the system boots.

When to Run the SCU

- When you first set up and configure the system
- If you get a configuration error message at power-on
- Whenever you add, remove, or move an ISA adapter that is not Plug and Play
- Whenever you add or remove memory
- In general, whenever you add hardware to or remove hardware from the system

Running the SCU is also recommended but optional for Plug and Play and PCI adapters.

Record Your SCU Settings

Record your SCU settings on the worksheets in Chapter 9. If the default values ever need to be restored (after a CMOS-clear, for example), you must run the SCU to reconfigure your system. Referring to the worksheets could make your task easier.

How to Enter and Start the SCU

✏ **Copy SCU to diskette**
Before you can run the SCU from a diskette, you must copy the SCU from the Configuration Software CD to a diskette. To create this diskette, see the "Getting Started" chapter in this manual.

1. Turn on your video display monitor and system.
2. You can enter and start the SCU in three different ways. Whether or not you can use the second and third ways described in the following table depends on how much main memory is used by drivers loaded on the system.

✏ **Use diskette**
Always start with a diskette that contains the SCU you copied from the Configuration Software CD.

You can start the SCU from these sources:	**How to do it:**
From diskette at boot time	Insert your SCU diskette in drive A. Press the reset button or type <Ctrl+Alt+Del> to reboot the system.
From diskette after installing your operating system	Insert your SCU diskette in drive A. At the DOS prompt, type **a:** and press <Enter> to change to drive A. Type **AUTOEXEC** and press <Enter> to start the SCU.
From a hard drive after installing your operating system	Insert your SCU diskette in drive A and copy the contents to a directory on your hard drive. Change to that directory, and type **AUTOEXEC** and press <Enter>.

A message like this message appears:

```
MS DOS startup menu
-------------------------------
1.  Execute SCU
2.  Execute SCU for system with PNP OS
```

3. If your operating system is not Plug and Play aware, type 1.

   If your operating system is Plug and Play aware, type 2. The Plug and Play-aware OS then manages the resources of all PCI and Plug and Play devices in the system.

4. When the SCU title appears on the screen, press any key to continue.

5. 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 single-click the left button to select it. Press <F1> at any time for help about a selection.

6. From the main menu, select "Step 1: About System Configuration" for information about setting up the system.

Six Steps in Using the SCU

The SCU main menu lists six steps to configure your system.

SCU Step	Description
System Configuration Utility **Step 1: About System Configuration** Step 2: Add and Remove Boards Step 3: Change Configuration Settings Step 4: Save Configuration Step 5: View Switch/Jumper Settings Step 6: Exit	Displays a brief text overview of the SCU and some important terms and definitions.
System Configuration Utility Step 1: About System Configuration **Step 2: Add and Remove Boards** Step 3: Change Configuration Settings Step 4: Save Configuration Step 5: View Switch/Jumper Settings Step 6: Exit	Displays a menu that lists all installed boards and devices. Most ISA boards cannot be detected automatically by the SCU, so you MUST use this step to add them to the system. PCI and ISA Plug and Play boards are automatically detected and added by the SCU. ⇒ **Note:** Manually verify the resource settings of any adapters before saving your configuration.
System Configuration Utility Step 1: About System Configuration Step 2: Add and Remove Boards **Step 3: Change Configuration Settings** Step 4: Save Configuration Step 5: View Switch/Jumper Settings Step 6: Exit	Use to view or change the configuration settings for a board installed in the system. Verify that the system board and adapter board resources are set properly. If you make changes, you can save them and exit this menu or exit without saving changes. Follow the onscreen prompts. ⇒ **Note:** For details about the menus and options in this step, see the section that begins on page 60.

Continued

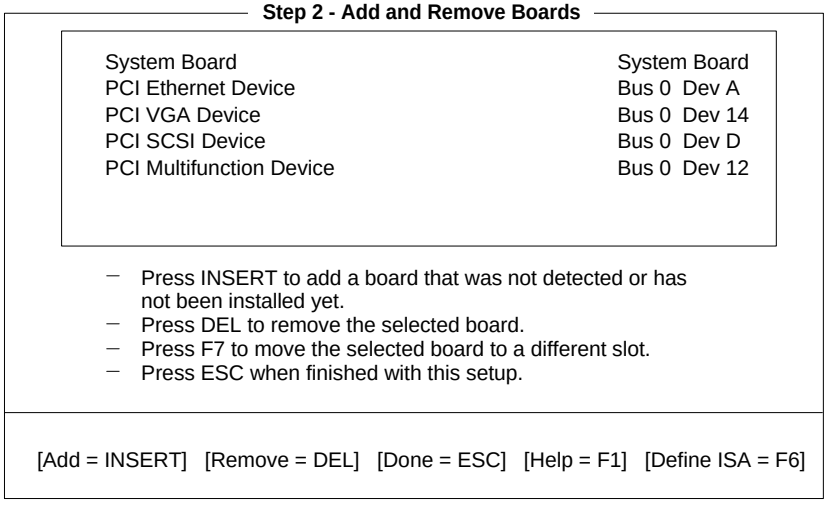
SCU Step	Description
System Configuration Utility Step 1: About System Configuration Step 2: Add and Remove Boards Step 3: Change Configuration Settings **Step 4: Save Configuration** Step 5: View Switch/Jumper Settings Step 6: Exit	⇒ **Note:** BEFORE selecting step 4, make sure you are ready to save the settings. The process begins immediately once you select this step and is completed when you see a check mark beside the step number. Saves configuration settings to nonvolatile RAM as well as to a backup file (.CMS file). You must save your settings once they have been configured.
System Configuration Utility Step 1: About System Configuration Step 2: Add and Remove Boards Step 3: Change Configuration Settings Step 4: Save Configuration **Step 5: View Switch/Jumper Settings** Step 6: Exit	View manufacturer's instructions about setting dip switches and jumpers, and run utilities to ensure the correct configuration of each adapter.
System Configuration Utility Step 1: About System Configuration Step 2: Add and Remove Boards Step 3: Change Configuration Settings Step 4: Save Configuration Step 5: View Switch/Jumper Settings **Step 6: Exit**	Exit to the operating system. If any settings were changed, you will be prompted to restart your system to see the changes.

About System Configuration

This step provides basic information for configuring expansion devices. More experienced users can skip this step.

Add and Remove Boards

Use step 2 to add, delete, or move boards. Most ISA boards cannot be detected automatically by the SCU, so you MUST use this step to add them to the system. However, PCI and ISA Plug and Play boards ARE automatically detected and added by the SCU. If the SCU did not detect a board, you can add a board using this step.



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To add a board:

1. Press <Ins>.
2. From the Select the Board to Add dialog box, select the board's .CFG file and press <Enter>.

To delete an existing board:

1. Use the arrow keys to select the board you want to delete.
2. Press <Del>.
3. Confirm that you want to delete the board.

To move a board from one slot to another:

1. Use the arrow keys to select the board you want to move.
2. Press <F7>.

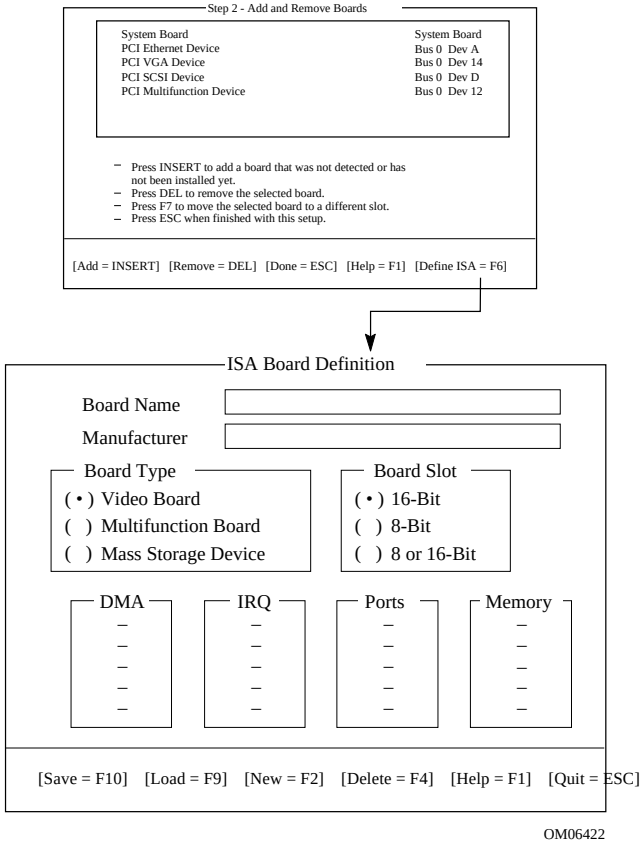
If you add, move, or remove boards
Manually verify the resource settings of these adapters, and any other adapters that are not locked, before saving your configuration.

To define an ISA board:

1. Press <F6> to display the ISA Board Definition dialog box. Refer to the section below for details.

Define an ISA Board

To define an ISA board that has no .CFG file, press <F6> while viewing the Add and Remove Boards screen. The ISA Board Definition dialog box will appear. It is necessary to define a board to prevent other boards in the system from using the same IRQ levels, DMA channels, I/O addresses, or memory addresses as that of the ISA board.



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If there is an ISA board already installed, you can press <F9> to load its definition and then modify that definition for a new ISA board you are installing.

If there is no ISA board installed, do the following steps:

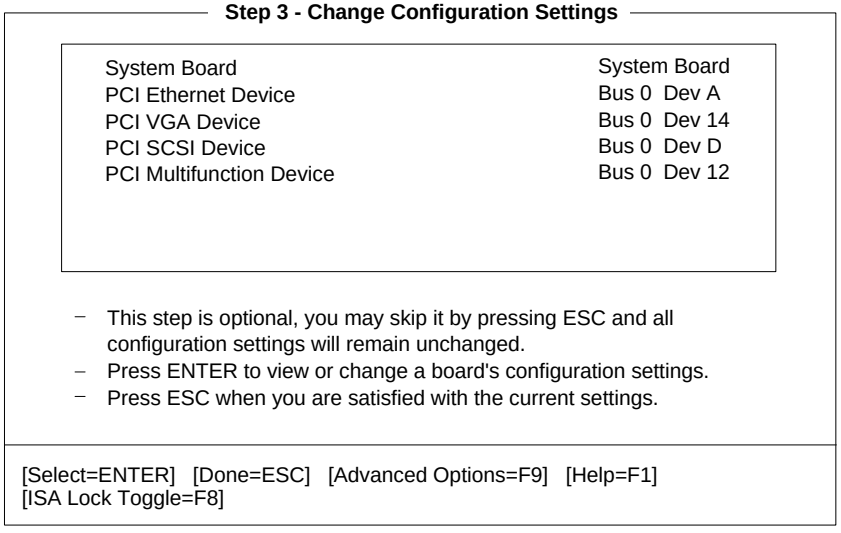
1. In the Board Name box, type a description of the board.
2. In the Manufacturer box, type the name of the board manufacturer.
3. From the Board Type box, choose the type of board.
4. From the Board Slot box, choose the type of slot.
5. In the DMA box, define up to four DMA channels.
6. In the IRQ box, define up to seven IRQ levels.
7. In the Ports box, define up to eight ranges of I/O ports.
8. In the Memory box, define up to eight memory address ranges.
9. Press <F10> to save the ISA board definition.

To load an existing ISA board: Press <F9>.

To delete an ISA board: Press <F9>, and confirm that you intend to delete the ISA definition.

Change Configuration Settings

Use step 3 to view or change the configuration settings for any board in the system. You can verify that the system board and adapter board resources are set properly. Configuring the system board involves a number of options, so this process and sample screen displays are described in detail, starting on page 60.



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To view or change the settings for a board:

1. Use the arrow keys to select the board.
2. Press <Enter>.
3. When you are satisfied with the current settings, press <Esc> to return to the main menu.

Advanced Options

The Advanced Options menu is intended for advanced users. These options are available:

Advanced Options	Select to view this information:
Global resource map	A list of allocated resources (DMA, logical slot, IRQ, ports, and memory)
Board details	Details about individual boards
System details	Information on the add-in board slots: slot number, type, whether bus master or not, NVRAM size

To view the Advanced Options menu: from the Change Configuration Settings dialog box, press <F9>.

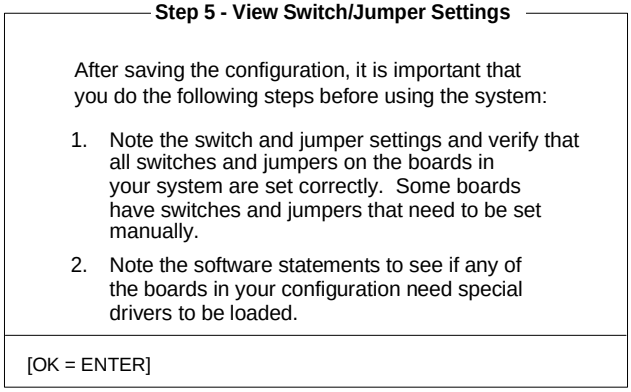
Save Configuration

This step saves the configuration settings to nonvolatile RAM as well as to a backup file (.CMS file). You must save your settings once they have been configured.

View Switch/Jumper Settings

Use this step to view manufacturer's instructions about setting dip switches and jumpers on add-in boards and about running utilities to ensure the correct configuration of each adapter.

This step does not provide switch and jumper information about the system board. Refer to Chapter 5 of this manual for defaults and options.



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Exit

This step exits to the operating system. If any configuration settings were changed, you will be prompted to restart your system to see the changes.

SCU Utilities

At the bottom of the main SCU menu, there is an option to press <F9> to display the Utilities menu. The menu lists options that control how a configuration is produced. For most of these choices, select the option line and press the spacebar to enable/disable the option.

For descriptions of the options, press <F1> for help while the Utilities menu displays on the screen. Here is a little more information about some of the utilities:

Advanced/Dealer Mode— some ISA boards can be shipped with configuration files that contain options that are not ordinarily configured by end users. If this mode is turned on, any functions marked as EXP (expert) in the shipped configuration file will be visible and can be updated.

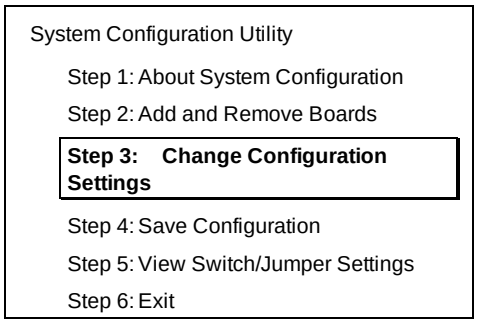
Force new configuration— this option forces the SCU to ignore any information stored in the Extended System Configuration Data (ESCD) structure in NVRAM. This means that any ISA boards will "disappear" and that PCI and Plug and Play ISA settings will be reset.

Specify name for .cms, .inf, and .set files— this option prompts you for the base filename for the .CMS, .INF, and .SET files. This allows you to save configuration information into different filenames. Otherwise, each time a save operation completes in the SCU, the .CMS, .INF, and .SET files will be overwritten. In this system, the default base filename is int31e0, so when the SCU is saved, the files int31e0.cms, int31e0.inf, and int31e0.set are created.

Press <F5> to restore a configuration from a CMS file— a .CMS file is created each time you do a save operation in the SCU. The file contains a copy of the ESCD image as it was stored into nonvolatile memory and can be used to restore this information at a later time. If the configuration information is accidentally erased or a mistake has been made during the configuration process, it might be desirable to restore to a previous configuration. The backup .CMS file provides this mechanism to restore the ESCD image.

Press <F7> to define an ISA board. If you have an ISA board with no .CFG file, you can use the ISA Board Definition screen to define the board. (You can access the same menu from SCU Step 2 by pressing <F6>.)

Configuration Settings for the System Board



When you select SCU step 3, Change Configuration Settings, there are many menus and options available under that heading. This section about the SCU shows the screen information that displays after you select the system board from the Change Configuration Settings screen.

- Default values are in **bold** type.
- Select an option and press <Enter> to display the menu for an option.
- Some items are displayed only, with no selection available here.

Some of the option choices are described below the grouping. Not all of them are described because (A) a few are not user-selectable but are displayed for your information, and (B) many of the option choices are relatively self-explanatory.

Systems Group
System Identification and Version Information

System Identification String	Displays System Identification String
Config and Overlay Version	Displays SCU configuration and overlay version number
BIOS Version String	Displays BIOS version, X.XXX.XXXX.X.XXXXXXXXXX
MP Spec Version	1.1/1.4
System Processor	Displays Pentium II Processor at {XXX} MHz

Memory Subsystem Group

Shadowing ISA ROMs Options	Press <Enter> to modify the shadowing options
Extended Memory Options (Cache, 1MB ISA Hole)	15 MB Extended Memory / 256 KB Cache (WB)

Shadowing ISA ROMs Options— all onboard adapter ROM (stored in compressed form in the system flash ROM) and PCI adapter ROM will be shadowed into RAM in the ISA-compatible ROM adapter memory space between C0000h to DFFFFh. Any BIOS found on ISA devices that can be shadowed will be shadowed into adapter memory space in the same range after initialization. ISA cards that require memory-mapped read/write accessibility should be located into the 15M-16M ISA space, or the 512-640KB space, which may be enabled individually via the SCU. Shadowing for ISA devices can be disabled for various regions via the SCU. A PCI BIOS is always shadowed.

Onboard Disk Controllers

Onboard Floppy Controller	**Enable Primary/Enable Secondary/**Disable
Primary Onboard IDE Controller	**Enable/**Disable

Onboard Communication Devices

Serial Port 1 Configuration	**Port:3F8h IRQ:4 (COM1)** Port:2F8h IRQ:3 (COM2) Port:3E8h IRQ:4 (COM3) Port:2E8h IRQ:3 (COM4) Port 1 Disable
Serial Port 2 Configuration	**Port:2F8h IRQ:3 (COM2)** Port:3F8h IRQ:4 (COM1) Port:3E8h IRQ:4 (COM3) Port:2E8h IRQ:3 (COM4) Port 2 Disable
Serial Port 2 Mode	Serial Port Mode
Parallel Port Configuration	**Port:378h IRQ:7 (LPT1)** Port:278h IRQ:5 (LPT2) Port:3BCh IRQ:7 (LPT3) Parallel Port Disable
Parallel Port Mode	**Parallel Port Mode ISA-Compatible** Parallel Port Mode PS/2 Parallel Port Mode Extended (Not valid with LPT3) Parallel Port Mode ECP on LPT1 with DMA1 Parallel Port Mode ECP on LPT1 with DMA3 Parallel Port Mode ECP on LPT2 with DMA1 Parallel Port Mode ECP on LPT2 with DMA3

Floppy Drive Subsystem Group

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

IDE Subsystem Group	
IDE Configuration - Primary Master	None User **Auto** CD
IDE Drive Options - Primary Master Multisector Transfer	**Disabled**, 2, 4, 8, or 16 Sectors
Translation Mode	**Standard CHS** Logical Block Addressing
IDE Configuration - Primary Slave	None User **Auto** CD
IDE Drive Options - Primary Slave Multisector Transfer	**Disabled**, 2, 4, 8, or 16 Sectors
Translation Mode	**Standard CHS** Logical Block Addressing

Automatic detection and enabling of IDE hard drives— during POST, if an IDE controller is detected, the BIOS does the following:

- Determines the types of IDE drives attached
- Sets the drive parameters for the best performance
- Maps each device into memory and I/O space
- Assigns IRQs and DMA channels so there are no conflicts

If you choose parameters for your drive that are different from the drive's native parameters, your definitions will be programmed into the drive controller.

To disable the IDE controller

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

Keyboard (KB) and Mouse Subsystem Group	
Typematic Speed	**30 CPS, 26 CPS, 21 CPS, 18 CPS, 13 CPS, 10 CPS, 6 CPS, 2 CPS**
Mouse Control Option	**Mouse Auto detected**

Console Redirection	
Console Redirection Control COM Port for Redirection	**Disable** Port Selection
Serial Port Baud Rate	2400 Baud 9600 Baud 19.2K Baud **115.2K Baud**
Hardware Flow Control	None **CTS/RTS** CTS/RTS & Xoff/Xon
Select Terminal Type	**IBM PC Extended ANSI/VT 100**

Security Subsystems Group	
Administrative Password Option	**Disable/**Enabled Press <Enter> to display the Password Menu. After entering a new password, <Tab> down to verify the password. New Password Enter Password XXXXXXX Verify Password XXXXXXX
User Password Option	**Disable/**Enabled Press <Enter> to display the Password Menu. After entering a new password, <Tab> down to verify the password. New Password Enter Password XXXXXXX Verify Password XXXXXXX
Hot Key Option)	**Disable/**{Ctrl-Alt-?} Press <Enter> to display menu: **Disable** Enable <Tab> down to Enable, and then <Tab> to Enter New Hot Key. Type one character, either a letter or number.
Lockout Timer	**Disable** Press <Enter> to display menu of possible choices.
Secure Boot Mode	**Disable/**Enable
Video Blanking	**Disable/**Enable
Floppy Writes	**Enable/**Disable

Security— the BIOS includes security features to prevent unauthorized access to or tampering with the system. Once the security features are enabled, access is allowed only after the correct password has been entered. Enabling is implied if you set a password here.

MultiBoot Group	
Boot Device Priority	Menu for Boot Devices

MultiBoot Group— the sequence that you specify on the menu in the MultiBoot Group will determine the boot order. If secure mode is enabled (a user password is set), then you will be prompted for a password before the system fully boots. If secure mode is enabled and the "Secure Boot Mode" option is also enabled, the system will fully boot but will require a password before accepting any keyboard or mouse input.

SCSI ROM BIOS Options Group	
SCSI-A ROM BIOS Scan	**Enable** Disable (if disabled, the SCSI-A channel is fully configured, but the ROM scan is skipped)

Management Subsystem Group	
System Sensor Control	Press <Enter> to modify the System Sensors.*
System Management Mode	**Enable**/Disable
Event Logging	**Enable**/Disable

* Select and enter values to be used by server management software.

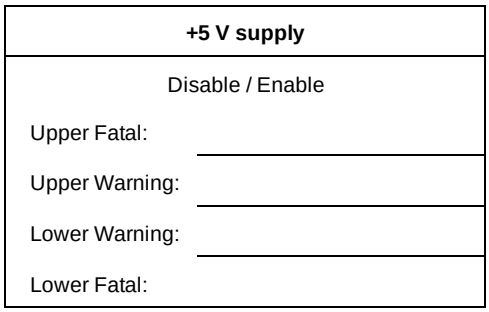
The options in the Management Subsystem Group are used to

- Set up system board voltage and temperature scanning by determining the appropriate thresholds
- Enable or disable a system speaker
- Scan the flash memory area for binaries that extend or alter critical event logging

This section does not list the sensors that will be displayed for configuring, because the list depends on information provided by the system at run-time. The information is placed in the system during manufacturing and assembly and depends on the particular configuration of the system.

However, the user interface should be constant when viewed on a sensor-by-sensor basis. The screen gives prompts for how to select and modify values and how to move around the screen. For each available sensor control, the display includes the choices shown below, with blanks for

entering values by using the <+> or <-> keys ("+5 V supply" is shown here as an example):



In most cases, we recommend leaving the controls Enabled.

However, if you have an operating system that does not handle system management interrupts, then you might want to disable the controls. When a control is disabled, the sensor itself is still active and able to give valid readings, but no system management interrupt will be generated. A server management utility can collect the readings for information or comparison.

System Management Options	
System Management Mode*	**Disable** Enable
Event Logging*	**Disable** Enable (controls onboard event logging.)
PCI System Error Detection*	**Disable** Enable
Reserved System Resources	

* Enable all three options if you are using server management software.

System Management Mode— if enabled, the embedded Server Management firmware is loaded.

Event Logging— if event logging is enabled, the BIOS can log critical and informational events to nonvolatile flash memory. Critical events are those that normally result in the system being shut down to prevent catastrophic side-effects from propagating to other parts of the system. These are example events:

- Operating system outside of the range of set temperature and voltage limits
- Multibit and parity errors in the memory subsystem
- Most errors that normally generate a Nonmaskable Interrupt (NMI) (including I/O channel check, software generated NMI, and PCI SERR events)

When such errors are detected, the system management interrupt (SMI) routines log the error or event (transparently to the OS) and cause an NMI to be generated for certain fatal events (for example, certain NMIs and uncorrectable ECC errors).

If the OS device driver is using the watchdog timer to detect software or hardware failures, and that timer happens to expire, an Asynchronous System Reset (ASR) is generated. This is equivalent to a hard reset, except that the limit registers are not reset. POST detects this event as the system reboots and will log the event to the logging area.

PCI System Error Detection— when enabled, if a PCI bus error (SERR#) is detected, a critical event is placed in the system event log and an NMI is generated. Enabling this feature has no effect when SMM Mode or Event Logging is disabled.

Server Management

As described in Chapter 1 in this manual, the system board includes hardware components that process information about system status and that monitor power supply voltages and operating temperature. You can use server management software to send and log messages about conditions reported if the system is not operating within specified limits.

✏ **Some options are required by server management software** If you are using server management software, make sure you select these options in the SCU and Setup; some of the options in the two utilities achieve the same goal, although the menu text differs:

Enable or select this option in SCU	Enable or select this option in Setup
System Management Options, System Management Mode, page 68	SMM Feature, System Management submenu, page 85
Event Logging, page 68*	Event Logging, System Management submenu, page 85
PCI System Error Detection, page 68	System SERR Detection, System Management submenu, page 85
System Sensor Control, page 66**	

* To view an event log, you must have server management software installed.

** The SCU contains menus for entering sensor control values (thresholds), and the BIOS will load defaults from the SCU. Note that server management software may include its own menus for entering threshold values, and these values may overwrite the ones you enter using the SCU menus. For details, refer to the manual that comes with your server management software.

Using Setup

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

Run Setup: you may run Setup to modify any standard PC AT† system board feature such as:

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

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

- Add or remove any ISA board that is not Plug and Play-compatible
- Enter or change information about a board
- Set system management threshold values
- Alter system resources (such as interrupts, memory addresses, I/O assignments) to user-selected choices instead of choices selected by the BIOS resource manager
- Specify new values whenever you add or remove memory

Record Your Setup Settings

Record your settings on the worksheets in Chapter 9. If the default values ever need to be restored (after a CMOS-clear, for example), you must run Setup again. Referring to the worksheets could make your task easier.

If You Cannot Access Setup

If the diskette drive is misconfigured so that you cannot access it to run a utility from a diskette, you may need to clear CMOS memory. You will need to open the system, change a jumper setting, use Setup to check and set diskette drive options, and change the jumper back. For a step-by-step procedure, see Chapter 5, under the heading, "CMOS Jumper."

How to Enter and Start Setup

You can enter and start Setup under several conditions:

- When you turn on the system, after POST completes the memory test
- When you reboot the system by pressing <Ctrl+Alt+Del> while at the DOS operating system prompt
- When you have moved the CMOS jumper on the system board to the "Clear CMOS" position (enabled); for the procedure, see Chapter 5, under the heading "CMOS Jumper"

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

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

If the <F2> prompt does not appear

If the <F2> prompt does not appear, the display of the prompt has been disabled in the SCU. You can enter Setup anyway by pressing <F2> right after the system memory size is shown.

For the procedure to enable the prompt, see Chapter 7 under the heading, "Press <F2> Key to Enter Setup: Prompt Does Not Display."

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

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

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

Setup Menus

Setup has six major menus and several submenus:

1. Main Menu
    - Primary IDE Master and Slave
    - Secondary Master and Slave
    - Keyboard Features
2. Advanced Menu
    - PCI Configuration
        - ⇒ PCI Device, Embedded SCSI
        - ⇒ PCI Device, Slot 1 - Slot 4
        - ⇒ PCI/PNP ISA UMB Region Exclusion
        - ⇒ PCI/PNP ISA IRQ Resource Exclusion
    - Integrated Peripheral Configuration
3. Security Menu
    - Set Supervisor Password
    - Set User Password
4. Server Menu
    - System Management
        - ⇒ Server Management Information
    - Console Redirection
5. Boot Menu
    - Boot Device Priority
    - Hard Drive
6. Exit Menu

To navigate the menus:	Press
Get help about an item	<F1>
Go back to a previous item	<Esc>
Select an item or display a submenu	<Enter>
Go to previous item	↑
Go to next Item	↓
Move between menus	← →
Reset to Setup defaults	<F5>
Return to previous values	<F6>
Save and exit Setup	<F10>

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

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

Main Menu

Default values are bold in the following tables.

You can make the following selections on the Main Menu itself. Use the submenus for other selections.

Feature	Choices	Description
System Time	HH:MM:SS	Sets the system time
System Date	MM/DD/YYYY	Sets the system date
Legacy Diskette A:	Disabled 360KB 1.2 MB 720KB **1.44/1.25 MB** 2.88 MB	Selects the diskette type
Legacy Diskette B:	**Disabled** 360KB 1.2 MB 720KB 1.44/1.25 MB 2.88 MB	
Memory Cache	**Enabled** Disabled	Enables Pentium II processor cache
CPU Speed Setting	**133 MHz** **233 MHz** 266 MHz 300 MHz 333 MHz	To activate this field, see “System Board Jumpers” in Chapter 5. **Note** Depending on your configuration, this option may or may not be available.
Language	**English (US)** Spanish Italian French German	Selects which language BIOS displays

Primary IDE Master and Slave

Feature	Choices	Description
Type	**Auto** None CD-ROM User	Auto allows the system to attempt auto-detection of the drive type. None informs the system to ignore this drive. CD ROM allows the manual entry of fields described below. User allows the manual entry of all fields described below.
Cylinders	1 to 2048	Number of Cylinders on Drive. This field is changeable only for Type User. This field is informational only for Type Auto.*
Heads	1 to 16	Number of read/write heads on drive. This field is available only for Type User. This field is informational only for Type Auto.*
Sectors	1 to 64	Number of sectors per track. This field is available only for Type User. This field is informational only for Type Auto.*
Maximum Capacity	N/A	Computed size of drive from cylinders, heads, and sectors entered. This field is available only for Type User. This field is informational only for Type Auto.*
Multi-Sector Transfer	Disabled 2, 4, 8, or 16 sectors	Determines the number of sectors per block for multi-sector transfers. This field is informational only for Type Auto.
LBA Mode Control	Disabled Enabled	Enabling LBA causes logical block addressing to be used in place of cylinders, heads, and sectors. This field is informational only for Type Auto.
32 Bit I/O	**Disabled** Enabled	Enabling allows 32 bit IDE data transfers. This field is informational only for Type Auto.
Transfer Mode	Standard Fast PIO 1 Fast PIO 2 Fast PIO 3 Fast PIO 4	Selects the method for moving data to and from the drive. This field is informational only for Type Auto.

Secondary Master and Slave

Feature	Choices	Description
32 Bit I/O	**Disabled** Enabled	Enabling allows 32 bit IDE data transfers. This field is informational only for Type Auto.
Smart Monitoring	Disabled	Not available.

Keyboard Features

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

Advanced Menu

The Advanced Menu includes selections that take you to two other configuration menus:

1. PCI configuration, which includes the following submenus:
   - PCI Device, Embedded SCSI
   - PCI Device, Slot 1 - Slot 4
   - PCI/PNP/ ISA UMB Region Exclusion
   - PCI/PNP ISA IRQ Resource Exclusion
2. Integrated Peripheral Configuration.

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

Feature	Choices	Description
Plug and 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 next boot. System automatically resets to No in next boot.
Use Multiprocessor Specification	**1.1** 1.4	Selects the version of multiprocessor specification to use. Some operating systems require version 1.1.
Large Disk Access Mode	**DOS** Other	Select DOS if your OS is DOS, or Other for UNIX, Novell Netware, or other OS.
Enable Memory Gap	**Disabled** Extended	Conventional creates a 128KB system memory gap starting at 512KB. Extended creates a 1MB extended memory gap starting at 15MB.
Delay on Option ROMs	**Disabled** Enabled	Forces a short delay at the end of each Option ROM scan.

PCI Configuration

The PCI Configuration Menu only contains selections that access other submenus.

PCI Device, Embedded SCSI

Feature	Choices	Description
Option ROM Scan	**Enabled** Disabled	Enables option ROM scan of the selected device.
Enable Master	**Enabled** Disabled	Enabled selects the device as a PCI bus master.
Latency Timer	Default 0020h **0040h** 0060h 0080h 00A0h 00C0h 00E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device may be master on a PCI bus.

PCI Device, Slot 1 - Slot 4

Feature	Choices	Description
Option ROM Scan	**Enabled** Disabled	Enables option ROM scan of the selected device.
Enable Master	**Enabled** Disabled	Enables selected device as a PCI bus master.
Latency Timer	Default 020h **040h** 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device may be master on a PCI bus.

PCI/PNP ISA UMB Region Exclusion

Feature	Choices	Description
C800 - CBFF	**Available** Reserved	Reserves the specified block of upper memory for use by legacy ISA devices.
CC00 - CFFF	**Available** Reserved	Reserves the specified block of upper memory for use by legacy ISA devices.
D000 - D3FF	**Available** Reserved	Reserves the specified block of upper memory for use by legacy ISA devices.
D400 - D7FF	**Available** Reserved	Reserves the specified block of upper memory for use by legacy ISA devices.
D800 - DBFF	**Available** Reserved	Reserves the specified block of upper memory for use by legacy ISA devices.
DC00 - DFFF	**Available** Reserved	Reserves the specified block of upper memory for use by legacy ISA devices.

PCI/PNP ISA IRQ Resource Exclusion

Feature	Option	Description
IRQ 3	**Available** Reserved	Reserves the specified IRQ for use by legacy ISA devices
IRQ 4	**Available** Reserved	Reserves the specified IRQ for use by legacy ISA devices
IRQ 5	**Available** Reserved	Reserves the specified IRQ for use by legacy ISA devices
IRQ 7	**Available** Reserved	Reserves the specified IRQ for use by legacy ISA devices
IRQ 9	**Available** Reserved	Reserves the specified IRQ for use by legacy ISA devices
IRQ 10	**Available** Reserved	Reserves the specified IRQ for use by legacy ISA devices
IRQ 11	**Available** Reserved	Reserves the specified IRQ for use by legacy ISA devices
IRQ 15	**Available** Reserved	Reserves the specified IRQ for use by legacy ISA devices

Integrated Peripheral Configuration

	Choices	Description
Serial Port A	Disabled **Enabled** Auto PnP OS	 Auto forces BIOS to configure the port. PnP OS forces OS configures the port.
Base I/O Address	**3F8** 2F8 3E8 2E8	Selects the base I/O address for COM port A
Interrupt	**IRQ 4** IRQ 3	Selects the IRQ for COM port A.
Serial Port B	Disabled **Enabled** Auto PnP OS	 Auto forces BIOS to configure the port. PnP OS forces OS configures the port.
Mode	**Normal** IrDA ASK-IR	Selects serial port B mode.
Base I/O Address	3F8 **2F8** 3E8 2E8	Selects the base I/O address for COM port B.
Interrupt	IRQ 4 **IRQ 3**	Selects the IRQ for COM port B.
Parallel Port	Disabled **Enabled** Auto PnP OS	 Auto forces BIOS to configure the port. PnP OS forces OS configures the port.
Mode	Output only Bi-directional EPP **ECP**	Selects parallel port mode
Base I/O Address	**378** 278	Selects the base I/O address for LPT port.

Continued

Interrupt	IRQ 5 **IRQ 7**	Selects the IRQ for LPT port
DMA channel	**DMA 1** DMA 3	Selects the DMA for LPT port
Floppy disk controller	Disabled **Enabled**	Enables onboard diskette controller.
Base I/O Address	**Primary** Secondary	Selects base I/O address for diskette controller.
PS/2 Mouse	Disabled **Enabled**	Enables or disables onboard mouse. Disabling the mouse frees up IRQ 12. If enabled, the OS can determine whether to enable or disable the mouse.

Security Menu

You can make the following selections on the Security Menu itself. Enabling the Supervisor Password field requires a password for entering Setup. The passwords are not case sensitive.

Feature	Choices	Description
Administrator Password is	**Clear**	Status only; user cannot modify.
User Password is	**Clear**	Status only; user cannot modify. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (see System Board Jumpers in Chapter 5).
Set Administrative Password	Press Enter	When the <Enter> key is pressed, the user is prompted for a password; press ESC key to abort. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (see System Board Jumpers in Chapter 5).
Set User Password	Press Enter	When the <Enter> key is pressed, the user is prompted for a password; press ESC key to abort. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (see System Board Jumpers in Chapter 5).
Password on Boot	**Disabled** Enabled	Requires password entry before boot. System will remain in secure mode until password is entered. Password on Boot takes precedence over Secure Mode Boot.
Diskette Access	**Administrator** User	Controls access to diskette drives.
Fixed Disk Boot Sector	**Normal** Write Protect	Write-protects boot sector on hard disk to protect against viruses.

Continued

System Backup Reminder	**Disabled** Daily Weekly Monthly	Displays reminder message at boot.
Virus Check Reminder	**Disabled** Daily Weekly Monthly	Displays reminder message at boot.
Secure Mode Timer	**Disabled** 1 min 2 min 5 min 10 min 20 min 1 hr 2 hr	Period of key/PS/2 mouse inactivity specified for secure mode to activate. A password is required for secure mode to function. Cannot be enabled unless at least one password is enabled.
Secure Mode Hot Key (Ctrl-Alt-)	[ ] [A, B, ..., Z]	Key assigned to invoke the Quicklock feature. Cannot be enabled unless at least one password is enabled.
Secure Mode Boot	**Disabled** Enabled	System will boot in secure mode. The user must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.
Video Blanking	**Disabled** Enabled	Blank video when secure mode is activated. The user must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.
Floppy Write Protect	**Disabled** Enabled	When secure mode is activated, the diskette drive is write protected. The user must enter a password to disable. Cannot be enabled unless at least one password is enabled.
Front Panel Lockout	**Disabled** Enabled	When secure mode is activated, the reset and power switches are locked. The user must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.

Server Menu

The Server Menu includes selections that take you to two other configuration menus:

1. System Management
   - Server Management Information
2. Console Redirection

You can make the following selections on the Server Menu itself.

Feature	Choices	Description
PCI IRQs to IO-APIC mapping	**Disabled** Enabled	If enabled, BIOS will describe direct PCI interrupt connections to IO APIC in multiprocessor table. Do not enable if OS does not support this feature.
PCI IRQ to External MUX	**Disabled** Enabled	Routes PCI IRQs to external multiplexer (MUX) and inputs PIIX4. Disables PIIX4 MUX.
Processor Retest	**No** Yes	If YES, BIOS clears historical processor status and retests all processors on next boot.

System Management

Feature	Choices	Description
I2C User Defaults	**Disabled**	If enabled, I^2C user default settings will be programmed.
System Management Mode	**Disabled** Enabled	Enabled loads the embedded server management firmware.
System Event Logging	**Disabled** Enabled	When enabled, system events will be logged by BIOS and BMC.
Clear Event Log	**No** Yes	Yes clears the system event log.
Fault Resilient Booting	**Disabled** Lvl-1 Lvl-2 Lvl-3	Determines level of Fault Resilient Booting. See Processor Board Controller in Chapter 1 for more information.
PERR Reporting	**Disabled** SMI Only SMI &NMI	If selected, system detects and reports PERR on PCI buses.
SERR Reporting	**Disabled** Enabled	Enabled generates a PCI bus system error report.
Test Extended Memory	**Enabled** Disabled	Diagnostic option only.
SMM Debug Mode	**Enabled** Disabled	If enabled, the SMM outputs to video and Port 80.
CPU Slot1 and Slot2 Presence	**Enabled** Disabled	Enables or disables processor at Slot1 or Slot 2.

Server Management Info

No items on this menu can be modified by the user. If items require changes, consult your system administrator.

Feature	Choices	Description
Board Part Number	N/A	Information field only
Board Serial Number	N/A	Information field only
System Part Number	N/A	Information field only
System Serial Number	N/A	Information field only
Chassis Part Number	N/A	Information field only
Chassis Serial Number	N/A	Information field only
BMC Revision	N/A	Information field only
FPC Revision	N/A	Information field only
PBC Revision	N/A	Information field only
Primary HSBP Revision	N/A	Information field only
Primary HSBP Part Number	N/A	Information field only
Primary HSBP Serial Number	N/A	Information field only
Secondary HSBP Revision	N/A	Information field only
Secondary HSBP Part Number	N/A	Information field only
Secondary HSBP Serial Number	N/A	Information field only
Power Share Revision	N/A	Information field only
Power Share Part Number	N/A	Information field only
Power Share Serial Number	N/A	Information field only

Console Redirection

Feature	Choices	Description
COM Port Address	**Disabled** 3F8 2F8 3E8	When enabled, console redirection uses the I/O port specified.
IRQ #	3 or 4	When console redirection is enabled, this displays the IRQ assigned per the address chosen in the COM Port Address field.
Baud Rate	9600 **19.2k** 38.4k 115.2k	When console redirection is enabled, use the baud rate specified.
Flow Control	None CTS/RTS XON/XOFF **CTS/RTS + CD**	None disallows flow control. CTS/RTS is hardware flow control. XON/XOFF is software flow control. CTS/RTS +CD is hardware plus carrier-detect flow control.

Boot Menu

The Boot Menu includes selections that take you to two other configuration menus:

1. Boot Device Priority
2. Hard Drive

Items on the Boot Menu can be prioritized. Use the up or down arrow keys to select a device, then press the <+> or <-> keys to move the device higher or lower in the boot priority list.

You can make the following selections on the Boot Menu itself.

Feature	Choices	Description
Floppy Check	**Disabled** Enabled	If Enabled, system verifies diskette type on boot. Disabled results in a faster boot.
Summary Screen	Disabled **Enabled**	If Enabled, system displays system configuration during boot.

Boot Device Priority

Boot Priority	Device	Description
1.	Diskette Drive	Attempts to boot from drive A:
2.	Removable Devices	Attempts to boot from a removable media device.
3.	Hard Drive	Attempts to boot from a hard drive device.
4	ATAPI CD-ROM Drive	Attempts to boot from an ATAPI CD-ROM drive.
5.	Diagnostic boot	Attempts to boot from diagnostic boot partition of the flash memory.

Hard Drive

For options on this menu, use the up or down arrow keys to select a device, then press the <+> or <-> keys to move the device higher or lower in the boot priority list

Option	Description
1. Other Bootable Device	N/A
2. WDC AC21600H	N/A

Exit Menu

You can make the following selections on the Exit Menu. Select an option using the up or down arrow keys, then press <Enter> to execute the option. Pressing <Esc> does not exit this menu. You must select one of the items from the menu or menu bar to exit.

Choices	Description
Exit Saving Changes	Exits after writing all modified Setup item values to NVRAM.
Exit Discarding Changes	Exits leaving NVRAM unmodified.
Load Setup Defaults	Loads values of all Setup items from previously saved custom defaults.
Load Custom Defaults	Loads default values for all Setup items.
Save Custom Defaults	Saves present Setup values to custom defaults.
Discard Changes	Reads previous values of all Setup items from NVRAM.
Save Changes	Writes all Setup item values to NVRAM.

Using SCSI*Select*

The SCSI*Select* utility detects the number of AIC-7880 wide/fast-20 SCSI III host adapters in the system. Use the utility to:

- Change default values
- Check or change SCSI device settings that may conflict with those of other devices in the system
- Perform a low-level format on SCSI devices installed in the system

How to Enter and Start SCSI*Select*

1. Turn on your video monitor and system. After a few seconds POST begins to run (see page 46 in this chapter). After the memory tests are completed, if you do *not* choose to enter Setup and you *do* have an operating system installed, a SCSI*Select* prompt will appear. Record your settings on the worksheets in Chapter 9.

   ```
   Press <Ctrl><A> for SCSISelect(TM) Utility!
   ```

2. Press <Ctrl+A> to run the utility.

SCSI*Select* has these menus:

1. Main Menu
   - Configuration
     - ⇒ Boot Device Configuration
     - ⇒ SCSI Device Configuration
     - ⇒ Advanced Configuration Options
   - SCSI Disk Utilities
2. Exit Menu

To navigate the menus:	Press
Exit a menu or the utility	<Esc>
Select an item	<Enter>
Go to previous item	↑
Go to next item	↓
Reset to host adapter defaults	<F6>

Main Menu, SCSI*Select*

The main SCSI*Select* menu shows the name of the host adapter and its address: <Host adapter> at Bus:Device xx:xxh. There are two menu options.

Options	Comment
Configure/View Host Adapter Settings	Press <Enter> to display the Configuration menu.
SCSI Disk Utilities	Press <Enter> to display the SCSI Disk Utilities menu. The utility scans for all SCSI devices installed in the system and lists them. Press <Enter> to select the device you want to run utilities on. The default ID for the SCSI host adapter is #7. If you select the host adapter, you will see only a message stating that fact; you cannot specify any options for the host adapter from the utilities menu.

Configuration Menu, SCSI*Select*

Feature	Default	Choices
SCSI Bus Interface Definitions		
Host Adapter SCSI ID	7	0 - 15
SCSI Parity Checking	Enabled	Enable/Disable
Host Adapter SCSI Termination	Low ON/High ON	Low ON/High ON Low OFF/High OFF Low OFF/High On
Additional Options		
Boot Device Options	Press <Enter>	See Boot Device Options, SCSI*Select*.
SCSI Device Configuration	Press <Enter>	See SCSI Device Configuration, SCSI*Select*.
Advanced Configuration Options	Press <Enter>	See Advanced Configuration Options, SCSI*Select*.

Host Adapter SCSI ID— Each device on the SCSI bus, including the adapter, must have a unique ID. The ID defines the device, and the priority of the ID determines which device controls the bus when two or more devices try to use it at the same time. Each adapter on the bus, whether 8- or 16-bit, has a default ID of 7, so the adapter always has the highest priority. This is the priority model:

Device priority model	Highest priority ID	Lowest priority ID
8-bit devices (narrow SCSI)	7	0
16-bit devices (wide SCSI) (In this case, ID 7 has the highest priority and ID 8 the lowest)	7 through 0	15 through 8

SCSI Parity Checking— when enabled, the host adapter uses SCSI parity checking to verify the accuracy of data transfer on the SCSI bus. If a device on the bus does not support SCSI parity, the option must be disabled.

Host Adapter SCSI Termination— the setting for this option is determined by (1) the location of the host adapter on the bus and (2) whether the SCSI devices connected to the bus are narrow, wide, or a combination. The bus must have a set of resistors, called *terminators*, either installed in or enabled on the first and last SCSI devices on the bus, or else data transfer may not be accurate. The host adapter itself is the SCSI device at one end of the bus, and termination on the adapter cannot be disabled. On a 16-bit adapter, termination is enabled for both the low byte (bits 0-7) and the high byte (bits 8-15). If there is no 8-bit adapter at the end of the bus, you must disable termination by using the option in the SCSI*Select* Configuration menu. This is the termination model:

Host adapter location	SCSI devices connected to bus	Host Adapter SCSI Termination choice
Installed at end of bus	***only*** 8-bit, ***or*** ***only*** 16-bit	Low ON/High ON (default)
Installed at end of bus	***both*** 8-bit and 16-bit	Low ON/High ON (same as default) **Note:** Last device must be 16-bit and terminated.
Not at end of bus*	***only*** 16-bit	Low OFF/High OFF
Not at end of bus*	***both*** 8-bit and 16-bit	Low OFF/High On

* In this system, the host adapter on the system board is always at one end of the bus.

Boot Device Options, SCSI*Select*

Feature	Option	Comment
Boot Target ID	0–15	The default boot device is at SCSI ID 0 with logical unit number (LUN) 0. To specify a different boot device, choose a different SCSI ID (0 through 7 on 8-bit adapters, 0 through 15 on 16-bit adapters).
Boot LUN Number	0–7	The logical unit number (LUN) can be 0 through 7 (on 8-bit or 16-bit adapters). If you disable Multiple LUN Support in the Advanced Configuration menu, specifying a number here has no effect.

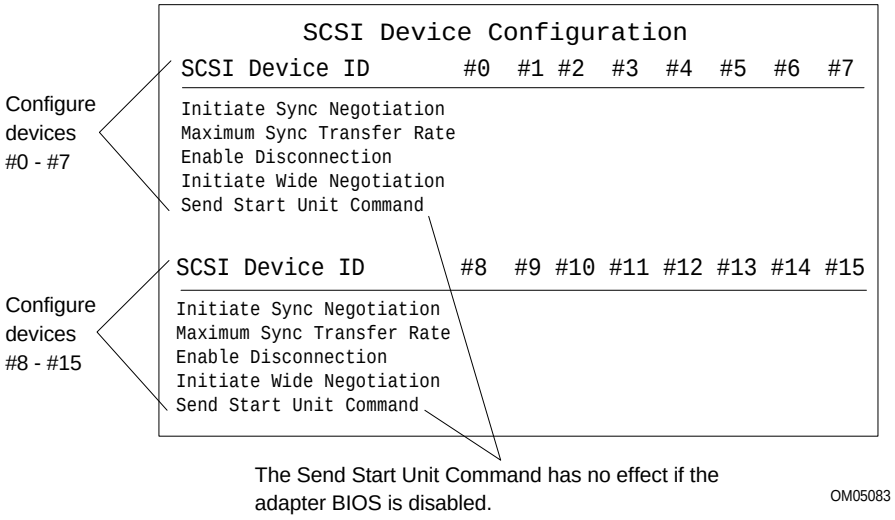
Boot Target ID— The default boot device is the device at SCSI ID 0 with logical unit number (LUN) 0. To specify a different boot device, choose a different SCSI ID (0 through 7 on 8-bit adapters, 0 through 15 on 16-bit adapters).

Boot LUN Number— If the boot device has multiple logical units, you must also specify the boot logical unit number (LUN). This can be 0 through 7 (on 8-bit or 16-bi5t adapters). Multiple LUN support can be disabled in the SCSI*Select* Advanced Configuration menu.

SCSI Device Configuration, SCSI*Select*

The screen shows five features that can be configured independently for each of up to 15 devices (SCSI Device ID #0 through #15)

Feature	Default	Choices
Initiate Sync Negotiation	Yes	Yes/No
Maximum Sync Transfer Rate	40.0 for 16-bit 20.0 for 8-bit	16-bit devices: 20.0, 26.8, 32.0, 40.0 8-bit devices: 10, 13.4, 16.0, 20.0
Enable Disconnection	Yes	Yes/No
Initiate Wide Negotiation	Yes	Yes/No
Send Start Unit Command	Yes	Yes/No No effect if the BIOS is disabled.



Initiate Sync Negotiation— when enabled (set to Yes), the host adapter initiates synchronous negotiation with the SCSI device; when No, the adapter does not initiate synchronous negotiation. Normally you should leave this set to Yes, because the SCSI adapter and its attached devices can transfer data faster in synchronous mode than in asynchronous. If a device

does not support synchronous negotiation, the adapter will automatically transfer data asynchronously. If the device initiates synchronous negotiation, the host adapter always responds accordingly.

Maximum Sync Transfer Rate— the setting determines the maximum synchronous data transfer rate that the adapter will negotiate with the device. If you have disabled (set to No) the Initiate Sync Negotiation option, the maximum sync rate you select is the rate at which the adapter accepts data from the device; there is no negotiation.

Enable Disconnection— when set to Yes, the adapter allows a SCSI device to temporarily disconnect from the bus, and the adapter can continue to do other bus operations. When no, the adapter does not allow a SCSI device to disconnect.

- Leave this set to Yes if there are two or more SCSI devices on the bus.
- Change to No if there is only one SCSI device connected to the bus (besides the adapter).

Initiate Wide Negotiation— when set to Yes, the adapter initiates wide negotiation with each 16-bit SCSI device. You can leave this set to Yes even if there are 8-bit devices connected; the adapter will not attempt wide negotiation with 8-bit devices.

Send Start Unit Command— this option reduces the load on the system power supply by allowing the host adapter to power-up SCSI devices one at a time at boot time.

- Yes is required for SCSI hard drives; the adapter sends the Start Unit Command to each SCSI device individually to power-up.
- When set to No, all SCSI devices power up at the same time. If a device has been jumpered to wait for a start command, it will not start.

If you enable the command for more than one device, the adapter sends the command first to the boot device specified in the Boot Device Options menu (page 94). After the first device responds, the adapter sends the command to the remaining SCSI devices, beginning with the lowest SCSI ID.

Do not enable the Send Start Unit option before checking...
Make sure the AIC-7880 BIOS option is enabled (see Advanced Configuration Options, page 97).

Check the manual that comes with your SCSI device to make sure the device supports the command. If so, it is likely that you will need to change a switch or jumper setting on the device so it can respond to the command.

Advanced Configuration Options, SCSI*Select*

Feature	Default	Choices
If you disable the Host Adapter BIOS option, the following options have no effect.		
Host Adapter BIOS (Configuration Utility Reserves BIOS Space)	Enabled	Enable/Disable
Support Removable Disks Under BIOS as Fixed Disks	Boot Only	Boot Only All Disks Disable
Extended BIOS Translation for DOS Drives greater than 1 GB	Enabled	Enable/Disable
Display <Ctrl-A> Message During BIOS Initialization	Enabled	Enable/Disable
Multiple LUN Support	Disabled	Enabled/Disable
BIOS Support for Bootable CD-ROM	Enabled	Enable/Disable
BIOS Support for Int13 Extensions	Enabled	Enable/Disable
Support for Ultra SCSI Speed	Enabled	Enable/Disable

⚠ **CAUTION, understand the options before changing defaults**
Do not change the default settings in the SCSI*Select* Advanced Configuration Options menu without understanding the consequences of making changes.

Host Adapter BIOS— The AIC-7880 BIOS must be enabled to allow these actions:

- Boot from a SCSI hard drive on the bus.
- Enable any of the other options listed on the same menu (Advanced Configuration Options).
- Boot from a SCSI CD-ROM drive. If any IDE devices are selected in the boot order, they will be chosen first over the SCSI device.

If the devices on the SCSI bus are controlled by device drivers and thus do not need a BIOS, you can disable the option. This frees about 16 KB of memory and shortens the boot time by up to 60 seconds. However, 2 KB of memory space is still reserved per PCI and Plug and Play specifications.

Support Removable Disks Under BIOS as Fixed Disks (i.e., hard disks)— the setting controls how removable-media devices are supported by the AIC-7880 BIOS. The choices are:

Choice	Description
Boot Only (default)	Only the removable-media drive designated as the boot device is treated as a fixed (hard) disk drive. The AIC-7880 BIOS must be enabled.
All Disks	All removable-media drives supported by the AIC-7880 BIOS are treated as fixed drives. (If you are a NetWare† user: all removable-media drives are automatically supported by NetWare as fixed disks regardless of how you set this option.) The AIC-7880 BIOS must be enabled.
Disabled	No removable-media drives running under DOS are treated as fixed drives. Driver software is needed because the drives are not controlled by the AIC-7880 BIOS.

⚠ **CAUTION, do not remove media from drive under BIOS control**
Do not remove media from a removable media drive if the drive is under the control of the AIC-7880 BIOS.

Extended BIOS Translation for DOS Drives > 1 GB— when Enabled, drives handled by the AIC-7880 BIOS can use extended translation (255 heads, 63 sectors per track) if their formatted capacity is greater than 1 GB and standard translation if smaller than 1 GB.

⚠ **CAUTION, before changing option, back up hard disks!**
First back up the hard disks if you need to change this setting and the translation scheme! All data is erased when you change from one translation scheme to another.

Display <Ctrl-A> Message During BIOS Initialization— if Enabled, at boot time a prompt displays to let you run the SCSI*Select* program.

Multiple LUN Support— the default setting is Disabled. Enable the option if any devices have multiple logical units.

BIOS Support for Bootable CD-ROM— when enabled, the system can boot from a CD-ROM. The option displays only if the adapter BIOS is configured to include it. To boot from a hard drive or other device, either disable this option or make sure there is no bootable CD in the drive.

BIOS Support for Int 13 Extensions— when enabled, the adapter BIOS supports Int 13h extensions, required for bootable CD-ROMs. The option

displays only if the adapter BIOS is configured to include bootable CD-ROM support. You can disable the option if the boot device is *not* a CD-ROM, but it does no harm to leave it enabled.

Support for *Ultra*SCSI Speed— the default setting is Disabled. The option displays only if the BIOS is configured to support *Ultra*SCSI speeds. Enable the option to use *Ultra*SCSI speeds with the AIC-7880.

SCSI Disk Utilities Menu, SCSI*Select*

When you select SCSI Disk Utilities from the SCSI*Select* Main Menu, the utility scans the SCSI bus for connected devices and lists the SCSI IDs and associated devices on the bus.

From the list of devices, select the one you want to format or verify.

If a device has multiple logical units, a menu of LUNs appears.

Select the device you want to format or verify. A small menu appears. Select Format Disk or Verify Disk.

Utility	What it does	Comment
Format Disk	Does a low-level format on the hard disk drive. Before it starts, a prompt appears asking you to confirm that you want to format the hard disk.	⚠ **CAUTION** You cannot stop the formatting once it starts! Do NOT answer yes unless you intend to format the disk.
Verify Disk Media	Scans the selected hard disk for bad blocks and prompts you to reassign them.	You can press <Esc> at any time to stop the verification task.

Exit Menu, SCSI*Select*

Feature	Option	Comment
Exit Utility?	Yes No	When you finish configuring SCSI devices, select “Yes” and press <Enter>. This message appears: `Please press any key to reboot`

Installing Video Drivers

After configuring the system, you need to install video drivers to take full advantage of the features of the onboard Cirrus Logic CL-GD5446 super VGA video controller.

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

Configuring the Network Controller

This system includes the onboard Intel 82557 PCI LAN Controller. The IRQ level and I/O address of the onboard controller are automatically set each time you start the system. PCI systems automatically detect and configure PCI-compliant adapters while booting.

For information about network software and configuration, refer to the Configuration Software CD shipped with this system.

Integrating and Upgrading Hardware 4

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

Tools and Supplies Needed

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

Safety: Before You Remove the Side Cover

Before removing the system side cover to work inside the system, observe these safety guidelines.

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

Warnings and Cautions

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

WARNINGS

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

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

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

CAUTIONS

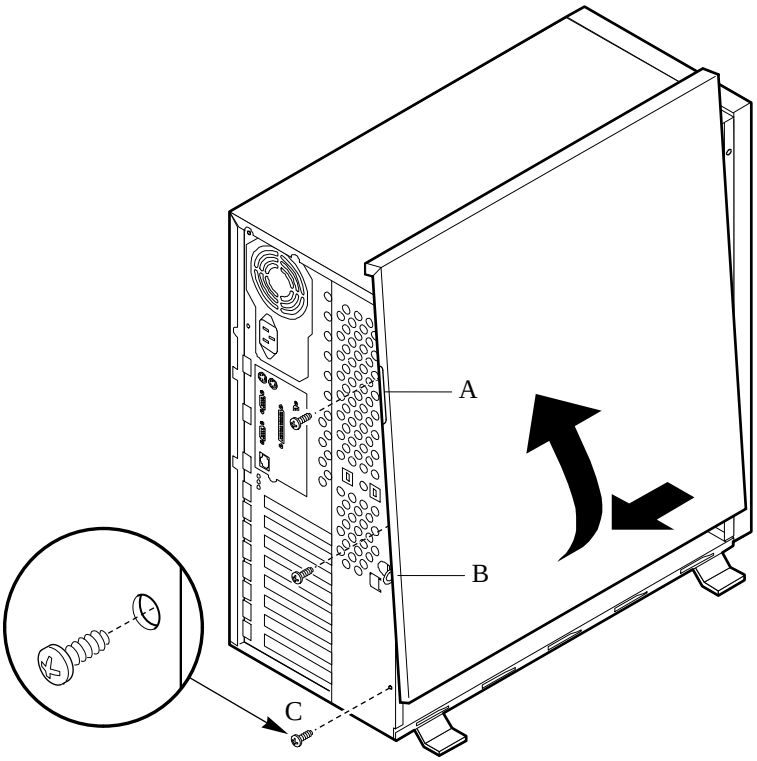
Electrostatic discharge (ESD) and ESD protection: ESD can damage disk drives, boards, and other parts. We recommend that you do all procedures in this chapter only at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground—any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

ESD and handling boards: Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the system, place it component-side up on a grounded, static-free surface. If you place the 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. Use a

conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

Cooling and airflow: For proper cooling and airflow, always install the chassis side cover before turning on the system. Operating it without the cover in place can damage system parts.

Side Cover, Removing



OM06410

Side cover, Removing

A Built-in handle

B Metal loop (for padlock)

C Retaining screws (3)

You need to remove the system side cover and in some cases the front cover to gain access to components inside the system.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Turn off all peripheral devices connected to the system.
3. Turn off the system by using the power on/off switch on the front panel, AND unplug the AC power cord.
4. Label and disconnect all peripheral cables attached to the I/O panel on the back of the system.
5. If there is a padlock installed on the back of the system, unlock and remove it.

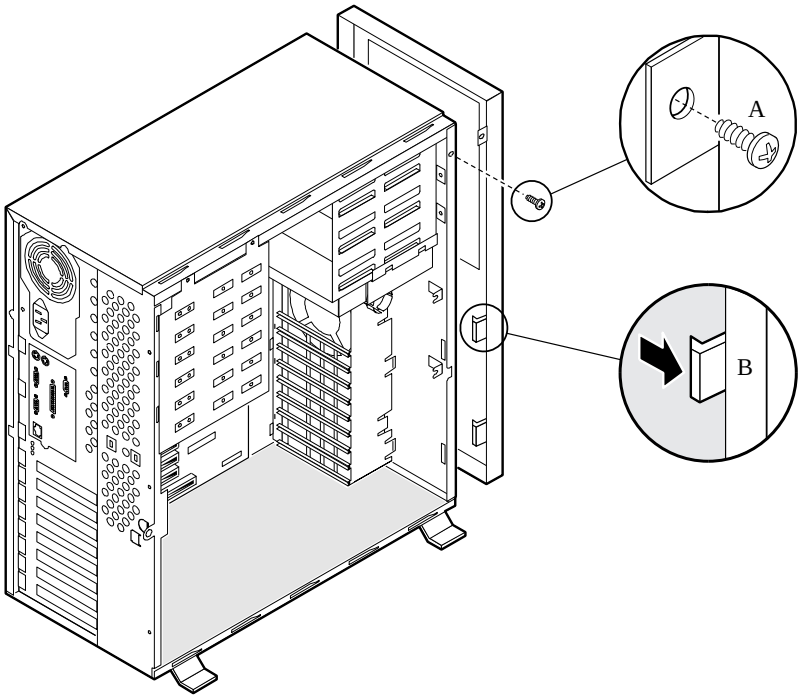
6. Remove and save the three screws from the side cover; you will need them later to reattach the cover.
7. Place the fingertips of your left hand under the built-in handle on the back of the cover.
8. Using an even pull, slide the cover backward, about an inch, until it stops.
9. Using your left hand, pull the back end of the cover toward you to disengage its bottom row of tabs from the notches in the chassis.
10. Using both hands, lift the cover upward to disengage the top row of tabs from the notches in the top edge of the chassis. Set the cover aside.

Side Cover, Installing

⚠ **CAUTION, do not damage EMI strips**
When you install the side cover, do not damage the EMI gaskets mounted on the cover. Replace any damaged strips, or your system may not meet EMI requirements.

1. Before replacing a side cover, check that you have not left loose tools or parts inside the system.
2. Check that cables, add-in boards, and other components are properly installed.
3. Position the cover over the chassis so that the top row of tabs aligns with slots in the top of the chassis. Slide the cover toward the front of the system until the cover tabs firmly engage in the chassis.
4. Attach the cover to the chassis with the three screws you removed earlier, and tighten them firmly (6.0 inch-pounds).
5. To prevent unauthorized access inside the system, insert and lock a padlock through the metal loop protruding through the slot in the back of the side cover.
6. Connect all external cables and the power cord to the system.

Front Cover, Removing



OM06411

Front cover

A Retaining screw

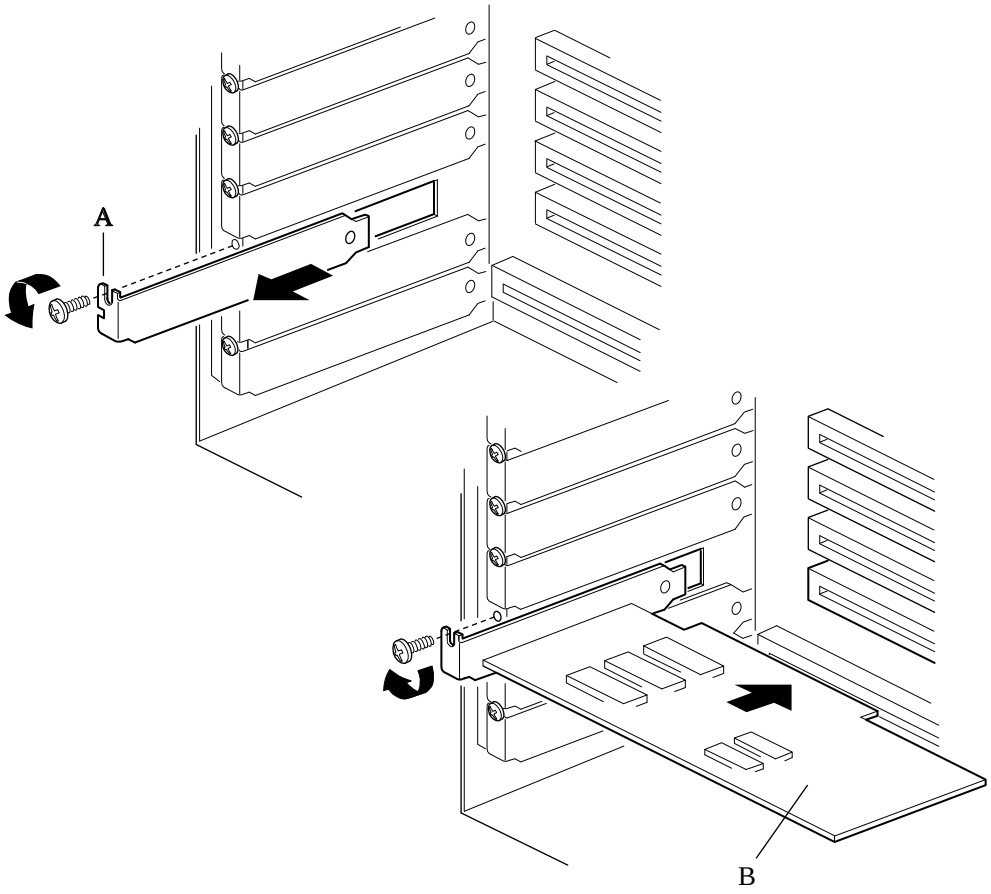
B Plastic tab (2)

1. Remove side cover.
2. Remove and save the screw from the front cover; you will need it later to reattach the cover.
3. Squeeze the two plastic tabs inside the front cover, and push them through the chassis slots.
4. Pull the left side of the cover out slightly, about 15°, until the cover clears the power and reset buttons. Slide the cover to the right until the tabs disengage from the chassis slots. Set the cover aside.

Front Cover, Installing

1. Before replacing the front cover, make sure you did not leave any tools or loose parts inside the chassis.
2. Insert the plastic tabs on the front cover into the slots on the right of the chassis. Squeeze the front panel and chassis together along the left side until the plastic tabs snap into their slots. Reinstall and tighten the screw firmly (6.0 inch-pounds).

Add-in Board, Installing



Installing add-in board

A Expansion slot cover and screw

B Add-in board, use same screw

⚠ **CAUTION, do not overload system board**
Do not overload the system board by installing add-in boards that draw excessive current. For expansion slot current limitations, see Chapter 8, the power system descriptions.

⚠ **CAUTION, ESD and handling boards**
Add-in boards can be extremely sensitive to ESD and always require careful handling. After removing the board from its protective wrapper or from the system board, place it component-side up on a grounded, static-free surface or conductive foam pad— if available. Do not slide the board over any surface.

The system board has four PCI bus master slots and one ISA bus master slot. The slot accepts any add-in PCI and ISA boards or any add-in board that is compatible with an IBM PC AT or PC XT† system (except for an 8-bit drop card that fits only in an 8-bit PC XT connector).

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove side cover.
3. Remove and save the expansion slot screw and cover.
4. Remove add-in board from its protective wrapper. Be careful not to touch the components or gold edge connectors. Place board component-side up on an antistatic surface.
5. Record the serial number of the add-in board in your equipment log.
6. Set jumpers or switches according to the manufacturer's instructions.
7. Hold board by its top edge or upper corners. Firmly press it into an expansion slot on the system board. The tapered foot of the board retaining bracket must fit into the mating slot in the expansion slot frame.
   - Install an ISA board component-side UP.
   - Install a PCI board component-side DOWN.
8. Align the rounded notch in the retaining bracket with the threaded hole in the frame. The bracket fits the space that was occupied by the slot cover.
9. Use the screw removed earlier. Insert it into the threaded hole, and push the rounded notch against the screw. Tighten it firmly (6.0 inch-pounds) to prevent the bracket from interfering with adjacent brackets. Attach cables if necessary.
10. Reinstall the side cover.

Must run SCU to configure some boards
If you install an ISA board that is not Plug and Play, you must run the SCU to reconfigure the system. Running the

SCU is optional for a PCI board. For information about running the SCU, see Chapter 3.

Add-in Board, Removing

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

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

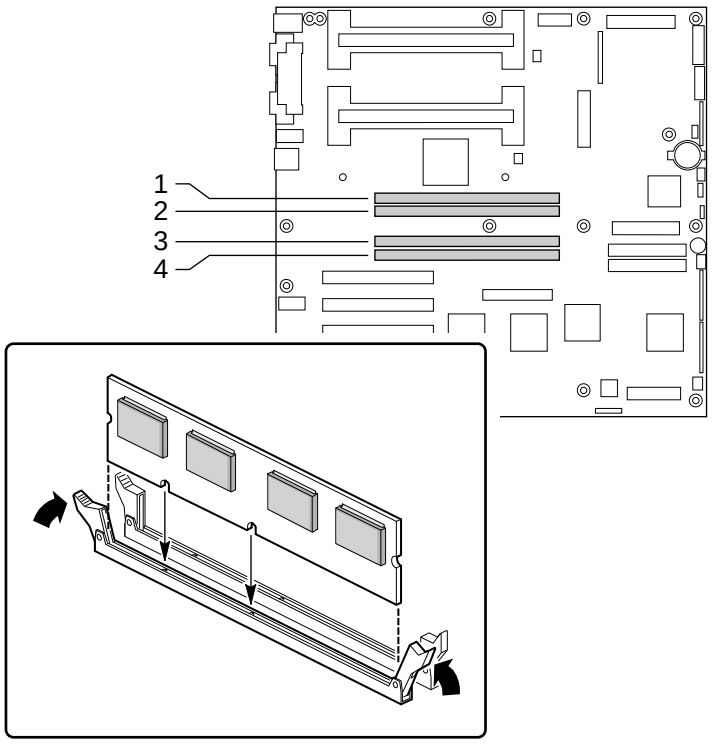
Memory, Installing DIMMs

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

CAUTION, match metal types
Mixing dissimilar metals may cause later memory failures resulting in data corruption. Install DIMMs with gold plated edge connectors only in gold plated sockets.

See Chapter 1 for memory size and requirements:

- Install from 32 MB to 512 MB of memory, using up to four double-banked DIMMs.



Installation and locations of memory DIMM sockets

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1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove side cover.
3. Holding the DIMM only by its edges, remove it from its antistatic package.
4. Orient the DIMM so that the two notches in the bottom edge of the DIMM align with the keyed socket.
5. Insert the bottom edge of the DIMM into the socket, and press down firmly on the DIMM until it seats correctly.
6. Gently push the plastic ejector levers on the socket ends to the upright position.
7. Repeat the steps to install each DIMM.
8. Reinstall side cover.
9. Connect all external cables and the power cord to the system.
10. Turn on the monitor and then the system.
11. Run the SCU to configure the system and to properly attribute ECC memory.

Make sure you run the SCU to configure ECC memory
Failure to do so may degrade the performance of the server.

Memory, Removing DIMMs

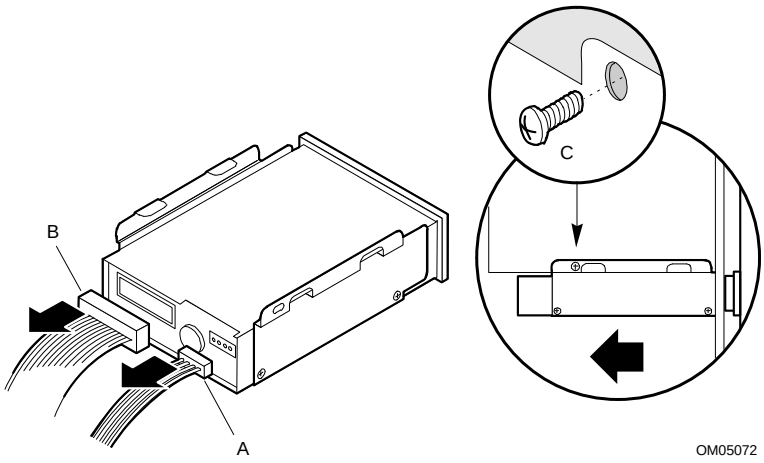
CAUTION, use care when removing DIMM
Use extreme care when removing a DIMM. Too much pressure can damage the socket slot. Apply only enough pressure on the plastic ejector levers to release the DIMM.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove side cover.
3. Gently push the plastic ejector levers out and down to eject a DIMM from its socket. Refer to the figure, "Installation and locations of memory DIMM sockets" on page 111, as necessary.

4. Hold the DIMM only by its edges, being careful not to touch its components or gold edge connectors. Carefully lift it away from the socket, and store it in an antistatic package.
5. Repeat to remove other DIMMs as necessary.
6. Reinstall the system side cover.
7. Connect all external cables and the power cord to the system.
8. Turn on the monitor and then the system.
9. Run the SCU to configure the system and to properly attribute ECC memory.

Diskette Drive, 3.5-inch, Removing

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove the side system cover.
3. Disconnect the power cable and signal cable from the diskette drive. The connectors are keyed for ease in reconnecting them to the drive.
4. Remove and save the screw that secures the diskette drive assembly to the 5.25-inch drive bay.
5. Slide the assembly back toward the power supply to disengage the tabs from the slots in the bottom of the 5.25-inch drive bay.
6. Remove the assembly from the chassis, and place it component-side up on an antistatic surface. If not reinstalling the same drive, place it in a protective wrapper.
7. Remove the four screws that hold the bracket to the drive, and set them and the bracket aside.
8. Place the drive in an antistatic protective wrapper.
9. Reinstall the side cover.

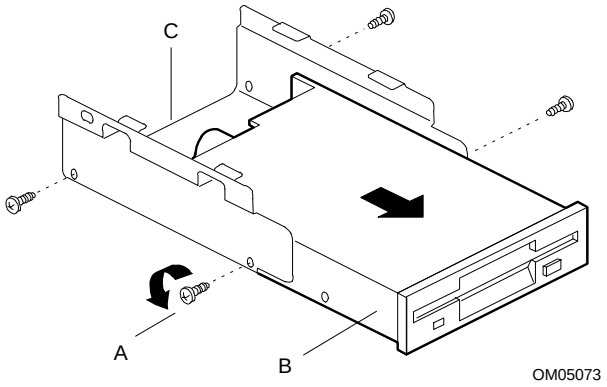


Removing diskette drive from chassis

A Power cable

B Signal cable

C Chassis screw



Removing diskette drive from bracket

A Bracket screws (4)

B Drive

C Bracket

Diskette Drive, 3.5-inch, Installing

1. Remove the new 3.5-inch diskette drive from its protective wrapper, and place it component-side up on an antistatic surface. Record the drive model and serial numbers in your equipment log.
2. Set any jumpers or switches according to the drive manufacturer's instructions.
3. Place the drive bracket on the component-side of the drive, and align the four mounting holes.
4. Attach the bracket to the drive with four screws of the appropriate size and length (reuse the screws you removed before). Tighten the screws firmly (between 4.0 and 6.0 inch-pounds).
5. Position the drive/bracket assembly under the bottom 5.25-inch bay, and slide the assembly toward the front of the system to engage the bracket tabs in the slots under the bottom bay. Make sure the front of the drive fits correctly in the front opening of the system.
6. Secure the assembly to the 5.25-inch bay with the screw you removed earlier; tighten the screw firmly (6.0 inch-pounds).
7. Connect the signal and power cables to the drive. The red stripe on the signal cable must face toward the center of the drive.
8. Reinstall the side cover.
9. Run the SCU to specify that the diskette drive is installed in the system.

Drive Cabling Considerations

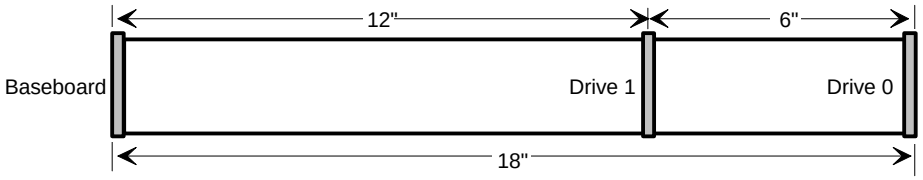
This section summarizes device cabling requirements and constraints. The number of devices you can install depends on:

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

IDE Requirements

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

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



To disable either IDE controller

If you plan to disable either IDE controller to reuse the interrupt for that controller, you must physically unplug the IDE cable from the board connector (IDE0 or IDE1) if a cable is present. Simply disabling the drive by configuring the SCU option does not free up the interrupt.

SCSI Requirements

A wide SCSI cable is standard in the system.

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

If the ONLY SCSI device installed is a CD-ROM drive, an active terminator on the drive is not required, but this is an unlikely system configuration.

In general, the SCSI cable must be routed from the connector at the system board to any 5.25-inch SCSI devices in the external bays, and finally to internal 3.5-inch SCSI hard drives.

Removable Media Drive, 5.25-inch, Installing

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

⚠ **CAUTION, only single-ended SCSI devices supported**
The internal SCSI interface in this system supports only single-ended SCSI devices. Connecting differential SCSI drive types to this interface can result in electrical damage to the system board and peripherals.

⚠ **CAUTION, do not install hard drives in 5.25-inch bays**
For several reasons, we recommend that you do NOT install hard drives in the 5.25-inch bays:

- The drives cannot be properly cooled in this location.
- A hard drive generates EMI and is more susceptible to ESD in this location.

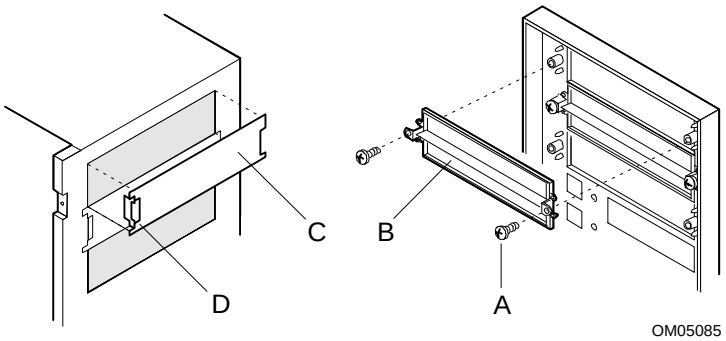
Save the filler panels and EMI shields
System EMI integrity and cooling are both protected by having drives installed in the bays or filler panels and EMI shields covering the bays. When you install a drive, save the panel and shield to reinstall in case you should later remove the drive and not reinstall one in the same bay.

Bus termination when installing SCSI devices
It is important that your cabling and connections meet the SCSI bus specification. Otherwise, the bus could be unreliable and data corruption could occur or devices may not work at all. The SCSI bus needs to be terminated at the end of the cable, and this is usually provided by the last SCSI device on the cable. For more information, see step 11, where you connect the signal cable to a drive.

1. Observe the safety and ESD precautions at the beginning of this chapter. Also see the cabling considerations on page 116.
2. Remove the side and front system covers. Place the front cover on a flat surface.
3. Remove the screws and filler panel from the bay, and set them aside.
4. Push the tab on the left side of the EMI metal shield to the right to disengage it from the chassis. Save the shield.

Remove filler panels and EMI shields

A Screws (2)
B Filler panel
C EMI shield
D Tab

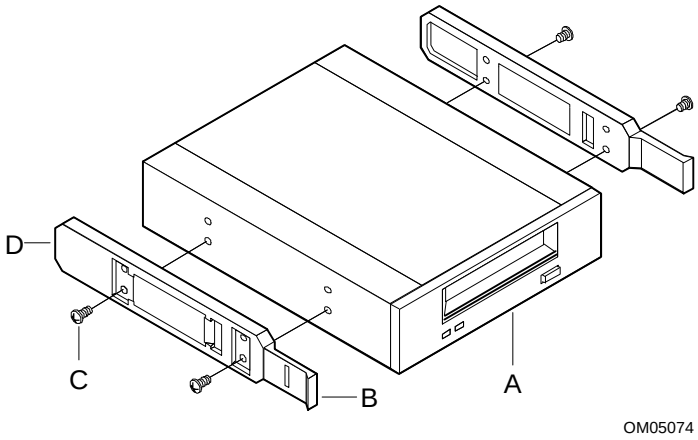


5. Remove the drive from its protective wrapper, and place it on an antistatic surface.
6. Record the drive model and serial numbers in your equipment log.
7. Set any jumpers and/or switches on the drive according to the drive manufacturer's instructions.

   If you are installing a SCSI drive:

   - Unique SCSI ID: A SCSI drive must be assigned a unique SCSI ID. Use the configuration jumpers on the back of the drive to change the ID of the drive. The SCSI microcontroller on the system board is always set to SCSI ID 22.
   - Active termination at end of SCSI bus cable: The AIC-7880 offers a SCSI terminator powerdown control; if a SCSI hard drive (presumably in the 3.5-inch internal bay) is the last device, it can terminate the bus.
8. Using two screws of the appropriate size and length (not supplied), attach each plastic slide rail with its metal grounding plate to the drive.

9. Position the drive so the plastic slide rails engage in the bay guide rails. Push the drive into the bay until the slide rails lock in place.



Snap-in plastic slide rails

A Tape drive or other removable media device

B Tab on slide rail

C Screws (4)

D Slide rails (2)

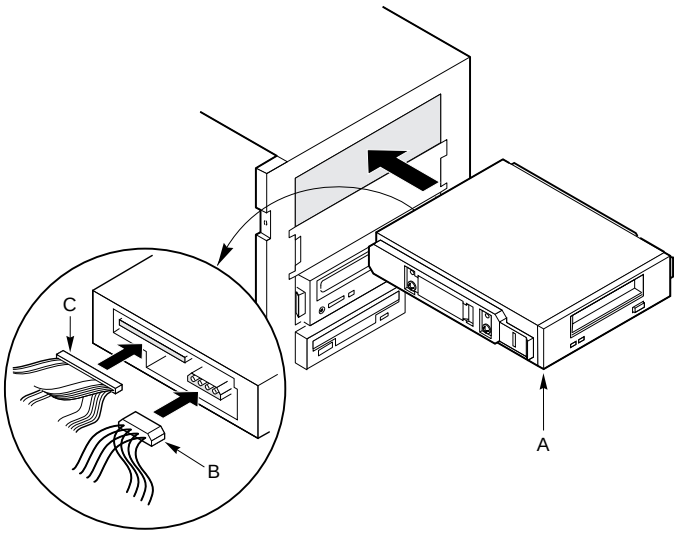
10. Connect a power cable to the drive. The connectors are keyed and can be inserted in only one way.

11. Connect a signal cable to the drive; the connectors are keyed and can be inserted in only one way.

    SCSI drive: Attach connectors on the cable to the SCSI device or devices you are installing.

    IDE drive: The system board has two IDE connectors. Each can support an IDE signal cable up to 18 inches long. See the figure on page 116 for the cable dimensions.

12. Reinstall the front and side system covers.



Installing removable media device

A Tape drive or other removable media device

B Power cable

C Typical SCSI signal cable

Removable Media Drive, 5.25-inch, Removing

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

SCSI Drive, Installing in Internal Bay

The internal peripheral bay has space for these possible drive combinations (height and quantity):

- Six drives, each 1 inch high
- Three drives, each 1.6 inches high
- Two 1.6-inch drives plus two 1-inch drives

You can install 1-inch high peripherals that consume up to 11 watts of power and run at a maximum ambient temperature of 50 °C in this bay.

The system supports a variety of single-ended SCSI devices. As shipped from your supplier, the system may not contain any devices.

The SCSI output drivers can directly drive a 48 mA single-ended SCSI bus with no additional drivers (the SCSI segment can handle up to 15 devices).

⚠ **CAUTION**
The internal SCSI interface in this system supports only single-ended SCSI devices. Connecting differential SCSI drive types to this interface can result in electrical damage to the system board and peripherals.

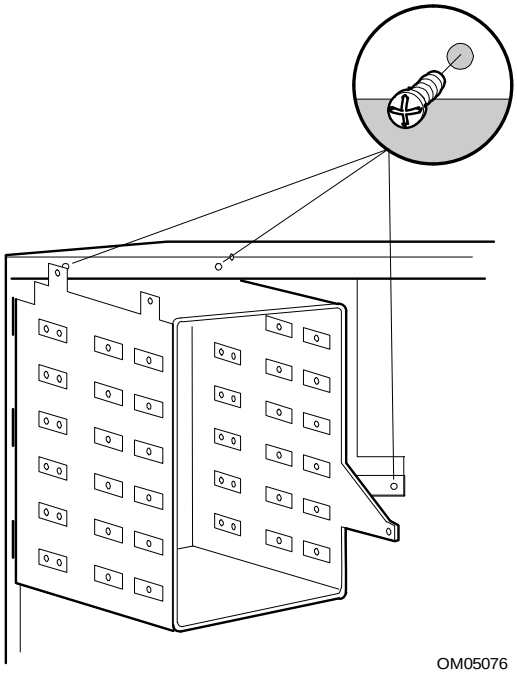
✏ **Bus termination is needed for SCSI drives**
If you install a SCSI cable, you must provide active SCSI bus termination *at the end of the cable*. Leaving the cable installed without active termination will violate the SCSI bus specification and will cause the SCSI bus to be unreliable. You must also ensure that termination is removed or disabled in all other drives on the bus.

You can meet the specification by installing, as the last SCSI device on the cable, a drive that includes active bus termination, or by attaching an active termination device onto the end of the cable.

1. Observe the safety and ESD precautions at the beginning of this chapter. Also see the cabling considerations on page 116.
2. Remove side system cover.
3. Disconnect power and signal cables from all drives installed in the bay.
4. Remove and save the three screws holding the bay to the chassis.
5. Swing the bay out to the left of the chassis.
6. Slide the bay upward to disengage its tabs from the chassis.

7. Remove the bay from the chassis, and place it on an antistatic surface.

Removing internal 3.5-inch drive bay



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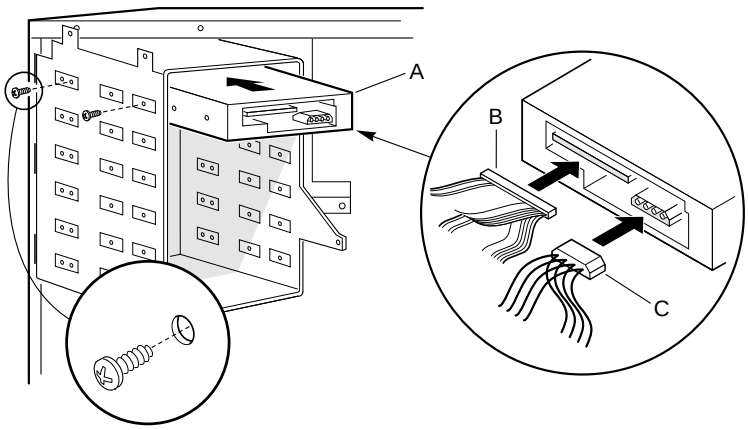
8. Remove the new drive from its protective wrapper and place it on an antistatic surface.
9. Record the drive model and serial numbers in your equipment log.
10. Set any jumpers and/or switches according to the drive manufacturer's instructions.
11. To terminate the SCSI bus
    - If the drive is NOT the last device on the SCSI cable: remove the terminating resistor packs or disable the SCSI IC active terminators, whichever is present on the drive.
    - If the drive IS the last device on the SCSI cable: do not remove the terminating resistor packs or disable the SCSI IC terminators on the drive. The terminating drive at the end of SCSI bus must be Fast-20 compliant.
12. Starting with the space at the *top* of the bay, position SCSI hard drive 0, component-side facing down, in the bay. Align the screw holes in the

drive with those in the bay, and secure the drive to the bay with four screws (not supplied).

13. Reinstall the bay in the chassis: insert the tabs on the bay into their slots in the chassis. Slide the bay downward until the tabs interlock with the slots.
14. Swing the bay to the right into the chassis.
15. Secure the bay with the three screws you removed earlier; tighten the screws firmly (6.0 inch-pounds).
16. Attach power and signals cables to any drives installed in the bay. Connect the SCSI signal cable to the connector on the system board. For proper cooling and airflow, neatly fold and secure the excess signal cable (use a tie wrap or cable clip) so that it does not drape across the system board or add-in boards.



Installing and cabling 3.5-inch SCSI device in internal bay

A Drive 0

B Typical SCSI signal cable

C Power cable

17. Reinstall the side cover.
18. This step is optional. Run the SCSI*Select* utility to configure the SCSI hard disk drives installed in the server.

Check SCU options if add-in host board is present
If you have an add-in host adapter board in your system, you may need to set the hard disk drive options to "Not Installed" and the Onboard IDE option to "Disabled" with the SCU.

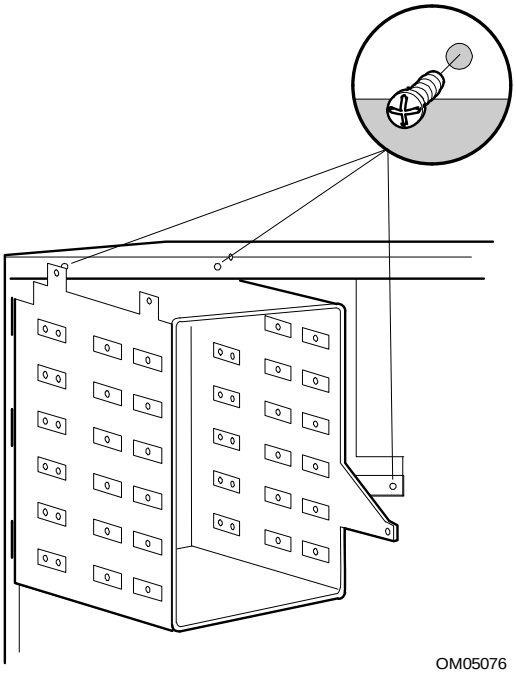
If your operating system is DOS or Windows 3.1 or above, see the manuals that come with your SCSI devices and SCSI software to install the devices in your system.

SCSI Drive, Removing from Internal Bay

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove side system cover.
3. Disconnect the power and signal cables from the drives in the 3.5-inch bay.
4. Remove and save the three screws holding the bay to the chassis.
5. Swing the bay out to the left of the chassis.
6. Slide the bay upward to disengage its tabs from the chassis.
7. Remove the bay from the chassis, and place it on an antistatic surface.
8. Remove the screws that attach the drive to the bay.
9. Remove the drive from the bay, and place the drive on an antistatic surface.
10. If a SCSI CD-ROM drive is the only SCSI device left in the system, remove the drive from the system, and install terminating resistors in the drive. Then reinstall the CD-ROM drive.
11. To reinstall the internal bay, insert the tabs on the bay into their slots in the chassis. Slide the bay downward until the tabs interlock with the slots.
12. Swing the bay to the right into the chassis.
13. Secure the bay to the chassis with the screws you removed earlier; tighten the screws firmly (6.0 inch-pounds).
14. Reinstall the side cover.

IDE Drive, Installing in Internal Bay

1. Observe the safety and ESD precautions at the beginning of this chapter. Also see the cabling considerations on page 116.
2. Remove side system cover.
3. Disconnect power and signal cables from all drives installed in the bay.
4. Remove and save the three screws holding the bay to the chassis.
5. Swing the bay out to the left of the chassis.
6. Slide the bay upward to disengage its tabs from the chassis.
7. Remove the bay from the chassis, and place it on an antistatic surface.



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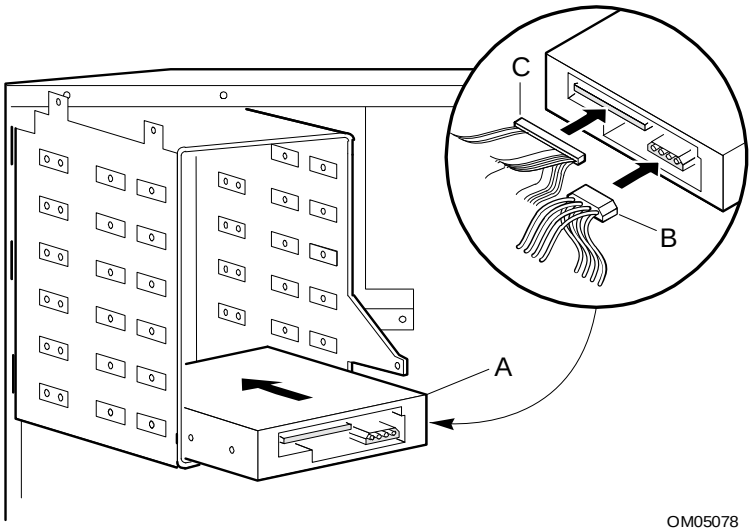
Removing internal 3.5-inch drive bay

8. Remove the new drive from its protective wrapper, and place on an antistatic surface.
9. Record the drive model and serial numbers in your equipment log.
10. Set the Master/Slave jumpers according to the manufacturer's instructions.

If installing multiple IDE hard drives
If installing two IDE hard drives on one IDE signal cable, you must configure one as a MASTER and the other as a SLAVE. IDE0 connector supports a primary master and slave, and IDE1 connector supports a secondary master and slave.

11. Starting with the space at the BOTTOM of the bay, position the first IDE hard drive, component-side facing down, in the bay. Align the screw holes in the drive with those in the bay, and secure the drive to the bay with four screws (not supplied).
12. To reinstall the bay in the chassis, insert the tabs on the bay into their slots in the chassis. Slide the bay downward until the tabs interlock with the slots.
13. Swing the bay to the right into the chassis.

14. Secure the bay with the three screws you removed earlier; tighten the screws firmly (6.0 inch-pounds).
15. Insert an IDE signal cable into the IDE header on the system board.
16. Connect the IDE signal cable connectors to the drives in the internal bay. (Reconnect other drive signal cables that you disconnected to do this procedure.)
17. Connect power cables to any drives installed in the bay.
18. Reinstall the side cover.
19. Run the SCU to enable the onboard IDE controller and to specify that IDE hard disk drives are installed.



Installing and cabling 3.5-inch IDE device in internal bay

A IDE drive 0

B Power cable

C IDE signal cable

IDE Drive, Removing from Internal Bay

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove side cover.
3. Disconnect power and signal cables from all drives in the bay.
4. Remove and save the three screws holding the bay to the chassis.
5. Swing the bay out to the left of the chassis.
6. Slide the bay upward to disengage its tabs from the chassis.
7. Remove the bay from the chassis, and place it on an antistatic surface.
8. Remove the screws that attach the drive to the bay.
9. Remove the drive from the bay, and place drive on an antistatic surface.
10. To reinstall the bay in the chassis, insert the tabs on the bay into their slots in the chassis. Slide the bay downward until the tabs interlock with the slots.
11. Swing the bay to the right into the chassis.
12. Secure the bay with the three screws you removed earlier; tighten the screws firmly (6.0 inch-pounds).
13. Reconnect signal and power cables to all drives still installed in the bay.
14. Reinstall the side cover.

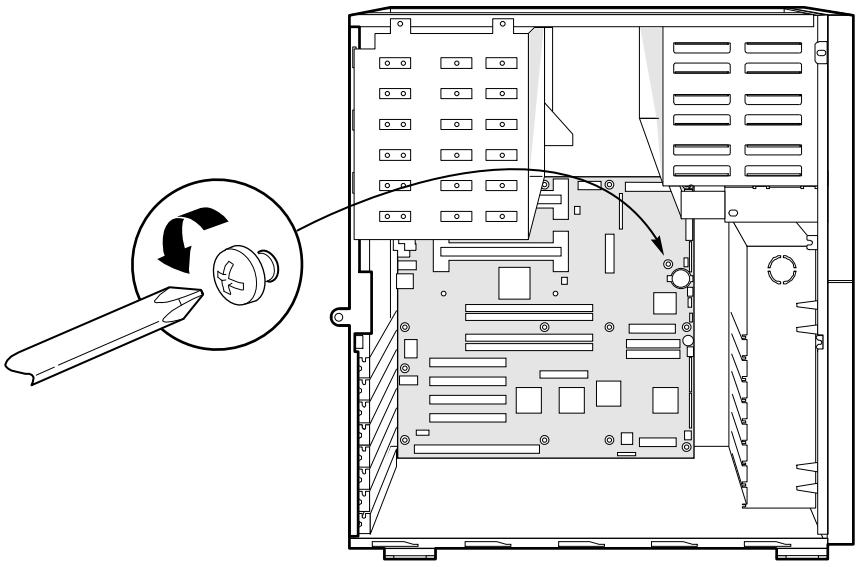
System Board, Removing

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

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove side system cover.
3. Label and disconnect all internal cables connected to add-in boards.
4. Remove all add-in boards.
5. Label and disconnect all internal cables connected to the system board.
6. Remove the internal 3.5-inch drive bay and the 3.5-inch diskette drive and bracket.
7. Remove the fan housing assembly.
8. Remove the system board retaining screws and set them aside.
9. Pull the board toward you slightly to disengage it from two snap-in standoffs, and then slide the board toward the front of the server until the board's I/O connectors clear the rear of the chassis.
10. Remove the system board, and place it component-side up on a nonconductive, static-free surface or in an antistatic bag.

> ⚠ **CAUTION**
> 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.

11. Remove and save the EMI gasket that covers the I/O connectors on the board.



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Removing system board

System Board, Installing

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Place the EMI gasket over the I/O connectors on the system board.
3. Position the board over the two snap-in standoffs and threaded standoffs inside the chassis, and slide it carefully toward the rear of the system until the I/O connectors protrude through the back panel.
4. Press the board onto the snap-in standoff, and insert one screw through one of the mounting holes of the board and into a threaded standoff. Do not tighten the screw until the next step.
5. Insert the remaining screws through the mounting holes and into the threaded standoffs. Make sure the board is properly seated, and then tighten all the screws firmly (6.0 inch-pounds).
6. Connect all internal cables to the system board.
7. Reinstall the fan housing assembly.
8. Reinstall the 3.5-inch internal drive bay and the 3.5-inch diskette drive and bracket.

9. Reinstall add-in boards.
10. Connect all internal cables to add-in boards.
11. Reinstall the side cover.
12. Connect all peripheral device cables to the I/O panel on the rear of the system.
13. Run the SCU to configure 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. 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 customer service representative or dealer for a list of approved devices.

WARNING
If the system has been running, any installed processor and heat sink on the processor board(s) will be hot. To avoid the possibility of a burn, be careful when removing or installing 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.

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

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

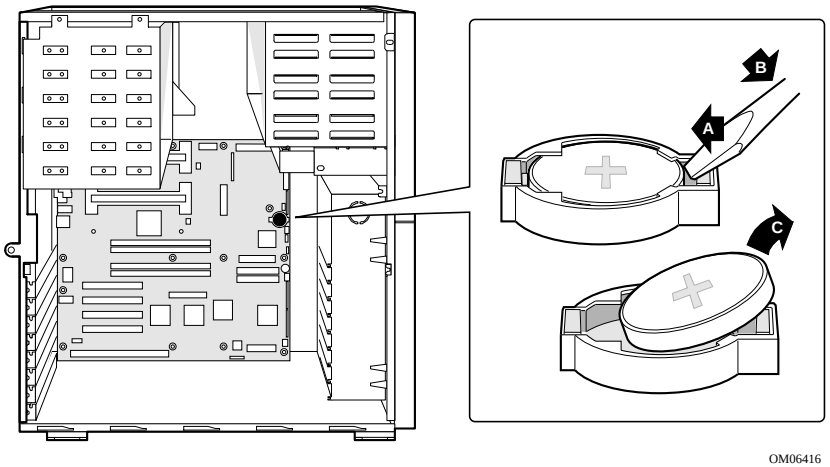
ADVARSEL
Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

VARNING

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

VAROITUS

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



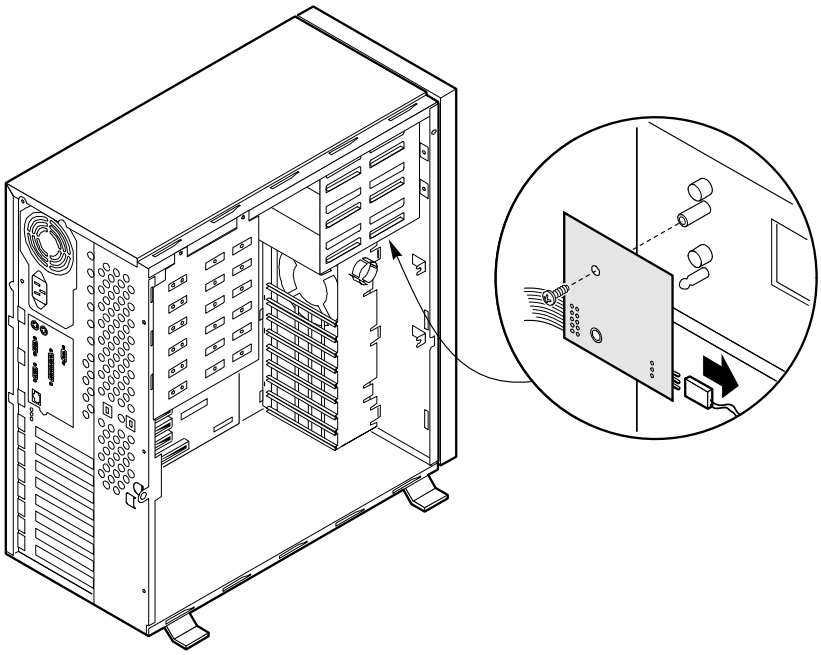
Replacing lithium battery

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove the side system cover.
3. Insert the tip of a small flat-bladed screw driver, or equivalent, under the plastic tab on the snap-on plastic retainer (A in figure).
4. Gently push down on the screwdriver to lift the battery (B).
5. Remove the battery from its socket (C).
6. Dispose of the battery according to local ordinance.
7. Remove the new lithium battery from its package, and, being careful to observe the correct polarity, insert it in the battery socket.
8. Reinstall the plastic retainer on the lithium battery socket.
9. Reinstall the side cover.

10. Run the SCU to restore the configuration settings to the RTC.

Front Panel Board, Removing

Removing front panel board



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

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove the side system cover.
3. Disconnect the 3.5-inch diskette drive cables, and remove the assembly from the chassis. Save the screw to use later. (See pages 114 and 115 for diskette drive removal and installation procedures.)
4. On the front panel board, remove and save the screw from the threaded standoff to use later.
5. Grasp the front panel board, and carefully pull it toward the back of the system until it clears the snap-on standoff.

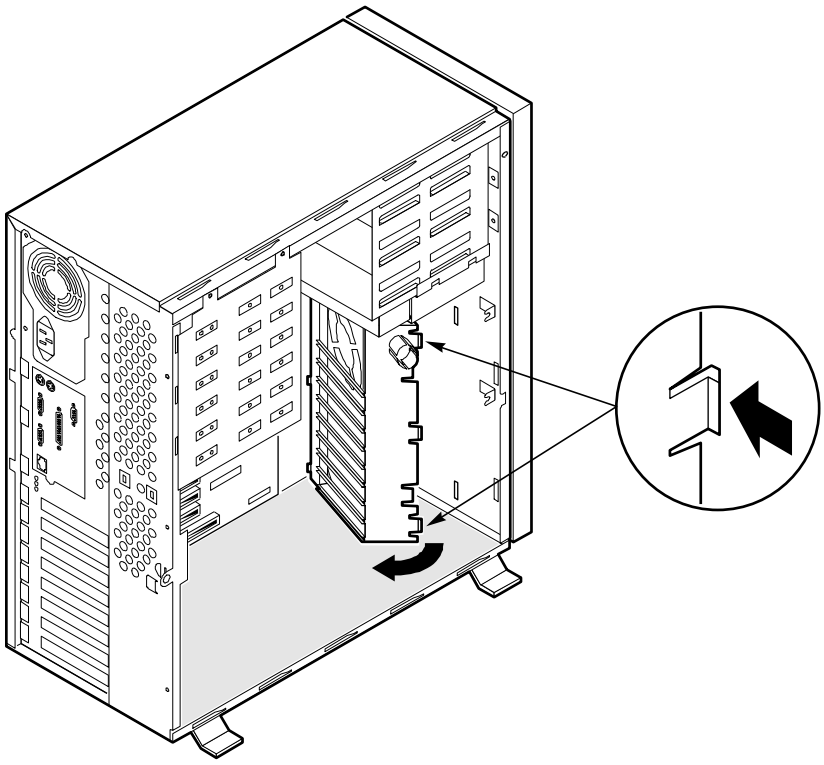
6. Disconnect the front panel board signal cable from the front panel board.
7. Disconnect the intrusion signal cable from the front panel board.
8. Remove the front panel board from the system, and place it on an antistatic foam pad or a grounded workstation.

Front Panel Board, Installing

1. Reconnect the intrusion signal cable to the front panel board.
2. Reconnect the front panel board signal cable to the front panel board.
3. Position the front panel board over the snap-on standoff and the threaded standoff inside the chassis.
4. Carefully press the board onto the snap-on standoff until it snaps in place.
5. Reinstall and tighten firmly (6.0 inch-pounds) the screw that secures the board to the chassis.
6. Reinstall the 3.5-inch diskette drive assembly, and connect the drive cables (see pages 114 and 115).
7. Reinstall the system side cover.

Fan, Removing

Removing the fan housing assembly



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For cooling and airflow, the system contains one or more removable chassis fans to cool the boards and removable media drives. The integrated power supply fan provides more cooling and airflow.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove the system side and front covers.
3. Label and disconnect any cables attached to add-in boards.
4. Remove all add-in boards. As you remove a board, label it with its slot number so you can reinstall the board in the same slot.
5. Disconnect the fan power cable connector from the fan header on the system board.

6. Remove the plastic snap-on fan housing assembly by firmly pressing the plastic tabs on the assembly inward until you can pull the tabs out of the slots in the chassis.
7. Swing the assembly to the left until you can disengage the plastic tabs on the other edge of the assembly from the slots in the chassis. Remove the assembly from the chassis, and place it on a flat surface.
8. Unsnap the fan from the housing by pressing out on the plastic tabs that hold the fan in place. Remove the fan from the housing, and set it aside.

Fan, Installing

A general rule about the correct airflow direction

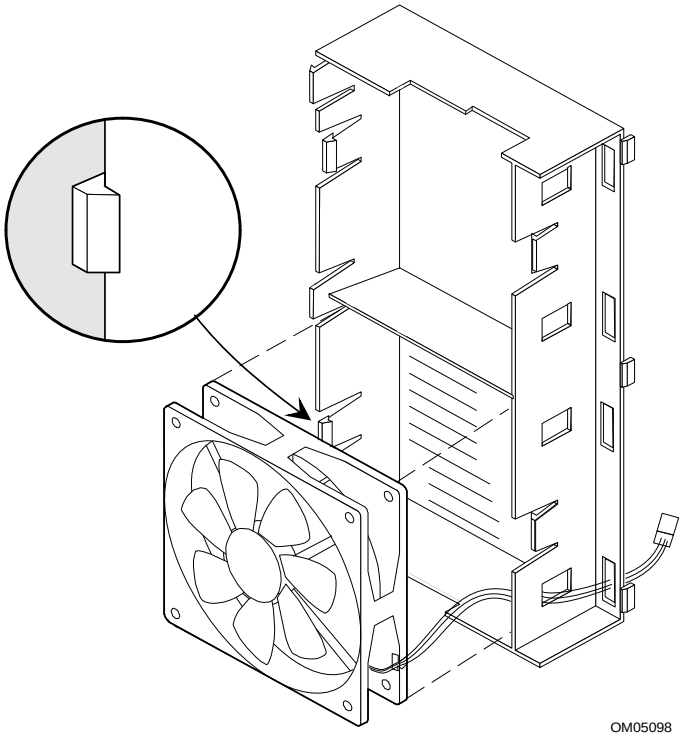
The removable fan pulls air from in front of the chassis so that it flows across the boards and out the back. Thus, the fan must be oriented for the correct airflow direction. If you place the fan so the label faces the back of the chassis, this should provide the correct orientation. You can confirm 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

Replacing a fan

Replace a failed fan with the same type as the one removed, with a tachometer signal, or an approved fan. For details about the fan connector, see Chapter 8 in this manual. For more information about replacing a fan, contact your customer service representative.

Installing fan

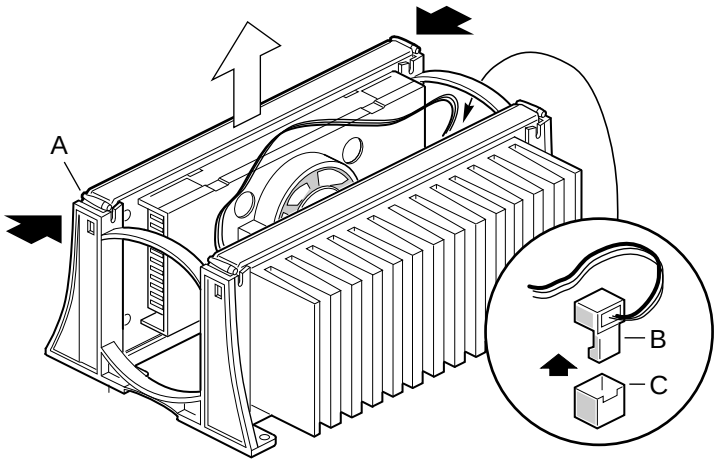


1. Position the cable side of the fan, label-side facing the card guides, over the plastic guide posts in the fan housing. Thread the fan power cable through the two openings on the side of the housing, as shown in the figure. Do not pinch the cable as you snap the fan into the housing.
2. Insert the assembly's inner edge plastic tabs, the ones near the fan cable, into the slots in the chassis.
3. Carefully swing the assembly to the right, like closing a door, until the outer edge tabs on the fan housing snap into the slots in the front of the chassis. To align these tabs correctly, you may need to repeat step 2.
4. Reconnect the fan power cable connector on the system board (a fan in the bottom of the housing connects to the Fan 1 header; a fan in the top of the housing connects to Fan 0 header).
5. Reinstall all add-in boards, each in the slot it was removed from.
6. Reconnect to the add-in boards any cables you removed.
7. Reinstall the side and front covers.

Processor, Removing

CAUTION, ESD and handling processors
Do not touch or bend the processor's exposed pins. Reduce the risk of electrostatic (ESD) discharge damage to the processor by doing the following: (1) Touch the metal chassis before touching the processor or system board. Keep part of your body in contact with the metal chassis to dissipate the static charge while handling the processor. (2) Avoid moving around unnecessarily.

1. Observe the safety and ESD precautions at the beginning of this chapter and the additional cautions given here. If the processor has a fan heat sink, disconnect the power wire (B in the figure below) from the connector on the system board (C).
2. As you work, place boards and processors on a grounded, static-free surface or conductive foam pad.
3. Press the processor latches toward the center of the S.E.C. cartridge to free them from the retention module (A).
4. Lift the S.E.C. cartridge upward, out of the retention module.
5. Put the processor in a piece of conductive foam and store in an antistatic package.



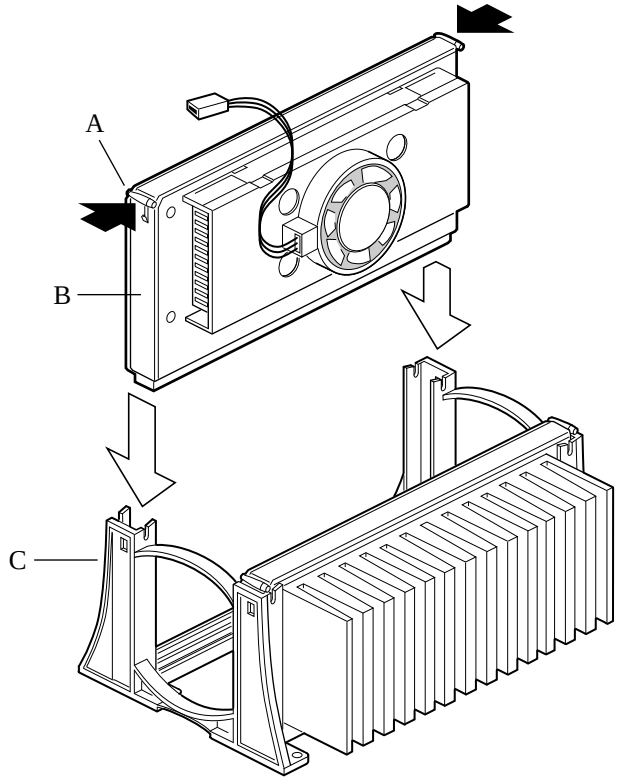
A. Processor latches; must be pushed inward until free from retention module

B. Fan heat sink power cable; must plug into processor fan connector on system board

C. Processor fan connector

Processor, Installing

Installing a second processor



A. Processor latches

B. Processor in S.E.C. cartridge

C. Retention module

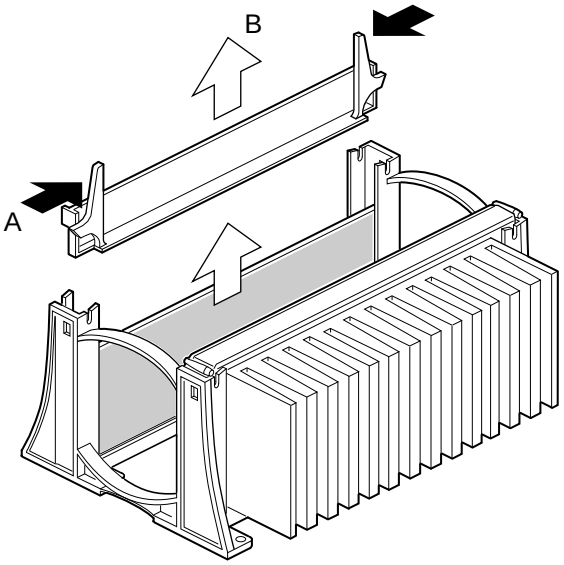
CAUTION, processor must be appropriate
You may damage the system if you install a processor that is inappropriate for your system. Make sure your system can handle a newer, faster processor (thermal and power considerations). For exact information about processor interchangeability, contact your customer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

⚠ **CAUTION, heat sink must be appropriate**
Depending on your configuration, this system has either one or two processors. In single-processor configurations, the existing processor has a passive heat sink. If you REPLACE the processor with a faster one, it must have a fan heat sink (powered fan instead of a passive heat sink). If you ADD a second processor, it must have a fan heat sink. When adding a processor, you must leave the existing one (with the passive heat sink) in Slot 1 secondary connector (closest to the center of the system board).

⚠ **CAUTION, ESD and handling processors**
Do not touch or bend the processor's exposed pins. Reduce the risk of electrostatic discharge (ESD) damage to the processor by doing the following: (1) Touch the metal chassis before touching the processor or system board. Keep part of your body in contact with the metal chassis to dissipate the static charge while handling the processor. (2) Avoid moving around unnecessarily.

1. Observe the safety and ESD precautions at the beginning of this chapter and the additional cautions given here.
2. If your system has one processor and you are ADDING a second, then you must remove the termination board in the empty Slot 1 primary connector. Press the tabs on the top of the termination board (A in figure) toward each other to release them from the retention module. Lift the board up and out of the retention module (B), and store it appropriately. See "Processor, Removing" on page 140.

Removing termination board from Slot 1 primary connector



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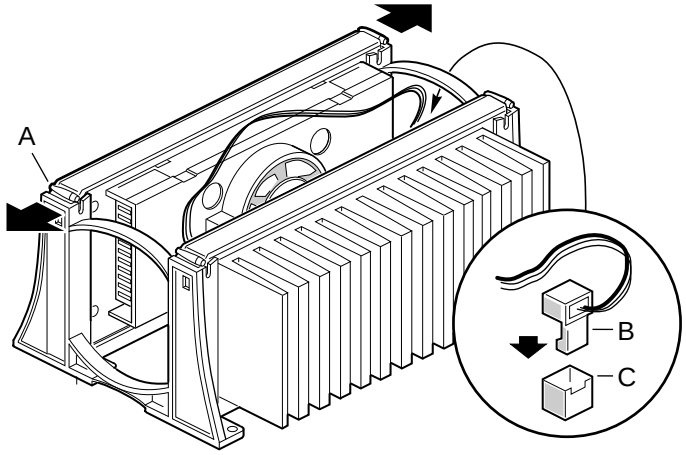
3. If your system has one processor and you are REPLACING it, leave the termination board intact in the empty Slot 1 primary connector. Remove the processor you want to replace. See "Processor, Removing" on page 140.
4. If your system has two processors and you are REPLACING one or both, remove the appropriate one(s). See "Processor, Removing" on page 140.
5. Remove the new processor from its antistatic package and place it on a grounded, static-free surface or conductive foam pad.

6. Orient the processor so that the heat sink faces the center of the system board. Slide the processor into the retention module. See figure on page 141. Ensure that the alignment notch in the S.E.C. cartridge fits over the plug in Slot 1. Push down firmly, with even pressure on both sides of the top, until the S.E.C. cartridge is seated.
7. To lock in the processor, push the latches outward until they click into place in the retention module (A in figure, below). The latches must be secured for proper electrical connection of the processor
8. Attach the small end of the power cable to the fan connector on the S.E.C. cartridge, then attach the large end (B) to the three-pin connector on the system board (C).

Locking in the processor



A. Processor latches; must be pushed outward until they click into retention module

B. Fan heat sink power cable; must plug into processor fan connector on system board

C. Processor fan connector

9. After you have installed the processor, you must configure its speed. See Chapter 5.

❑ ❑ ❑

Configuring the System Board 5

The system board has jumper blocks that control various configuration options. This chapter describes the default jumper settings and the options.

Warnings and Cautions

These warnings and cautions apply throughout this chapter. Only a technically qualified person should configure the system board.

WARNINGS

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

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

CAUTIONS

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

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

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

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

Tools and Supplies Needed

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

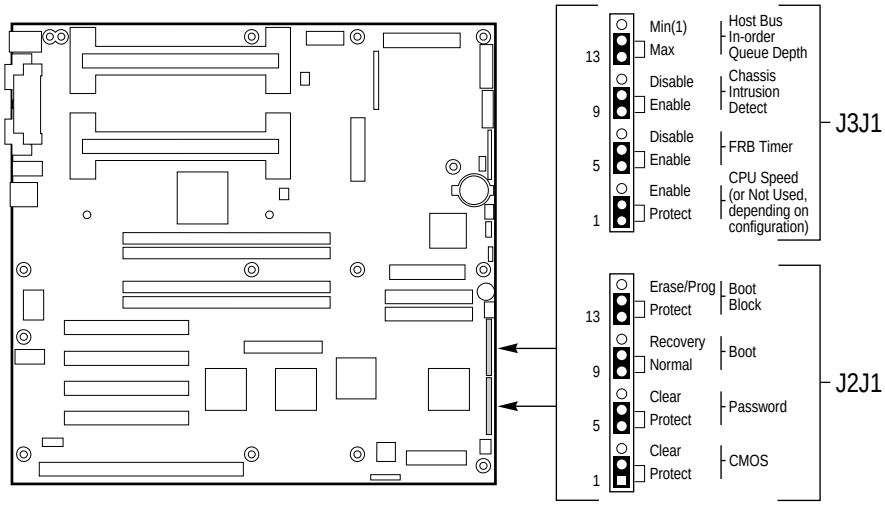
General Procedure to Change Jumper Setting

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

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Turn off all connected peripherals, turn off system power, and disconnect the AC power cord.
3. Remove the side cover. You do not need to remove the system board from the chassis, and you probably do not need to remove any add-in boards.
4. Locate the configuration jumpers at the edge of the system board toward the front of the system.
5. Move jumper to pins specified for the desired setting.
6. Reinstall the side cover, connect the power cord, and turn on the system for the change to take effect.
7. You may need to repeat these steps to move the jumper back to its original setting, depending on the jumper function.

System Board Jumpers

Two 15-pin single inline headers provide eight 3-pin jumper blocks that control various configuration options, as shown in the figure below. The shaded areas show default jumper placement for each configurable option



Function	Pins (default in bold)	What it does at system reset
CMOS clear	**1-2, Protect**	Preserves the contents of NVRAM.
	2-3, Erase	Replaces the contents of NVRAM with the manufacturing default settings.
Password clear	**5-6, Protect**	Maintains the current system password.
	6-7, Erase	Clears the password.
Recovery Boot	**9-10, Normal**	System attempts to boot using the BIOS stored in flash memory.
	10-11, Recovery	BIOS attempts a recovery boot, loading BIOS code from a floppy diskette into the flash device. This is typically used when the BIOS code has been corrupted.
Boot Block Write Protect	**13-14, Protect**	BIOS boot block is write-protected
	14-15	BIOS boot block is erasable and programmable ⚠ **CAUTION** Programming the boot block incorrectly will prevent the system from booting.
CPU Speed	**1-2, Protect**	Processor speed configuration is protected.
	2-3, Enable	Processor speed configuration is enabled. ✎ **Note** Depending on your configuration, this jumper is either available to set the speed of the processor, or not available at all.
FRB Timer Enable	**5-6, Enable**	FRB operation is enabled (system boots from processor 1 if processor 0 fails)..
	6-7, Disable	FRB is disabled..
Chassis Intrusion Detection	**9-10, Enable**	Switch installed on chassis indicates when cover has been removed.
	10-11, Disable	Chassis intrusion switch is bypassed.
Host Bus In-order Queue	**13-14, Max**	Host in-order queue depth is set at maximum.
	14-15, Min (1)	Host in-order queue depth is set at 1 (used for debugging).

CMOS Jumper

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

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

1. See "General Procedure to Change Jumper Setting" on page 147.
2. Move the CMOS jumper from pins 1 and 2 to pins 2 and 3 (the Clear CMOS memory position).
3. Reinstall the side cover for your safety, and connect the power cord to the system.
4. Turn the system on. Wait for POST to complete and for the messages "NVRAM cleared by jumper" and "Press F2 to enter Setup" to appear. This automatically reprograms CMOS and RTC to their default settings.
5. Enter Setup and make any changes necessary (for example, changing the boot device). Press F10 to save the new Setup configuration and exit Setup.
6. Turn off the system, and disconnect the power cord from the system.
7. Again remove the side cover.
8. Move the jumper from pins 2 and 3 back to pins 1 and 2 (the Protect CMOS memory position).
9. Reinstall the side cover, and connect the power cord to the system.
10. Run BIOS Setup or the SCU to verify the correct settings. See Chapter 3.

Password Jumper

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

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

1. See "General Procedure to Change Jumper Setting" on page 147.
2. Move the Password jumper from pins 5 and 6 to pins 6 and 7.
3. Reinstall the side cover for your safety, and connect the power cord to the system.
4. Turn the system on, and wait for POST to complete. This automatically clears the password.
5. Turn off the system, and disconnect the power cord.

6. Again remove the side cover.
7. Move the jumper from pins 6 and 7 back to pins 5 and 6.
8. Reinstall the side cover, and connect the power cord to the system.
9. Run the SCU to specify a new password. See Chapter 3.

Recovery Boot Jumper

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

Procedure to disable recovery booting:

1. See "General Procedure to Change Jumper Setting" on page 147.
2. Move the recovery boot jumper from pins 9 and 10 to pins 10 and 11.
3. Reinstall the side cover for your safety, connect the power cord to the system.
4. Turn the system on, and insert the Flash Memory Update Utility diskette in drive A. After the system boots, the speaker emits a single beep and the recovery process starts. This takes about three minutes. When the recovery process completes, the speaker emits two beeps.

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

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

6. Turn the system off, disconnect the power cord(s) from the system, and remove the left side cover.
7. Move the jumper from pins 9 and 10 to pins 10 and 11 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. See Chapter 3.

Boot Block Write Protect Jumper

The jumper at pins 13, 14, and 15 controls whether the BIOS boot block is protected from being erased and reprogrammed.

⚠ **CAUTION, leave boot block jumper at factory-default setting**
Programming the boot block incorrectly will prevent the system from booting. Programming *should only be done* by a technically qualified person. The procedure requires a special "Boot Block Update Utility." Contact your dealer or sales representative for more information.

Procedure to permit boot block erasing and programming:

1. See "General Procedure to Change Jumper Setting" on page 147.
2. Move the boot block jumper from pins 13 and 14 to pins 14 and 15 to erase and program the BIOS boot block.
3. Reinstall the side cover for your safety, and connect the power cord to the system.
4. Run the Boot Block Update Utility.
5. Turn off the system, and disconnect the power cord from the system.
6. Remove the side cover.
7. Move the jumper from pins 14 and 15 back to pins 13 and 14 to write protect the BIOS boot block.
8. Reinstall the side cover, and connect the power cord to the system.

CPU Speed Jumper

The jumper at pins 1, 2, and 3 controls whether you can configure the speed of the processor.

Note
Depending on your configuration, this jumper is either available to set the speed of the processor, or not available at all If available, enabling this jumper will activate the CPU Speed Setting field in the Main Menu of the BIOS Setup Utility. See Chapter 3.

Procedure to enable processor speed configuration:

1. See "General Procedure to Change Jumper Setting" on page 147.
2. Move the processor speed jumper from pins 1 and 2 to pins 2 and 3. This activates the CPU Speed Setting field in the BIOS Setup Utility.

3. Reinstall the side cover for your safety, and connect the power cord to the system.
4. Run the BIOS Setup Utility as described in Chapter 3.
5. Select the proper speed for your processor.
6. Again remove the side cover.
7. Move the processor speed jumper from pins 2-3 back to pins 1-2.
8. Reinstall the side cover for your safety, and connect the power cord to the system.

FRB Timer Enable Jumper

The jumper at pins 5, 6, and 7 controls whether the system boots from processor 1 if processor 0 fails.

Procedure to disable FRB timer:

1. See "General Procedure to Change Jumper Setting" on page 147.
2. Move the recovery boot jumper from pins 5 and 6 to pins 6 and 7.
3. Reinstall the side cover for your safety, and connect the power cord to the system.
4. Turn the system on, and wait for POST to comlpete.
5. Run the SCU to configure the system. See Chapter 3.

Chassis Intrusion Detection Jumper

The chassis contains an alarm switch that sends a notification signal to the server management software if a cover is removed. The jumper at pins 9, 10, and 11 controls whether this alarm feature is enabled or disabled.

Procedure to disable (bypass) the chassis intrusion switch:

1. See "General Procedure to Change Jumper Setting" on page 147.
2. Move the chassis intrusion detection jumper from pins 9 and 10 to pins 10 and 11 to disable the alarm switch.
3. Reinstall the side cover for your safety, and connect the power cord to the system.
4. Turn the system on, and wait for POST to complete.
5. Run the SCU to configure the system. See Chapter 3.

To enable the intrusion switch, do the above steps but move the jumper back to pins 9 and 10.

Host Bus In order Queue Jumper

The jumper at pins 13, 14, and 15 controls whether the host bus in-order queue is set at maximum or minimum (one).

Procedure to change setting of the host bus in-order queue from maximum to minimum (one):

1. See "General Procedure to Change Jumper Setting" on page 147.
2. Move the chassis intrusion detection jumper from pins 13 and 14 to pins 14 and 15 to disable the alarm switch.
3. Reinstall the side cover for your safety, and connect the power cord to the system.
4. Turn the system on, and wait for POST to complete.
5. Run the SCU to configure the system. See Chapter 3.

To change the setting to maximum, do the above steps but move the jumper back to pins 13 and 14.

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Updating Flash Memory 6

System BIOS

The system BIOS is stored in nonvolatile memory (NVRAM) in a flash EPROM device. You can easily update the BIOS without replacing the device. This chapter describes two procedures:

- Update the BIOS, normal procedure: you do not need to open the system. A BIOS update always updates Setup, the onboard Video BIOS, and the SCSI BIOS.
- Recover the BIOS when an interruption has occurred during an update: in this case, you will need to change a jumper on the system board, do the recovery procedure, and then change the jumper back. The recovery procedure updates only the main system BIOS.

Flash in your custom language files again
Language files will be overwritten by a BIOS update or recovery. If a custom language file has been created for your system, you must flash in your custom file again after updating the BIOS. The user binary area is untouched by a system BIOS update.

Make sure you have a backup copy
It is always a good idea to have a backup copy of your system before installing any new software.

Contents of BIOS Update

A new BIOS is contained in .BIx files. The number of files is determined by the size of the BIOS area in the flash part. The system BIOS files are named as follows:

xxxxxxxx.BIO
xxxxxxxx.BI1
xxxxxxxx.BI2
....

Filename restrictions
The first eight letters of the filename can be anything but cannot be renamed. Each file contains a link to the next file in the sequence. FMUP does a link check before updating to ensure that the FMUP process will be successful. The first file in the list can be renamed to any filename, but all subsequent filenames must remain unchanged.

User Flash Block

One 8 KB user block is available for general use, and Flash Memory Update Utility (FMUP) can update this area with user-supplied code or data. This area may optionally be scanned for adapter BIOS signatures during POST, and any BIOS found there will be initialized in the same manner as any other adapter BIOS. To enable or disable this scanning process, use an option in the SCU and in Setup. Some system resources (e.g., RAM, CMOS) may be required by the scanned BIOSes.

To accommodate a range of uses, the user flash area will allow user programs to be called at various points in the BIOS execution.

A custom BIOS placed in flash must be recognizable to the system BIOS so it can execute the code, and to applications (i.e., DOS memory managers) so that they will be protected after DOS boots.

Normal BIOS Update Procedure

1. Get a BIOS update from your customer sales representative or dealer, and copy the file to a bootable DOS diskette. You do not need to open the system or remove add-in boards for a normal BIOS update.
2. Insert the update diskette in drive A.
3. Reboot the system. The update process starts automatically following system boot. Follow the displayed prompts, including a final reboot.

Updating the BIOS does not clear CMOS. If you need to clear CMOS and reset nonvolatile memory to the factory defaults, see Chapter 5.

Recovery Procedure

A special program, the Flash Memory Update Utility (FMUP), must be used to recover the BIOS. For a copy of the utility, contact your customer service representative.

Recovery may be needed in the case of a corrupt .BIx image or an unsuccessful BIOS update. For example, you might be doing a normal update to flash memory and the procedure gets interrupted because of a power outage. Flash memory contains a protected area that cannot be corrupted, and therefore code in this area can be used to boot the system from drive A even though the BIOS has been corrupted. The recovery code boots DOS from drive A and executes the special AUTOEXEC.BAT file released with the BIOS version. The batch file invokes FMUP to recover the system BIOS from files on the diskette.

You can use FMUP to:

- Save: Take a mirror image copy of a given flash area and copy it to a file or files on hard disk or diskette.
- Update: Take a file or files from hard disk or diskette and update them in the system's flash device.
- Verify: Compare an existing flash area against a file or files on hard disk or diskette to verify that the versions are the same and insure that the system has the correct BIOS version.

WARNINGS
All Warnings and Cautions given at the beginning of Chapter 5 apply here.

Before beginning recovery procedure
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 beginning a recovery procedure or physically remove the board from the system.

Exit Windows and disable EMM386 before using FMUP
FMUP must be run without the presence of a 386 control program (such as Windows or EMM386). FMUP uses the processor's flat model mode to update the flash part.

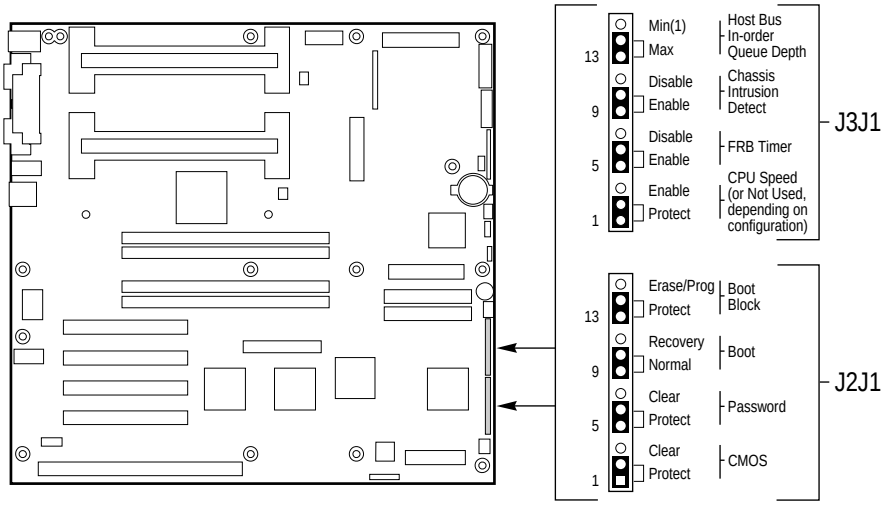
Recovery updates only the main system BIOS. Video is not initialized, and the keyboard is disabled. Because there is no screen display, you will need to listen for these audible beep codes:

Recovery beep codes	Description
1	Signals beginning of recovery process; process takes 2 to 4 minutes.
2	Signals successful completion, no errors.
4	System could not boot from the diskette. Diskette may not be bootable.
Continuous series of low beeps (like a buzz)	Any or all of these causes: The wrong BIOS recovery files are being used. The boot option configuration jumper allowing BIOS Recovery mode is in wrong position. One or more system BIOS FMUP files is corrupt or missing.

Requirements:

- At least 4 MB of RAM installed.
- Drive A must be a 3.5-inch 1.44 MB diskette drive.

1. If you have not already done so, create a bootable DOS diskette, and copy the BIOS update to the diskette.
2. Observe the safety and ESD precautions at the beginning of Chapter 5.
3. Turn off all connected peripherals, turn off system power, and disconnect the AC power cord.
4. Remove the side cover. You do not need to remove the system board from the chassis, and you probably do not need to remove any add-in boards.
5. Locate the configuration jumper header on the system board.
6. Move the Recovery Boot jumper at J2J1 from pins 9 and 10 to pins 10 and 11.
7. Reinstall the side cover, and connect the power cord to the system.
8. Insert the Flash Memory Update Utility (FMUP) diskette in drive A. Turn the system on. You will hear a single initial beep that is part of the typical system bootup process.



9. Then you will hear another single beep that indicates the recovery process is beginning. The process takes two to four minutes. While in the recovery mode, there is no screen display on the monitor, and the keyboard is disabled as the system automatically recovers the BIOS.
10. You will hear two beeps when the process is successfully completed. (If the process is not successful, you will hear a different beep pattern; refer to the table on page 158.)
11. Make sure the diskette drive activity light is OFF. Turn off the system, and disconnect the power cord from the system.
12. Again remove the side cover.
13. Remove the Recovery Boot jumper from pins 10 and 11, and place it back on pins 9 and 10 for the normal boot mode.
14. Remove the FMUP diskette from drive A.
15. Reinstall the side cover, connect the power cord, and turn on the system. Check the BIOS version number against what you intended to flash into memory.
16. Run the SCU to check or modify the configuration. See Chapter 3.

CMOS is not cleared when you update the BIOS. After doing the recovery procedure, clear CMOS (see procedure in Chapter 5, section "CMOS Jumper"). Also, you will need to flash in again any additional languages that were present before updating.

❑ ❑ ❑

7 Solving Problems

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

Resetting the System

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

You can also reset the system 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 processors 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 switch and jumper settings on the system board correct?
- ❑ Are all jumper and switch settings on add-in boards and peripheral devices correct? To check these settings, refer to the manufacturer's documentation that comes with them. If applicable, ensure that there are no conflicts— for example, two add-in boards sharing the same interrupt.
- ❑ Are all SDRAM DIMMs installed correctly?
- ❑ Are all peripheral devices installed correctly?
- ❑ If the system has a hard disk drive, is it properly formatted or configured?
- ❑ Are all device drivers properly installed?
- ❑ Are the configuration settings made with the SCU correct?
- ❑ Is the operating system properly loaded? Refer to the operating system documentation.
- ❑ Did you press the system power on/off switch on the front panel to turn the server on (power-on light should be lit)?
- ❑ Is the system power cord properly connected to the system and plugged into a NEMA 5-15R outlet for 100-120 V~ or a NEMA 6-15R outlet for 200-240 V~?
- ❑ Is AC power available at the wall outlet?

If these items are correct but the problem recurs, see "Error! Reference source not found." on page 165.

Running New Application Software

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

Checklist

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

If the problems persist, contact the software vendor's customer service representative.

Running the SCU

The CONFIG.SYS file must be configured correctly so that your changes to the SCU are saved and the system will not hang.

- ❑ To properly save SCU changes when running the SCU from an IDE drive, remove the NOEMS switch if it is set in the EMM386 line of the CONFIG.SYS file.
- ❑ If running the SCU from diskette, make sure that HIMEM.SYS has been added to the CONFIG.SYS file on the diskette.

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 disk, try a different disk 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, and try running it again. Make sure all necessary files are installed.
- ❑ If a software application does not run correctly with the "Boot Speed" set to turbo, try setting the speed 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.)

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

- ❑ If the problem recurs after you have checked and corrected all the above items, see “More Problem-solving Procedures” on page 165.

If you received error messages, see "Bootable CD-ROM Is Not Detected” on page 179, or “Error and Informational Messages” on page 179.

Check the following:

- ❑ Is the BIOS set to allow the CD-ROM to be the first bootable device?
- ❑ The CD-ROM may not be spinning fast enough to be detected. To fix this problem, you can increase the hard disk pre-delay to nine seconds. For more information on this process, see Chapter 3.

More Problem-solving Procedures

This section provides a more detailed approach to identifying a problem and locating its source.

Preparing the System for Diagnostic Testing

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

1. Turn off the system and all external peripheral devices. Disconnect all of them from the system, except the keyboard and video monitor.
2. Make sure the system power cord is plugged into a properly grounded AC outlet.
3. Make sure your video display monitor and keyboard are correctly connected to the system. Turn on the video monitor. Set its brightness and contrast controls to at least two-thirds of their maximum ranges (see the documentation supplied with your video display monitor).
4. If the operating system normally loads from the hard disk drive, make sure there is no diskette in drive A. Otherwise, place a diskette containing the operating system files in drive A.
5. Turn on the system. If the power LED does not light, see "Power Light does not Light" on page 168.

Using PCDiagnostics

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

- The program called Testview uses a simple DOS-based menu system.
- The program called T.EXE is not for Windows or DOS; you can access it at the command line prompt without having a hard drive installed.

The README.TXT file for diagnostics tells how to install the program.

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

Monitoring POST

See Chapter 3.

Verifying Proper Operation of Key System Lights

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

- ❑ Does the diskette drive activity light turn on briefly? If not, see "Diskette Drive Activity Light Does Not Light" on page 170.
- ❑ If a second diskette drive is installed, does its activity light turn on briefly? If not, see "Diskette Drive Activity Light Does Not Light" on page 170.
- ❑ If there is a hard disk drive or SCSI devices installed in the system, does the hard disk drive activity light on the control panel turn on briefly? If not, see "Hard Disk Drive Activity Light Does Not Light" on page 171.

Confirming Loading of the Operating System

Once the system boots up, the operating system prompt appears on the screen. The prompt varies according to the operating system. If the operating system prompt does not appear, see "Initial System Startup" on page 162.

Specific Problems and Corrective Actions

This section provides possible solutions for these specific problems:

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

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

Power Light Does Not Light

Check the following:

- ❑ 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."

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

No Beep Codes

If the system operates normally, but there was no beep, the speaker may be defective or the jumper may be set incorrectly. Verify that the speaker is enabled by running the SCU. If the speaker is enabled and the jumper is set correctly, but the speaker does not function, contact your service representative or authorized dealer for assistance. For more information on correctly setting the jumper, see "ATX Interface" in Chapter 8.

Record the beep code emitted by POST, and see "Bootable CD-ROM Is Not Detected" on page 179, or "Error and Informational Messages" on page 179.

Check the following:

- ❑ Is the BIOS set to allow the CD-ROM to be the first bootable device?
- ❑ The CD-ROM may not be spinning fast enough to be detected. To fix this problem, you can increase the hard disk pre-delay to nine seconds. For more information on this process, see Chapter 3..

No Characters Appear on Screen

Check the following:

- ❑ Is the keyboard working? Check to see that the "Num Lock" light is functioning.
- ❑ Is the video monitor plugged in and turned on?
- ❑ 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 Codes" on page 180.
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? See 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.

System Cooling Fans Do Not Rotate Properly

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

Check the following:

- ❑ Is AC power available at the wall outlet?
- ❑ Is the system power cord properly connected to the system and the wall outlet?
- ❑ Did you press the power on/off push-button switch?
- ❑ Is the power-on light lit?
- ❑ Have any of the fan motors stopped (use the server management subsystem to check the fan status)?
- ❑ Are the fan power connectors properly connected to the system board?
- ❑ Is the cable from the front panel board connected to the system board?
- ❑ Are the power supply 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 outlet, contact your service representative or authorized dealer for assistance.

Diskette Drive Activity Light Does Not Light

Check the following:

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

If you are using the onboard diskette controller, use the 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." To run the SCU, see Chapter 3.

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 drive properly installed?
- ❑ If your system contains an add-in SCSI adapter board, is it fully seated in the system board connector?
- ❑ Are all relevant switches and jumpers on the hard drive and adapter board set correctly?
- ❑ Is the onboard IDE controller enabled?
- ❑ Is the hard disk drive properly configured?
- ❑ If your system contains an add-in SCSI adapter board, is the hard disk activity LED cable connector plugged into the controller board and the system board?

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

- ❑ Did you set a jumper or switch so that a SCSI device waits for the Send Start Unit Command (at power-on) but (1) the SCSI BIOS is disabled or (2) you have set the command option to No? The device will not start.

If you received error messages, see "Bootable CD-ROM Is Not Detected" on page 179, or "Error and Informational Messages" on page 179.

Check the following:

- ❑ Is the BIOS set to allow the CD-ROM to be the first bootable device?
- ❑ The CD-ROM may not be spinning fast enough to be detected. To fix this problem, you can increase the hard disk pre-delay to nine seconds. For more information on this process, see Chapter 3.

If you did not receive error messages, run the SCU and make sure that the drive is configured with the correct parameters. To run the SCU, see Chapter 3.

If the problem persists, there may be a problem with the drive, add-in controller board, system board, drive signal cable, or LED connector. Contact your service representative or authorized dealer for assistance.

CD-ROM Drive Activity Light Does Not Light

Check the following:

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

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

If you received error messages, see "Bootable CD-ROM Is Not Detected" on page 179, or "Error and Informational Messages" on page 179.

Check the following:

- ❑ Is the BIOS set to allow the CD-ROM to be the first bootable device?
- ❑ The CD-ROM may not be spinning fast enough to be detected. To fix this problem, you can increase the hard disk pre-delay to nine seconds. For more information on this process, see Chapter 3.

If you did not receive error messages, run the SCU and make sure that the drive is configured with the correct parameters. To run the SCU, see Chapter 3.

If the problem persists, there may be a problem with the drive, add-in controller board, system board, drive signal cable, or LED connector. Contact your service representative or authorized dealer for assistance.

Cannot Connect to a Server

- ❑ Make sure you are using the drivers that are shipped on the system Configuration Software CD for the onboard network controller.
- ❑ Make sure the driver is loaded and the protocols are bound.
- ❑ Make sure the network cable is securely attached to the connector at the system back panel and that the network controller Link LED is on (visible at back panel). If the cable is attached but the problem persists, try a different cable.

- Make sure the hub port is configured for the same duplex mode as the network controller.
- Check with your LAN administrator about the correct networking software that needs to be installed.
- If you are directly connecting two servers (no hub), some hubs may also require a crossover cable (see your hub documentation for more information on crossover cables).
- Check the network controller LEDs that are visible through an opening at the system back panel.

Network status LED	What to look for	Description
DS1		Transmit/receive activity on the LAN:
	● On or ✱ blinking	The network controller is sending or receiving data over the network. The frequency of flashes varies with the amount of network traffic.
	❍ Off	The network controller is *not* sending or receiving data over the network.
LNK		Valid link to the LAN:
	● On	The network controller and hub are receiving power; the cable connection between the controller and hub are good.
	❍ Off	The controller and hub are *not* receiving power; the cable connection between the controller and hub is faulty; or you have a driver configuration problem.
100		Transfer mode: The network controller is operating at:
	● On	100 Mbps
	❍ Off	10 Mbps

Problems with Network

SETUP.EXE reports the adapter is "Not enabled by BIOS."

- ❑ The PCI BIOS isn't configuring the adapter correctly. Try the "PCI Installation Tips" below.

The server hangs when the drivers are loaded.

- ❑ Change the PCI BIOS interrupt settings. Try the "PCI Installation Tips" below.

Diagnostics pass, but the connection fails.

- ❑ Make sure the network cable is securely attached.
- ❑ Make sure you specify the correct frame type in your NET.CFG file.

The Link LED doesn't light.

- ❑ Make sure you have loaded the network drivers.
- ❑ Check all cable connections.
- ❑ Try another port on the hub.
- ❑ Make sure you have the correct type of cable between the adapter and the hub. Some hubs require a crossover cable while others require a straight-through cable (for more information on crossover cabling, see your hub documentation).

The Activity LED doesn't light.

- ❑ Make sure you've loaded the correct network drivers.
- ❑ Network may be idle. Try accessing a server.

The controller stopped working when an add-in adapter was installed.

- ❑ Make sure the cable is connected to the port from the onboard network controller.
- ❑ Make sure your PCI BIOS is current. Try the "PCI Installation Tips" below.
- ❑ Make sure the other adapter supports shared interrupts. Also, make sure your operating system supports shared interrupts; OS/2 does not.
- ❑ Try reseating the add-in adapter.

The add-in adapter stopped working without apparent cause.

- Try reseating the adapter first; then try a different slot if necessary.
- The network driver files may be corrupt or deleted. Delete and then reinstall the drivers.
- Run the diagnostics.

PCI Installation Tips

Some common PCI tips are listed here.

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

Problems with Application Software

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

- ❑ Verify that the software is properly configured for the system. See the software installation and operation documentation for instructions on setting up and using the software.
- ❑ Try a different copy of the software to see if the problem is with the copy you are using.
- ❑ Make sure all cables are installed correctly.
- ❑ Verify that the system board jumpers are set correctly. See Chapter 5.
- ❑ Try running the software in a different speed mode. See Chapter 3.
- ❑ 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.

Press <F2> Key to Enter Setup: Prompt Does Not Display

If the prompt "Press <F2> key to run Setup" does not appear at system startup, then the prompt option has been disabled in the SCU. There are two ways to enable the prompt:

- Reboot the system using your SCU diskette, and go into the SCU to enable the prompt.
- Clear CMOS memory by changing a jumper, and go into the SCU to enable the prompt.

Enable <F2> Prompt by Using SCU

1. Insert your SCU diskette in the diskette drive. This is the diskette that is created by copying the SCU software from the Configuration Software CD that comes with the system.
2. Reboot the system by pressing <Ctrl+Alt+Del> while at the DOS operating system prompt *or* by pressing the reset switch.
3. When the DOS Startup menu appears, select 1 or 2 to enter the SCU.
4. Select step 3, Change Configuration Settings. If a Password menu pops up, enter a user or administrative password if either is enabled, or just press <Esc> to bypass this menu prompt.

5. Select the System Board.
6. Page down until you reach the Boot Subsystem Group. It is toward the end of the groups.
7. Find and select the option that says, "Display '<F2> for Setup' Message during POST."
8. Press <Enter> to display the option menu.
9. Select Enable and press <Enter>.
10. If you are finished editing the settings for the system board, press <Esc>. This takes you back up to the main step 3 menu.
11. Press <Esc> again to return to the main SCU menu.
12. Select step 4, Save Configuration. Once you select this step, the changes are immediately saved into an INF file, a CMS file, and nonvolatile memory.
13. Press <Esc> to exit the SCU. You will be prompted to reboot the system or simply exit to the command line prompt. You'll need to reboot the system to let your changes take effect, but *first* remove the SCU diskette drive. *Then* press <F10> to reboot.

You should now see the <F2> prompt displayed at bootup.

Enable <F2> Prompt by Changing a Jumper and Using SCU

If you do not have an SCU diskette or CD available, you can clear CMOS memory to enable the <F2> prompt. This means you must change a jumper on the system board, run the SCU, save your changes, and change the jumper back to the default setting.

⟹ **This procedure resets *all* to default settings**
Clearing CMOS memory resets *all* SCU and Setup settings to their defaults, not just the CMOS CLR setting. Before proceeding, check that you have a backup paper copy of configuration settings (the worksheet at the back of Chapter 9). Referring to the worksheets could make your reconfiguration task easier.

1. Observe the safety and ESD precautions stated at the beginning of Chapter 5.
2. Turn off all connected peripherals, turn off system power, and disconnect the AC power cord.

3. Remove the side cover. You do not need to remove the system board from the chassis, and you probably do not need to remove any add-in boards.
4. Locate the CMOS configuration pins at the edge of the system board toward the front of the system.
5. Move the CMOS CLR jumper from the CMOS Protect setting on pins 1 and 2 to the CMOS Clear setting on pins 2 and 3.
6. Reinstall the side cover for your safety, and connect the power cord to the system.
7. Turn the system on. Wait for POST to complete and for the messages "NVRAM cleared by jumper" and "Press F1 to enter Setup" to appear. This automatically reprograms CMOS and RTC to their default settings.
8. Enter Setup and make any changes necessary. You will need to check and possibly reset all your settings (referring to your worksheets at the back of Chapter 9).
9. Press F10 to save the new Setup configuration and exit Setup.
10. Turn off the system, and disconnect the power cord.
11. Again remove the side cover.
12. Move the jumper from pins 2 and 3 back to pins 1 and 2 (the Protect CMOS memory position).
13. Reinstall the side cover, and connect the power cord.
14. Turn the system on. Run BIOS Setup and the SCU to verify the correct settings. (See Chapter 3.)

Bootable CD-ROM Is Not Detected

Check the following:

- ❑ Is the BIOS set to allow the CD-ROM to be the first bootable device?
- ❑ The CD-ROM may not be spinning fast enough to be detected. To fix this problem, you can increase the hard disk pre-delay to nine seconds. For more information on this process, see Chapter 3.

Error and Informational Messages

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

POST Codes and Countdown Codes

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

Normal Port-80 Codes

Normal Port 80 Codes	Beeps	Description
02		Verify real mode
04		Get processor type
06		Initialize system hardware
08		Initialize chipset registers with initial POST values
09		Set in POST flag
0A		Initialize processor registers
0B		Enable processor cache
0C		Initialize caches to initial POST values
0E		Initialize I/O
0F		Initialize the local bus IDE
10		Initialize power management
11		Load alternate registers with initial POST values new
12		Restore processor control word during warm boot
14		Initialize keyboard controller
16	1-2-2-3	BIOS ROM checksum
18		8254 timer initialization

Continued

Normal Port 80 Codes	Beeps	Description
1A		8237 DMA controller initialization
1C		Reset programmable interrupt controller
20	1-3-1-1	Test DRAM refresh
22	1-3-1-3	Test 8742 keyboard controller
24		Set ES segment register to 4GB
28		Autosize DRAM
2A		Clear 512K base RAM
2C	1-3-4-1	RAM failure on address line xxxx
2E	1-3-4-3	RAM failure on data bits xxxx of low byte of memory bus
30	1-4-1-1	RAM failure on data bits xxxx of high byte of memory bus
32		Test processor bus-clock frequency
34		Test CMOS
35		RAM Initialize alternate chipset registers
36		Warm start shut down
37		Reinitialize the chipset (MB only)
38		Shadow system BIOS ROM
39		Reinitialize the cache (MB only)
3A		Autosize cache
3C		Configure advanced chipset registers
3D		Load alternate registers with CMOS values new
40		Set Initial processor speed new
42		Initialize interrupt vectors
44		Initialize BIOS interrupts
46	2-1-2-3	Check ROM copyright notice
47		Initialize manager for PCI Option ROMs
48		Check video configuration against CMOS
49		Initialize PCI bus and devices
4A		Initialize all video adapters in system

Continued

Normal Port 80 Codes	Beeps	Description
4B		Display quiet boot screen
4C		Shadow video BIOS ROM
4E		Display copyright notice
50		Display processor type and speed
51		Initialize EISA board
52		Test keyboard
54		Set key click if enabled
56		Enable keyboard
58	2-2-3-1	Test for unexpected interrupts
5A		Display prompt "Press F1 to enter SETUP"
5C		Test RAM between 512 and 640k
60		Test extended memory
62		Test extended memory address lines
64		Jump to user patch1
66		Configure advanced cache registers
68		Enable external and processor caches
6A		Display external cache size
6C		Display shadow message
6E		Display non-disposable segments
70		Display error messages
72		Check for configuration errors
74		Test real-time clock
76		Check for keyboard errors
7A		Test for key lock on
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

Continued

Normal Port 80 Codes	Beeps	Description
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 diskette controller
90		Initialize hard disk controller
91		Initialize local-bus hard disk controller
92		Jump to user patch 2
93		Build MPTABLE for multi-processor boards
94		Disable A20 address line
95		Install CD ROM for boot
96		Clear huge ES segment register
98	1-2	Search for option ROMs. One long, two short beeps on checksum failure
9A		Shadow option ROMs
9C		Set up power management
9E		Enable hardware interrupts
A0		Set time of day
A2		Check key lock
A4		Initialize typematic rate
A8		Erase F2 prompt
AA		Scan for F2 key stroke
AC		Enter SETUP
AE		Clear in-POST flag
B0		Check for errors
B2		POST done - prepare to boot operating system
B4	1	One short beep before boot
B5		Display MultiBoot menu

Continued

Normal Port 80 Codes	Beeps	Description
B6		Check password (optional)
B8		Clear global descriptor table
BC		Clear parity checkers
BE		Clear screen (optional)
BF		Check virus and backup reminders
C0		Try to boot with INT 19
DO		Interrupt handler error
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 error codes and messages are representative of various conditions BIOS identifies. The exact strings and error numbers may be different from those listed here.

Code	Error message
01xx	System errors
02xx	Extended system errors
0200	Failure fixed disk
0210	Stuck key
0211	Keyboard error
0212	Keyboard controller failed
0213	Keyboard locked - Unlock key switch
0220	Monitor type does not match CMOS - Run SETUP
0230	System RAM failed at offset:
0231	Shadow Ram failed at offset:
0232	Extended RAM failed at offset:
0240	? ERR_POS
0250	System battery is dead - Replace and run SETUP
0251	System CMOS checksum bad - Default configuration used
0260	System timer error
0270	Real time clock error
0280	Previous boot incomplete - Default configuration used
0281	Memory size found by POST differed from EISA CMOS
0290	String not defined
02A0	String not defined
02B0	Diskette drive A error
02B1	Diskette drive B error
02B2	Incorrect Drive A type - run SETUP
02B3	Incorrect Drive B type - run SETUP
02C0	String not defined
02D0	System cache error - Cache disabled
02E0	String not defined

Continued

Code	Error message
02E1	String not defined
02E2	String not defined
02E3	String not defined
02E4	String not defined
02E5	String not defined
02E6	String not defined
02E7	String not defined
02F0	Processor ID:
02F1	String not defined
02F2	String not defined
02F3	String not defined
02F5	DMA test failed
02F6	Software NMI failed
02F7	Fail-safe timer NMI FAILED
03xx	EISA errors
0400	String not defined
0401	Invalid system configuration data - Run configuration utility
???	System configuration data read error
0402	? Write_ESCD_error
0403	Resource Conflict
0404	Resource Conflict
0405	Expansion ROM not initialized
0406	Warning: IRQ not configured
0504	Resource CONFLICT
0505	Expansion ROM not initialized
0506	Warning: IRQ not configured
0601	Device configuration changed
0602	Configuration error - device disabled
0900	BSP ID: Failed BIST
0901	BSP ID: Failed BIST
0902	Processor ID: Failed

Hardware Technical Reference 8

This chapter includes the following:

- Environmental specifications
- System memory map addresses
- Board interrupts
- System board connectors
- Front panel control board connectors
- Standard video modes
- Power supply specifications
- Electromagnetic Compatibility (EMC) notices

Terms and Abbreviations

The following terms and abbreviations are used in the connector pinout tables:

- Signal active low: Either a pound sign (#) following a signal name or an "_L" symbol following the name indicates that the signal is active in the low state (for example, HD1_ACTIVE# or P_REQ_SLOT0_L).
- NC = Not connected. This also appears spelled out.
- GND = Ground.

Environmental Specifications

Temperature	
Nonoperating	–40° to 70°C (–55° to 150°F)
Operating	0° to 35°C (41° to 95°F); derated 0.5°C for every 1000 ft (305 m)
Humidity	
Nonoperating	95% relative humidity (noncondensing) at 30°C (86°F)
Operating wet bulb	Not to exceed 33°C (91.4°F) (with diskette drive or hard disk drive)
Shock	
Nonoperating	20 g, 11 msec, trapezoidal
Operating	2.0 g, 11 msec, 1/2 sine
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
AC Input Power	
100-120 V~	100-120 V~, 6.3 A, 50/60 Hz
200-240 V~	200-240 V~, 3.5 A, 50/60 Hz

System I/O Addresses

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

Address(es)	Resource	Device	Notes
0000h - 000Fh	DMA Controller 1	PIIX4	
0010h - 001Fh	DMA Controller 1	PIIX4	Aliased from 0000h - 000Fh
0020h - 0021h	Interrupt Controller 1	PIIX4	
0022h - 0023h			
0024h - 0025h	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
0026h - 0027h			
0028h - 0029h	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
002Ah - 002Bh			
002Ch - 002Dh	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
002Eh - 002Fh	Super I/O Index and Data Ports		
0030h - 0031h	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
0032h - 0033h			
0034h - 0035h	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
0036h - 0037h			
0038h - 0039h	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
003Ah - 003Bh			
003Ch - 003Dh	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
003Eh - 003Fh			

Continued

Address(es)	Resource	Device	Notes
0040h - 0043h	Programmable Timers	PIIX4	
0044h - 004Fh			
0050h - 0053h	Programmable Timers	PIIX4	Aliased from 0040h - 0043h
0054h - 005Fh			
0060h, 0064h	Keyboard Controller		Keyboard chip select from 87307
0061h	NMI Status & Control Register	PIIX4	
0063h	NMI Status & Control Register	PIIX4	Aliased
0065h	NMI Status & Control Register	PIIX4	Aliased
0067h	NMI Status & Control Register	PIIX4	Aliased
0070h	NMI Mask (bit 7) & RTC Address (bits 6::0)	PIIX4	
0072h	NMI Mask (bit 7) & RTC Address (bits 6::0)	PIIX4	Aliased from 0070h
0074h	NMI Mask (bit 7) & RTC Address (bits 6::0)	PIIX4	Aliased from 0070h
0076h	NMI Mask (bit 7) & RTC Address (bits 6::0)	PIIX4	Aliased from 0070h
0071h	RTC Data	PIIX4	
0073h	RTC Data	PIIX4	Aliased from 0071h
0075h	RTC Data	PIIX4	Aliased from 0071h
0077h	RTC Data	PIIX4	Aliased from 0071h

Continued

Address(es)	Resource	Device	Notes
0080h - 0081h	BIOS Timer		
0080h - 008Fh	DMA Low Page Register	PIIX4	
0090h - 0091h	DMA Low Page Register (aliased)	PIIX4	
0092h	System Control Port A (PC-AT control Port) (this port not aliased in DMA range)	PIIX4	
0093h - 009Fh	DMA Low Page Register (aliased)	PIIX4	
0094h	Video Display Controller		
00A0h - 00A1h	Interrupt Controller 2	PIIX4	
00A4h - 00A15	Interrupt Controller 2 (aliased)	PIIX4	
00A8h - 00A19	Interrupt Controller 2 (aliased)	PIIX4	
00ACh - 00ADh	Interrupt Controller 2 (aliased)	PIIX4	
00B0h - 00B1h	Interrupt Controller 2 (aliased)	PIIX4	
00B2h	Advanced Power Management Control	PIIX4	
00B3h	Advanced Power Management Status	PIIX4	
00B4h - 00B5h	Interrupt Controller 2 (aliased)	PIIX4	
00B8h - 00B9h	Interrupt Controller 2 (aliased)	PIIX4	

Continued

Address(es)	Resource	Device	Notes
00BCh - 00BDh	Interrupt Controller 2 (aliased)	PIIX4	
00C0h - 00DFh	DMA Controller 2	PIIX4	
00F0h	Clear NPX error	Resets IRQ13	
00F8h - 00FFh	x87 Numeric Coprocessor		
0102h	Video Display Controller		
0170h - 0177h	Secondary Fixed Disk Controller (IDE)	PIIX4 (not used)	
01F0h - 01F7h	Primary Fixed Disk Controller (IDE)	PIIX4	
0200h - 0207h	Game I/O Port	Not used	
0220h - 022Fh	Serial Port A		
0238h - 023Fh	Serial Port B		
0278h - 027Fh	Parallel Port 3		
02E8h - 02EFh	Serial Port B		
02F8h - 02FFh	Serial Port B		
0338h - 033Fh	Serial Port B		
0370h - 0375h	Secondary Diskette		
0376h	Secondary IDE		
0377h	Secondary IDE/Diskette		
0378h - 037Fh	Parallel Port 2		
03B4h - 03BAh	Monochrome Display Port		

Continued

Address(es)	Resource	Device	Notes
03BCh - 03BFh	Parallel Port 1 (Primary)		
03C0h - 03CFh	Video Display Controller		
03D4h - 03DAh	Color Graphics Controller		
03E8h - 03EFh	Serial Port A		
03F0h - 03F5h	Diskette Controller		
03F6h - 03F7h	Primary IDE - Sec. Diskette		
03F8h - 03FFh	Serial Port A (Primary)		
0400h - 043Fh	DMA Controller 1, Extended Mode Registers	PIIX4	
0461h	Extended NMI / Reset Control	PIIX4	
0462h	Software NMI	PIIX4	
0480h - 048Fh	DMA High Page Register	PIIX4	
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		

Continued

Address(es)	Resource	Device	Notes
0C80h - 0C83h	EISA System Identifier Registers	PIIX4	
0C84h	Board Revision Register		
0C85h - 0C86h	BIOS Function Control		
0CA9h	DISMIC Data Register	Server management mailbox	
0CAAh	DISMIC Control/Status Register	registers.	
0CABh	DISMIC Flags Register		
0CF8h	PCI CONFIG_ADDRESS Register	Located in PAC	
0CF9h	PAC Turbo and Reset control	PIIX4	
0CFCh	PCI CONFIG_DATA Register	Located in PAC	
46E8h	Video Display Controller		
xx00 - xx1F*	SCSI registers	Refer to SCSI chip doc	

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

DOS Compatibility Region

The DOS compatibility region covers 1 MB of memory from addresses 0000_0000h to 0FFFFF.

Address Range (hex)	Amount	Function
0 to 07FFFFh	512 KB	DOS region, base system memory (fiXEd)
080000h to 09FFFFh	128 KB	ISA window memory
0A0000h to 0BFFFFh	128 KB	Video or SMM memory
0C0000h and 0DFFFFh	128 KB	Add-in board BIOS and buffer area
0E0000h to 0EFFFFh	64 KB	Extended system BIOS
0F0000h to 0FFFFFh	64 KB	System BIOS

Extended Memory Region

The Extended Memory region covers 4 GB of address space from addresses 0100000h to FFFFFFFFh.

Address Range (hex)	Amount	Function
100000h to 3FFF_FFFFh	1 GB	Local DRAM space
FEC00000h to FFFFFFFFh	3 GB	PCI memory space

Interrupts

The table below recommends the logical interrupt mapping of interrupt sources; it reflects a typical configuration, but these interrupts can be changed by the user. Use the information to determine how to program each interrupt. The actual interrupt map is defined using configuration registers in the PIIX4 and the I/O controller. I/O Redirection Registers in the I/O APIC are provided for each interrupt signal; the signals define hardware interrupt signal characteristics for APIC messages sent to local APIC(s).

To disable either IDE controller and reuse the interrupt
If you plan to disable either IDE controller to reuse the interrupt for that controller, you must physically unplug the IDE cable from the board connector (IDE0 or IDE1) if a cable is present. Simply disabling the drive by configuring the SCU option does not free up the interrupt.

Interrupt	I/O APIC level	Description
INTR	INT0	Processor interrupt
NMI	N/A	NMI from DISMIC to processor
IRQ1	INT1	Keyboard interrupt
Cascade	INT2	Interrupt signal from second 8259 in PIIX4
IRQ3	INT3	Serial port A or B interrupt from 87307VUL device (user can configure)
IRQ4	INT4	Serial port A or B interrupt from 87307VUL device (user can configure)
IRQ5	INT5	Parallel port
IRQ6	INT6	Diskette
IRQ7	INT7	Parallel port
IRQ8_L	INT8	RTC interrupt
IRQ9	INT9	Available (can be used by ISA bus)

Continued

Interrupt	I/O APIC level	Description
IRQ10	INT10	Open for use
IRQ11	INT11	Open for use
IRQ12	INT12	Mouse interrupt
N/A	INT13	Used by floating point unit (FPU) and is NOT AVAILABLE
IRQ14	INT14	Compatibility IDE interrupt from primary channel IDE devices 0 and 1
IRQ15	INT15	Open for use
P_INTA_L	INT16	PCI Interrupt signal A
P_INTB_L	INT17	PCI Interrupt signal B
P_INTC_L	INT18	PCI Interrupt signal C
P_INTD_L	INT19	PCI Interrupt signal D
SMI_L	N/A	System management interrupt—general purpose error indicator from a control PAL that provides an SMI_L from non-traditional error sources (PERR_L, SERR_L, and others)

Video Modes

The 5446 integrated video controller provides all standard IBM VGA modes. With 1 MB of video memory, the system goes beyond standard VGA support. The tables below show all supported video modes using 1 MB of video memory. The following tables show the standard modes that the chip supports, including the number of colors and palette size, resolution, pixel frequency, and scan frequencies.

Standard VGA Modes

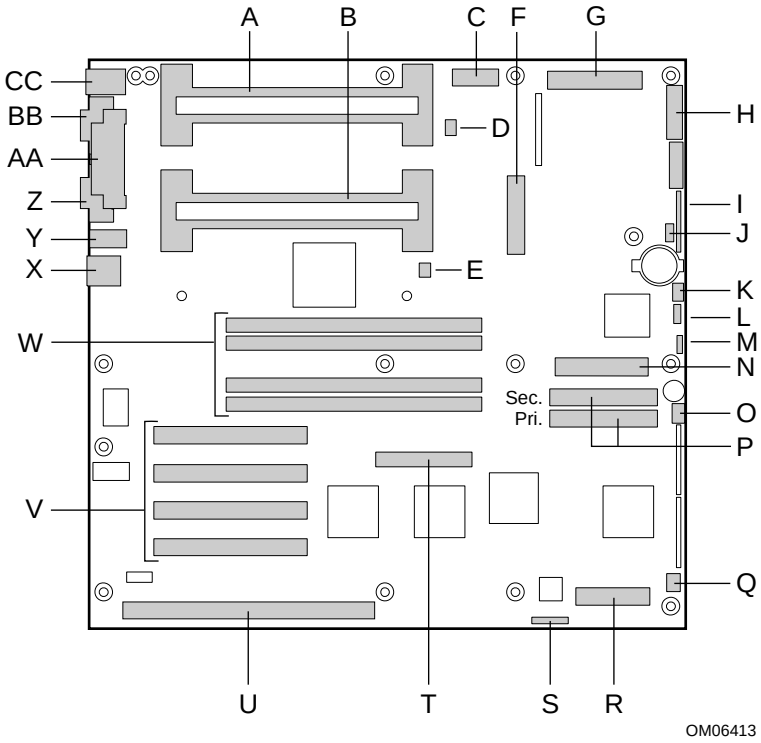
Mode(s) in Hex	Bits Per Pixel	Colors (no. per palette size)	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (kHz)	Vert. Freq. (Hz)
0, 1	4	16/256K	360 X 400	14	31.5	70
2, 3	4	16/256K	720 X 400	28	31.5	70
4, 5	4	4/256K	320 X 200	12.5	31.5	70
6	4	2/256K	640 X 200	25	31.5	70
7	4	Mono	720 X 400	28	31.5	70
D	4	16/256K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

Extended VGA Modes

Mode(s) in Hex	Bits per pixel	Colors (no per palette size)	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (kHz)	Vert. Freq. (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

Connectors

The figure shows connector locations on the system board. This section provides pin information about the connectors.



A	Slot 1 primary connector
B	Slot 1 secondary connector
C	Auxiliary power connector, 14 pin
D	Fan heat sink primary connector
E	Fan heat sink secondary connector
F	ATX power connector, 20 pin
G	Main power connector (from power supply), 24 pin
H	Front panel connector, 16 pin
I	AT front panel connector
J	Local I^2C connector
K	Hard drive LED connector
L	System management bus connector
M	External speaker connector
N	Diskette drive connector
O	System fan 1 connector
P	IDE connectors, primary (labeled IDE1) and secondary (labeled IDE2)
Q	System fan 2 connector
R	Server monitor module (SMM) connector
S	ISP connector
T	Wide SCSI connector
U	ISA slot for add-in board (one)Hard drive activity LED connector
V	PCI slots for add-in boards (four); slot 1 is closest to ISA slot
W	Memory sockets for four DIMM components; socket 4 is closest to PCI slots
X	RJ45 network controller
Y	Serial port B (COM 2)
Z	VGA monitor port
AA	Parallel port
BB	Serial A (COM 1)
CC	Keyboard and Mouse PS/2 compatible connectors (interchangeable)

ATX Power

Pin	Signal	Wire color	Pin	Signal	Wire color
1	+3.3 VDC	Orange	11	+3.3 VDC	Orange
				3.3 V sense	Brown
2	+3.3 VDC	Orange	12	-12 VDC	Blue
3	COM	Black	13	COM	Black
4	+5 VDC	Red	14	PS-ON #	Green
5	COM	Black	15	COM	Black
6	+5 VDC	Red	16	COM	Black
7	COM	Black	17	COM	Black
8	PWR-OK	Grey	18	-5 VDC	White
9	5 VSB	Purple	19	+5 VDC	Red
10	+12 VDC	Yellow	20	+5 VDC	Red

Main Power

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

Auxiliary Power (non-ATX Connector)

Pin	Signal	Wire color
1	5V Remote sense return	Black
2	5 V remote sense	Red
3	3.3 V remote sense	Orange
4	3.3V remote sense return	Black
5	Not connected	none
6	Not connected	none
7	GND	Black
8	POWER_GOOD	Gray
9	PS_ON	Green
10	COM *	Black
11	5 VSB	Purple
12	Key	None
13	Not connected	None
14	COM	Black

Peripheral Power Connectors

Pin	Description
1	+12 VDC
2 and 3	GND
4	+5.1 VDC

Diskette Drive

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

Hard Disk Drive Activity LED

Pin	Signal
1	Return
2	Hard disk active
3	Hard disk active
4	Return

Front Panel Connector

Pin	Signal	Pin	Signal
1	GND	2	Hard disk activity LED
3	Front panel reset switch	4	Front panel power switch
5	+5V	6	N/C (key)
7	Front panel NMI switch	8	+5V
9	Fan failure indicator LED	10	Chassis intrusion switch
11	Power fault LED	12	+5V standby
13	I^2C Data line	14	GND
15	I^2C Clock line	16	GND

Fan Interface

The system board has four 3-pin, shrouded, and keyed fan connectors. Two are located next to the processor sockets (one for each processor) for a tachometer fan heat sink. The remaining two fan connectors attach to a fans equipped with a sensor that indicates whether the fan is operating. The sensor pins for these fans are routed to the BMC for failure monitoring. Each connector has the following pinout:

Pin	Signal
1	GND
2	Fan Sensor
3	+12V

The fan heat sink connector has the following pinout:

Pin	Signal
1	GND
2	+12V
3	Fan Sensor

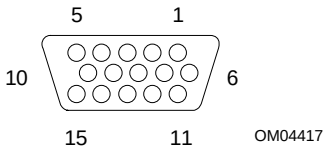
Server Management

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

I2C

Pin	Signal
1	LOCAL_I2C_SCL
2	GND
3	LOCAL_I2C_SDA

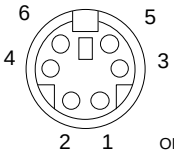
VGA Video Port



Pin	Signal
1	Red
2	Green
3	Blue
4	Not connected
5	Video GND (shield)
6	Video GND (shield)
7	Video GND (shield)
8	Video GND (shield)

Pin	Signal
9	Not connected
10	GND (video ground)
11	Not connected
12	DDCDAT (monitor ID data)
13	HSYNC (horizontal synchronization)
14	VSYNC (vertical synchronization)
15	DDCCLK (monitor ID clock)

Keyboard and Mouse

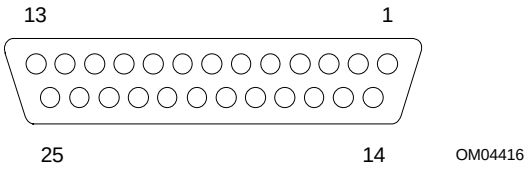


These PS/2-compatible connectors share a common housing; they are functionally equivalent.

Pin	Keyboard signal
1	KEYDAT (keyboard data)
2	Not connected
3	GND
4	FUSED_VCC (+5 V)
5	KEYCLK (keyboard clock)
6	Not connected

Pin	Mouse signal
1	MSEDAT (mouse data)
2	Not connected
3	GND
4	FUSED_VCC (+5 V)
5	MSECLK (mouse clock)
6	Not connected

Parallel Port



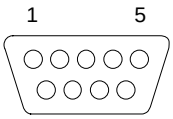
The IEEE 1284-compatible parallel port, used primarily for a printer, sends data in parallel format.

Pin	Signal
1	STROBE_L
2	Data bit 0
3	Data bit 1
4	Data bit 2
5	Data bit 3
6	Data bit 4
7	Data bit 5
8	Data bit 6

Pin	Signal
10	ACK_L (acknowledge)
11	Busy
12	PE (paper end)
13	SLCT (select)
14	AUFDXT (auto feed) #
15	ERROR_L
16	INIT_L (initialize printer)
17	SLCTIN_L (select input) #

9	Data bit 7	18–25	GND

Serial Ports A and B



These ports support external devices such as modems and scanners that require serial data transmission.

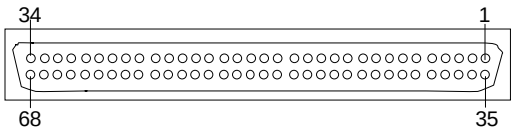
Pin	Serial Port A Signal
1	DCD (data carrier detect)
2	RXD (receive data)
3	TXD (transmit data)
4	DTR (data terminal ready)
5	GND
6	DSR (data set ready)
7	RTS (request to send)
8	CTS (clear to send)
9	RIA (ring indicator)

Pin	Serial Port B Signal
1	DCD (data carrier detect)
2	DSR (data set ready)
3	RXD (receive data)
4	RTS (request to send)
5	TXD (transmit data)
6	CTS (clear to send)
7	DTR (data terminal ready)
8	RIA (ring indication active)
9	GND

RJ45 Network

Pin	Signal	Description
1	TX+	Transmit data plus—the positive signal for the TD differential pair contains the serial output data stream transmitted onto the network
2	TX-	Transmit data minus—the negative signal for the TD differential pair contains the same output as pin 1
3	RX+	Receive data plus—the positive signal for the RD differential pair contains the serial input data stream received from the network
4	No connection	
5	No connection	
6	RX-	Receive data minus—the negative signal for the RD differential pair contains the same input as pin 3
7	No connection	
8	No connection	

68-Pin Wide/Fast 16-Bit SCSI



Pin	Signal	Pin	Signal
1–16	GND	49–50	GND
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	RESERVED	53	RESERVED
20–34	GND	54	GND
35	DB 12_L	55	ATN_L
36	DB 13_L	56	GND
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

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

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

ISA

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

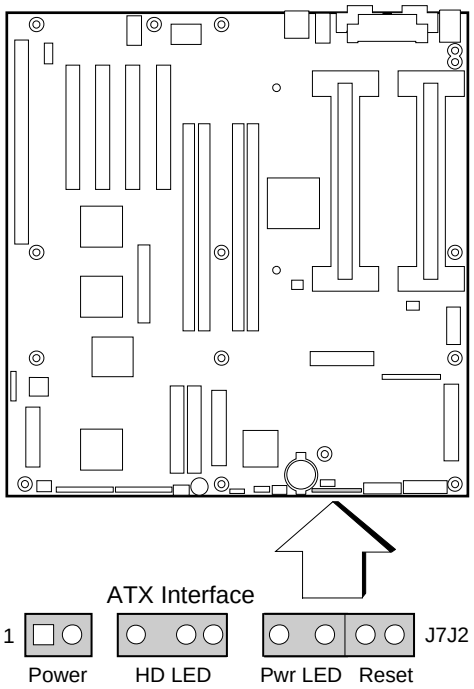
PCI

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

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

ATX Interface

The system board has connectors that meet the standard AT interface for LED indicators and other functions. The connector block is at J7J2.



OM06430

Pin	Signal	Description
1	Power control	Typically connected to one side of a normally open (N.O.) momentary push-button switch, with the other side connected to Ground (pin 2). Pressing and releasing the switch toggles the power state.
2	GND	Ground.
3	Key	No pin present.
4	HD LED power	Connected to VCC5 through 150 ohm resistor. Typically connected to the anode of the hard disk LED.
5	Key	No pin present.
6	HD activity	Hard disk activity signal. Typically connected to the cathode of the hard disk LED.
7	HD LED power	Same function as pin 4, connected directly to pin 4.
8	GND	Ground.
9	Key	No pin present.
10	INT_SPK	Internal speaker connection. Jumpered to pin 11 when onboard speaker is being used.
11	EXT_SPK	External speaker connection. Attach header for an external speaker to pin 11 and pin 8 (GND).
12	GND	Ground.
13	Key	No pin present.
14	Power LED	Connected to VCC5 through 150-ohm resistor. Typically connected to the anode of the power indicator LED.
15	Key	No pin present.
16	$V_{CC}5$	Connected to +5 V power supply.
17		Pulled down to ground through a 10K resistor.
18	GND	Ground.
19	RESET_L	Typically connected to one side of a normally-open (N.O.) momentary push-button switch, with the other side connected to Ground (pin 18). Pressing and releasing the switch resets the system.

Power Supply Specifications

Input Voltages

The 275 watt power supply, designed to minimize EMI and RFI, provides sufficient power for a maximum configuration of the server. The input voltage ranges are:

- 100-120 V~ at 50/60 Hz; 6.3 A maximum current
- 200-240 V~ at 50/60 Hz; 3.5 A maximum current

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 275 watts.

For information about calculating the power usage for your system configuration, see the calculation worksheets on pages 221 and 222.

Voltage	Maximum Continuous Current	Peak Current	Watts
+3.3 V	11.0 A		36.3 W
+5.0 V	26.0 A		130.0 W
–5.0 V	0.5 A		2.5 W
+5V Standby	0.1 A		0.5 W
+12.0 V	10.0 A	13.0 A	120.0 W
–12.0 V	0.5 A		6.0 W

Current Usage

As an overall current usage limitation on the power supply, do not exceed a combined power output of 147 watts for the +5 and +3.3 volt outputs.

The ISA slots on the system board are rated at a maximum of 4.5 amperes per slot. The ISA specification recommends supporting an average of 2.0 amperes per slot. The average current usage should not exceed 3.0 amperes per slot; that is, 15 watts.

The PCI slots on the system board are rated at a maximum of 5 amperes per slot. The maximum power allowed for each slot is 20 watts at +5 volts. The average current usage per slot should not exceed 3.0 amperes per slot; that is, 15 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.

	Current (maximum) at voltage levels:				
Device	**+5 V**	**+3.3 V**	**+12 V**	**–5 V**	**–12 V**
System board	8.0 A	1.0 A	1.1 A	0.1 A	0.4 A
Processor **Note** The current usage may vary depending on the processor installed in the system.	8.0 A				0
Server monitor module	0.5 A		0.8 A		
PCI RAID disk array controller	4.0 A		0.1 A		
3.5-inch diskette drive	0.3 A				
3.5-inch SCSI hard disk drive, 4 GB	0.6 A		0.6 A		
3.5-inch IDE hard disk drive	0.6 A		0.4A		
SCSI tape drive	0.3 A		1.0 A		
CD-ROM drive	0.4 A		1.0 A		
ISA bus slot, typical; see vendor specifications	2.0 A				
PCI bus slot, typical; see vendor specifications	2.0 A				
Cooling fan, 120 mm			0.6 A		

Calculating Power Usage

The total combined wattage for the system configuration must be less than 275 watts. Use the two worksheets in this section to calculate the total used by your system. For current and voltage requirements of add-in boards and peripherals, see your vendor documents.

Worksheet, Calculating DC Power Usage

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

	Current (maximum) at voltage level:				
Device	**+3.3 V**	**+5 V**	**–5 V**	**+12 V**	**–12 V**
System board	1.0 A	8.0 A	0.1 A	1.1 A	0.4 A
Processor/memory		8.0 A			
3.5-inch diskette drive		0.3 A			
CD-ROM drive		0.4 A		1.0 A	
Cooling fan 1, 120 mm				0.6 A	
PCI slot 1					
PCI slot 2					
PCI slot 3					
ISA slot 1					
ISA slot 2					
1st 3.5-inch hard disk drive					
2nd 3.5-inch hard disk drive					
3rd 3.5-inch hard disk drive					
4th 3.5-inch hard disk drive					

Continued

	Current (maximum) at voltage level:				
Device	**+3.3 V**	**+5 V**	**–5 V**	**+12 V**	**–12 V**
5th 3.5-inch hard disk drive					
6th 3.5-inch hard disk drive					
Tape drive					
Total Current					

Worksheet, Total Combined Power Used by the System

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

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**

Declaration of the Manufacturer or Importer

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

Safety Compliance

USA:	UL 1950, 3rd Edition
Canada:	UL certified to CSA C22.2 No. 950-95 for Canada
Europe:	TUV to EN60950 2nd Edition, with amendments
International:	NEMKO to IEC950 (A1 + A2 + A3) NEMKO to EN60950 (A1 + A2), NEMKO to EMKO-TSE(74-SEC) 207/94

Electromagnetic Compatibility (EMC)

USA:	FCC 47 Class B CFR Parts 2 and 15, Tested Class B
Canada:	IC ICES-003 Class B
Europe:	EN55022, Class B EN50082-1 IEC 801-2 ESD Susceptibility IEC 801-3 Radiated Immunity IEC 801-4 Electrical Fast Transient
International:	CISPR 22/93, Class B
Japan:	VCCI Class 2 ITE

Electromagnetic Compatibility Notice (USA)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on; the user is encouraged to try to correct the interference by one or more of the following measures:

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

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

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

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

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

FCC Declaration of Conformity

Product Type: COLRED

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful

interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

Intel Corporation
5200 N.E. Elam Young Parkway
Hillsboro, OR 97124-6497
Phone: 1 (800)-INTEL4U (628-8686)

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 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.

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 2 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 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 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.

Equipment Log and Configuration Worksheets 9

Equipment Log

Use the blank equipment log provided here to record information about your system. You will need some of this information when you run the System Configuration Utility (SCU).

Item	Manufacturer Name and Model Number	Serial Number	Date Installed
System			
System board			
Processor speed and cache			
Video display			
Keyboard			
Mouse			
Diskette drive A			
Diskette drive B			
Tape drive			
CD-ROM drive			

Continued

Item	Manufacturer Name and Model Number	Serial Number	Date Installed
Hard disk drive 1			
Hard disk drive 2			
Hard disk drive 3			
Hard disk drive 4			
Hard disk drive 5			
SCSI host adapter board 1			
SCSI host adapter board 2			

Continued

Item	Manufacturer Name and Model Number	Serial Number	Date Installed

Worksheets

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

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

SCU Worksheets

Add and Remove Boards

System Board	
PCI Ethernet Device	Bus 0 Dev A
PCI VGA Device	Bus 0 Dev 14
PCI SCSI Device	Bus 0 Dev D
PCI Multifunction Device	Bus 0 Dev 12

ISA Board Definition

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

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

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

System Board (SCU, Change Configuration Settings)

Systems Group **System Identification and Version Information**	
System Identification String	
Config and Overlay Version	
BIOS Version String	
System Processor	
System Performance Power-on Speed Option	Fast / Slow

Memory Subsystem Group	
Base Memory Options	512 KB / 640 KB
Shadowing ISA ROMs Options	
Extended Memory Options (Cache, 1MB ISA Hole)	15 MB Extended Memory / 256 KB Cache (WB)

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

Onboard Communications Devices
Serial Port 1 Configuration
Serial Port 2 Configuration
Parallel Port Configuration
Parallel Port Mode

Diskette Drive Subsystems Group
Diskette drive A Options
Diskette drive B Options

IDE Subsystem Group	
ISA IDE DMA Transfers	Auto Configured / Disable
IDE Configuration **Primary Master**	(drive name) Auto / Customize / Disable
Multisector Transfer	Auto Configured / 4 Sector/Block 8 Sector/Block / Disable
Translation Mode	Auto Configured / Standard CHS Logical Block Addressing / Extended CHS
Enhanced IDE Mode	Auto Configured / Disable
IDE Configuration **Primary Slave**	(drive name) Auto / Customize / Disable
Multisector Transfer	Auto Configured / 4 Sector/Block 8 Sector/Block / Disable
Translation Mode	Auto Configured / Standard CHS Logical Block Addressing / Extended CHS
Enhanced IDE Mode	Auto Configured / Disable
IDE Configuration **Secondary Master**	(drive name) Auto / Customize / Disable
Multisector transfer selection	Auto Configured / 4 Sector/Block 8 Sector/Block / Disable
Translation Mode	Auto Configured / Standard CHS Logical Block Addressing / Extended CHS
Enhanced IDE Mode	Auto Configured / Disable

Continued

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

IDE Subsystem Group, continued	
IDE Configuration **Secondary Slave**	(drive name) Auto / Customize / Disable
Multisector transfer selection	Auto Configured / 4 Sector/Block 8 Sector/Block / Disable
Translation Mode	Auto Configured / Standard CHS Logical Block Addressing / Extended CHS
Enhanced IDE Mode	Auto Configured / Disable

BIOS Language Support Group
BIOS Language Support Options Current BIOS Language

Keyboard (KB) and Mouse Subsystem Group	
Keyboard and Mouse Options Num Lock Options	Off at Boot / On at Boot
Typematic Speed	Auto / Fast / Medium / Slow
Mouse Control option	Mouse Auto detected

Console Redirection	
Console Redirection Control COM Port for Redirection	Disable / Enable on COM1 Enable on COM2
Serial Port baud rate	2400 / 9600 / 19.2k / 115.2k
Hardware Flow Control	None / CTS/RTS / CTS/RTS & Xoff/Xon
Terminal Type	ANSI

Security Subsystems	
Administrative Password	Disable / Enable
User Password	Disable / Enable
Hot-Key Option	Disable / Ctrl-Alt-{ }
Lockout Timer	Disable / { } minutes
Secure Boot Mode	Disable / Enable
Video Blanking	Disable / Enable
Diskette Writes	Enable / Disable

Boot Subsystem Group **Boot Options**	
First Boot Device	Boot Diskette Boot Hard Disk Boot IDE CD-ROM Diskette Image Boot IDE CD-ROM Hard Drive Image Boot Network
Second Boot Device	Boot Disabled Boot **Diskette** Boot Hard Disk Boot Network
Third Boot Device	Boot Disabled Boot **Diskette** Boot Hard Disk Boot Network
Fourth Boot Device	Boot Disabled Boot **Diskette** Boot Hard Disk Boot Network
Display “<F2> for Setup” message during POST	Enable / Disable
Require user interaction on POST errors	Enable / Disable

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

SCSI ROM BIOS Options Group	
SCSI-A ROM BIOS scan	Enable / Disable

Management Subsystem Group	
System Sensor Control	Write your selections on the separate worksheet that starts on page 237.
Speaker Options	Enable / Disable
Scan User Flash Area	Enable / Disable
System Management Options System Management Mode	Enable / Disable
Event Logging	Enable / Disable
PCI System Error Detection	Enable / Disable
Reserved VGA Resources	

Management Subsystem, System Sensor Control Worksheet

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

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

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

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

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

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

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

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

BIOS Setup Worksheets

Main Menu	
System Date	
System Time	
Diskette A Type	Disabled 360 KB 5¼” 1.2 MB 5¼” 720 KB 3½” 1.44 / 1.25 MB 3½” 2.88 MB 3½”
Diskette B Type	Disabled 360 KB 5¼” 1.2 MB 5¼” 720 KB 3½” 1.44 / 1.25 MB 3½” 2.88 MB 3½”
Memory Cache	Enabled / Disabled
Language	English Spanish Italian French German

Primary IDE Master and Slave Submenu	
Type	Auto / None / CD-ROM / User
Cylinders	
Heads	
Sectors	
Maximum	
Multi-Sector Transfer	
LBA Mode Control	Disabled / Enabled
32 Bit I/O	Disabled / Enabled
Transfer Mode	Standard / Fast PIO 1 / Fast PIO 2 / Fast PIO 3 / Fast PIO 4

Secondary Master and Slave Submenu	
32 Bit I/O	Disabled / Enabled
Smart Monitoring	Disabled

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

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

Advanced Menu	
Plug and Play OS	Yes / No
Reset Configuration Data	Yes / No
Use Multiprocessor Specification	1.1 / 1.4
Large Disk Access Mode	DOS / Other
Enable Memory Gap	Disabled / Conventional / Extended
Delay on Option ROMs	Disabled / Enabled

PCI Configuration - PCI Device, Embedded SCSI	
Option ROM Scan	Disabled / Enabled
Enable Master	Disabled / Enabled
Latency Timer	Default / <time>

PCI Configuration - PCI Device, Slot 1 - Slot 4	
Option ROM Scan	Disabled / Enabled
Enable Master	Disabled / Enabled
Latency Timer	Default / <time>

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

PCI Configuration - PCI/PNP ISA UMB Region Exclusion	
C800 - CBFF	Available / Reserved
CC00 - CFFF	Available / Reserved
D000 - D3FF	Available / Reserved
D400 - D7FF	Available / Reserved
D800 - DBFF	Available / Reserved
DC00 - DFFF	Available / Reserved

PCI Configuration - PCI/PNP ISA IRQ Region Exclusion	
IRQ 3	Available / Reserved
IRQ 4	Available / Reserved
IRQ 5	Available / Reserved
IRQ 7	Available / Reserved
IRQ 9	Available / Reserved
IRQ 10	Available / Reserved
IRQ 11	Available / Reserved
IRQ 15	Available / Reserved

Advanced - Peripheral Configuration	
Serial Port A	Disabled / Enabled / Auto / PnP OS
Base I/O Address (A)	3F8h / 2F8h / 3E8h / 2E8h
Interrupt (A)	4 / 3
Serial Port B	Disabled / Enabled / Auto / PnP OS
Base I/O Address (B)	3F8h / 2F8h / 3E8h / 2E8h
Interrupt (B)	4 / 3
Parallel Port	Disabled / Enabled / Auto / PnP OS
Mode	Output only / Bidirectional / EPP / ECP
Base I/O Address (LPT)	378h / 278h
Interrupt (LPT)	5 / 7
DMA channel	1 / 3
Floppy disk controller	Disabled / Enabled
PS/2 Mouse	Disabled / Enabled

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

Server Menu	
PCI IRQs to IO APIC Mapping	Disabled / Enabled
PCI IRQ to External MUX	Disabled / Enabled
Processor Retest	NO / YES

Server - System Management.	
I2C User Defaults	Disabled
System Management Mode	Disabled / Enabled
System Event Logging	Disabled / Enabled
Clear Event Log	No / Yes
Fault Resilient Booting	Disabled / Enabled
PERR Interrupt Routing	Disabled / SMI Only / SMI & NMI
SERR Reporting	Disabled / Enabled
Test Extended Memory	Disabled / Enabled
SMM Debug Mode	Disabled / Enabled
CPU Slot1 and Slot2 Presence	Disabled / Enabled

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

Boot Menu	
Floppy Check	Disabled / Enabled
Summary Screen	Disabled / Enabled

Boot - Device Priority	
Boot Priority 1	Diskette Drive / <other>
Boot Priority 2	Removable Devices / <other>
Boot Priority 3	Hard Drive / <other>
Boot Priority 4	ATAPI CD-ROM Drive / <other>
Boot Priority 5	Diagnostic Boot / <other>

Boot - Hard Drive
Drive 1
Bootable ISA Cards
Additional Entries

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

SCSI*Select* Utility Worksheets

SCSI Bus Interface Definitions	
Host Adapter SCSI ID	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
SCSI Parity Checking	Enabled / Disabled
Host Adapter SCSI Termination	Low ON/High ON Low OFF/High OFF Low OFF/High ON

Boot Device Options
Boot Device, Target ID
Boot Device, Boot LUN Number

SCSI Device Configuration			
Device ID #0		**Device ID #1**	
Initiate Sync Negotiation	Yes / No	Initiate Sync Negotiation	Yes / No
Maximum Sync Transfer Rate	20 16 13.4 10	Maximum Sync Transfer Rate	20 16 13.4 10
Enable Disconnection	Yes / No	Enable Disconnection	Yes / No
Initiate Wide Negotiation	Yes / No	Initiate Wide Negotiation	Yes / No
Send Start Unit Command	Yes / No	Send Start Unit Command	Yes / No
Device ID #2		**Device ID #3**	
Initiate Sync Negotiation	Yes / No	Initiate Sync Negotiation	Yes / No
Maximum Sync Transfer Rate	20 16 13.4 10	Maximum Sync Transfer Rate	20 16 13.4 10
Enable Disconnection	Yes / No	Enable Disconnection	Yes / No
Initiate Wide Negotiation	Yes / No	Initiate Wide Negotiation	Yes / No
Send Start Unit Command	Yes / No	Send Start Unit Command	Yes / No
Device ID #4		**Device ID #5**	
Initiate Sync Negotiation	Yes / No	Initiate Sync Negotiation	Yes / No
Maximum Sync Transfer Rate	20 16 13.4 10	Maximum Sync Transfer Rate	20 16 13.4 10
Enable Disconnection	Yes / No	Enable Disconnection	Yes / No
Initiate Wide Negotiation	Yes / No	Initiate Wide Negotiation	Yes / No
Send Start Unit Command	Yes / No	Send Start Unit Command	Yes / No
Device ID #6		**Device ID #7**	
Initiate Sync Negotiation	Yes / No	Initiate Sync Negotiation	Yes / No
Maximum Sync Transfer Rate	20 16 13.4 10	Maximum Sync Transfer Rate	20 16 13.4 10
Enable Disconnection	Yes / No	Enable Disconnection	Yes / No
Initiate Wide Negotiation	Yes / No	Initiate Wide Negotiation	Yes / No
Send Start Unit Command	Yes / No	Send Start Unit Command	Yes / No
Device ID #8		**Device ID #9**	
Initiate Sync Negotiation	Yes / No	Initiate Sync Negotiation	Yes / No
Maximum Sync Transfer Rate	20 16 13.4 10	Maximum Sync Transfer Rate	20 16 13.4 10
Enable Disconnection	Yes / No	Enable Disconnection	Yes / No
Initiate Wide Negotiation	Yes / No	Initiate Wide Negotiation	Yes / No
Send Start Unit Command	Yes / No	Send Start Unit Command	Yes / No

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

SCSI Advanced Configuration Options	
Host Adapter BIOS (Configuration Utility Reserves BIOS Space)	Enabled / Disabled
Support Removable Disks Under BIOS as Fixed Disks	Boot Only / All Disks / Disabled
Extended BIOS Translation for DOS Drives greater than 1 GB	Enabled / Disabled
Display <Ctrl-A> Message During BIOS Initialization	Enabled / Disabled
Multiple LUN Support	Enabled / Disabled
BIOS Support for Bootable CD-ROM	Enabled / Disabled
BIOS Support for Int13 Extensions	Enabled / Disabled
Support for Ultra SCSI Speed	Enabled / Disabled

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