

The Space-Saving Office PC

POWERMATE® ES SLIMLINE SERIES

**S E R V I C E A N D R E F E R E N C E
M A N U A L**

NEC

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Preface

This manual contains technical information for servicing and repairing the NEC PowerMate® ES SlimLine Series systems manufactured by NEC Computers Inc. Use this manual for NEC PowerMate ES SlimLine Series computers assembled in Europe. Check the regulatory sticker at the rear of the system to find the assembly location for the computer.

The manual contains hardware and interface information for users who need an overview of system design. The manual includes system setup information, disassembly procedures, and an illustrated parts list. The manual is prepared for NECC-trained customer engineers and service center personnel.

The manual is organized as follows.

Section 1 — System Overview, provides an overview of system features and includes brief descriptions of system components.

Section 2 — System Configuration, includes information on system IRQs, jumpers, and BIOS. The section also contains information on power management features and system utilities, including the BIOS FLASH Utility and PowerMate Product Recovery Program.

Section 3 — Disassembly and Reassembly, provides system disassembly and reassembly procedures. Each procedure is supported by disassembly illustrations.

Section 4 — System Boards, includes information on system board and riser board cable and board connector locations, jumper settings, and upgrade sockets. Also provided is information on board components.

Section 5 — Illustrated Parts Breakdown, includes an exploded view diagram (illustrated parts breakdown) and a parts list for field-replaceable parts.

Section 6 — Preventive Maintenance, provides recommended maintenance information for maintaining the system in top condition.

Section 7 — Troubleshooting, includes information for solving possible system problems and their solutions.

Section 8 — NECC Information Services, lists telephone numbers for obtaining service. The section also includes information on NECC technical support and the NECC website.

Section 9 — Specifications, provides specifications for the major components in the system, including the system board, power supply, diskette drive, hard drive, and CD-ROM drive.

Abbreviations

A	ampere	DMI	Desktop Management Interface
AC	alternating current	DOS	disk operating system
ACK	acknowledge	DPI	dots per inch
AGP	accelerated graphics port	DRAM	dynamic RAM
ASIC	application-specific integrated circuit	DVD	digital versatile disc
AT	advanced technology (IBM PC)	ECC	error checking and correction
ATA	AT attachment	ECP	extended capabilities port
ATAPI	AT attachment packet interface	EDO	extended data output
ATM	asynchronous transfer mode	EGA	Enhanced Graphics Adapter
BBS	Bulletin Board Service	EISA	enhanced ISA
BCD	binary-coded decimal	email	electronic mail
BCU	BIOS Customized Utility	EMI	electromagnetic interference
BIOS	basic input/output system	EPP	enhanced parallel port
bit	binary digit	EPROM	erasable and programmable ROM
BUU	BIOS Upgrade Utility	ESD	electrostatic discharge
bpi	bits per inch	EVGA	Enhanced Video Graphics Array
bps	bits per second	F	Fahrenheit
C	capacitance	FAX	facsimile transmission
C	centigrade	FCC	Federal Communications Commission
Cache	high-speed buffer storage	FG	frame ground
CAM	constantly addressable memory	FM	frequency modulation
CAS	column address strobe	FP	fast page
CD-ROM	compact disk-ROM	FRU	field-replaceable unit
CH	channel	FSB	front side bus
clk	clock	ftp	file transfer protocol
cm	centimeter	GB	gigabyte
CMOS	complementary metal oxide semiconductor	GND	ground
COM	communication	HEX	hexadecimal
CONT	contrast	HGA	Hercules Graphics Adapter
CPGA	ceramic pin grid array	Hz	hertz
CPU	central processing unit	IC	integrated circuit
DAC	digital-to-analog converter	ID	identification
DACK	DMA acknowledge	IDE	intelligent device electronics
dB	decibels	IDTR	interrupt descriptor table register
DC	direct current	in.	inch
DCC	direct cable connection	INTA	interrupt acknowledge
DCE	data communications equipment	I/O	input/output
DDC	Display Data Channel	IPB	illustrated parts breakdown
DIMM	Dual In-Line Memory Module	IPC	integrated peripheral controller
DIP	dual in-line package	ips	inches per second
DMA	direct memory access	IR	infrared
DMAC	DMA controller	IrDA	Infrared Data Association
		IRR	Interrupt Request register

ISA	Industry Standard Architecture	PPI	programmable peripheral interface
ISP	internet service provider	PROM	programmable ROM
IRQ	interrupt request	PS/2	personal system/2
K	kilo (1024)	QFP	quad flat pack
k	kilo (1000)	R	read
KB	kilobyte	RAM	random-access memory
kg	kilogram	RAMDAC	RAM digital-to-analog converter
kHz	kilohertz	RAS	row address strobe
lb	pound	RGB	red green blue
LAN	local area network	RGBI	red green blue intensity
LED	light-emitting diode	rms	root mean square
LDCM	LANDesk Client Manager	ROM	read-only memory
LSB	least-significant bit	rpm	revolutions per minute
LSI	large-scale integration	RTC	real-time clock
M	mega (million)	R/W	read/write
mA	milliamps	S	slave
max	maximum	SCSI	Small Computer System Interface
MB	megabyte	SDRAM	synchronous dynamic random access memory
MFM	modified frequency modulation	S.E.C.	single edge contact cartridge
MHz	megahertz	SG	signal ground
MIDI	musical instrument digital interface	SGRAM	synchronous graphics random access memory
mm	millimeter	SIMM	single inline memory module
MMX	multimedia extensions	SMART	Self-Monitoring, Analysis and Reporting Technology
modem	modulator/demodulator	S/N	signal to noise ratio
MOS	metal-oxide semiconductor	SNMP	simple network management protocol
MPEG	Motion Picture Experts Group	SPM	standard page mode
ms	millisecond	SRAM	static random access memory
MSB	most-significant bit	SRS	Sound Retrieval System
NC	not connected	SSI	small scale integration
NIC	networked information center	SVGA	Super Video Graphics Array
NMI	Non-maskable Interrupt	SW	switch
ns	nanosecond	T&D	test and diagnostics
OCR	optical character recognition	TSC	Technical Support Center
OS	operating system	TTL	transistor/transistor logic
PAL	programmable array logic	tpi	tracks per inch
PC	personal computer	UART	universal asynchronous receiver/transmitter
PCB	printed circuit board	UHF	ultra high frequency
PCI	Peripheral Component Interconnect	UL	Underwriter's Laboratories
PDA	personal digital assistant	UMA	unified memory architecture
PFP	plastic flat package	UPS	uninterruptible power supply
PIO	parallel input/output	URL	uniform resource locator
pixel	picture element	USB	universal serial bus
PLCC	plastic leaded chip carrier	V	volt
PLL	phase lock loop		
POST	Power-On Self-Test		
p-p	peak-to-peak		

Vac	volts, alternating current
VCR	video cassette recorder
Vdc	volts, direct current
VDT	video display terminal
VESA	video electronics standards association
VFC	VESA-compliant feature connector
VGA	Video Graphics Array
VHF	very high frequency
VLSI	very large scale integration
VRAM	video RAM
W	watt
WAN	wide area network
WRAM	Windows RAM
W	write
www	world wide web

1

System Overview

- Configurations
- Features
- Components

This section provides an overview of the NEC PowerMate® ES SlimLine Series system. Included are descriptions of the system's

- hardware configuration
- front, back, and inside features
- software features
- security features
- major components.

The system can be configured as a slimtower or as a desktop to suit the user's requirements.

Configuration

The NEC PowerMate ES SlimLine Series systems are built-to-order systems for commercial offices. System features include an Intel® Celeron™ or Pentium® III processor, two dual inline memory module (DIMM) sockets, synchronous dynamic random access memory (SDRAM), a plug and play input/output (I/O) controller, and a built-in local area network (LAN).

The system also features two universal serial bus (USB) ports, one serial port, and a parallel port. Ultra direct memory access (DMA), remote wakeup ("Wake-On LAN"), accelerated graphics port (AGP), and power management are supported.

Build choices include enhanced intelligent device electronics (EIDE) hard drives ranging from 10 gigabytes (GB) to 30 GB or higher. All drives feature Ultra DMA/66 and Self-Monitoring, Analysis and Reporting Technology (SMART).

System memory is provided in 64-megabyte (MB) (minimum), 128-MB, or 256-MB DIMM modules. Memory configurations range from 64 MB to 512 MB.

The following table summarizes the PowerMate ES SlimLine Series system configuration.

PowerMate ES SlimLine Series System Configuration

Component	Description
System Board	Micro-Star International MS-6303 with onboard LAN
Processor*	Celeron: 500-MHz or higher, 66-MHz or higher Front Side Bus (FSB) Pentium III: 533-MHz or higher, 100-MHz or higher FSB
L1 Cache	Celeron: 32-KB SRAM integrated on processor Pentium III: 32-KB SRAM integrated on processor
L2 Cache	Celeron: 128-KB Pipeline Burst SRAM Pentium III: 256-KB Pipeline Burst SRAM
Processor Mount	Socket 370
System RAM*	64-MB (minimum) to 512-MB of PC100 SDRAM in 2 DIMM sockets
Chip Set	Intel 810E with 82810E Graphics Memory Controller Hub, 82801 I/O Controller Hub, 82802 Firmware Hub, Dynamic Video Memory Technology (DVMT), Audio-Codec 97 Controller, and System Manageability Bus
Winbond Super I/O Controller	I/O controller for parallel, serial, keyboard, mouse, hardware monitor, diskette drive

PowerMate ES SlimLine Series System Configuration

Component	Description
Hard Drive*	10-GB or higher, 5400 rpm or higher: EIDE, Ultra DMA/66, with SMART technology
AGP	Direct AGP integrated on system board
Graphics Memory	Shared with system memory (DVMT)
Audio	Audio-Codec (AC) 97 controller integrated on 810E chipset
Diskette Drive	Notebook type, 3.5-inch 1.44-MB
Power Supply	106-watt
Keyboard	Windows 95-enhanced, PS/2 [®] -compatible
Mouse	PS/2-compatible, 3D button wheel
CD-ROM Drive*	40X or higher CD-ROM drive
DVD-ROM Drive*	8X or higher DVD-ROM
Riser Board	Supports up to three PCI expansion boards
LAN Board*	Intel Ethernet PRO 100+ WOL (PCI) Accton Ethernet TX4 with or without WOL (PCI) 3COM [®] Ethernet Combo 30900B (PCI)
Speaker Set*	10-watt, with AC power adapter

* Built-to-order component

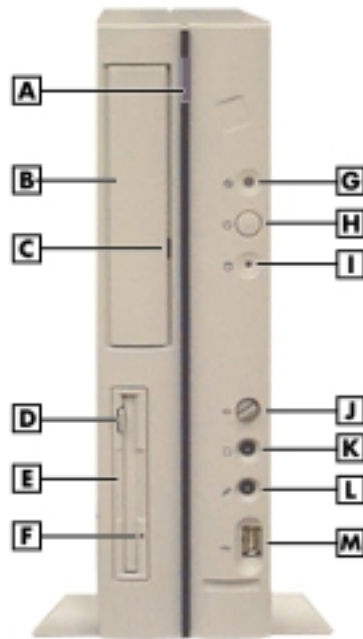
Features

The system front, back, and inside features are described in the following paragraphs. Also included are descriptions of system software and security features.

Front Features

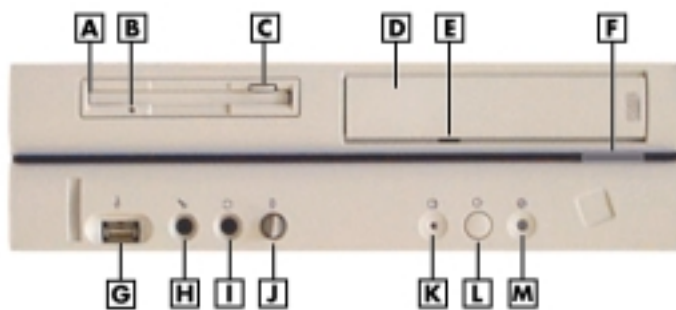
The PowerMate ES SlimLine system can be used as a slimtower or as a desktop. The following figures show the features on the front of the system for both setups. Brief descriptions of the features follow the figure.

PowerMate ES SlimLine Series Slimtower Front Features



- | | |
|---|-------------------------------------|
| A – CD-ROM Tray Open/Close Button | H – Power/Sleep Button |
| B – CD-ROM Drive | I – Hard Drive Activity Lamp |
| C – CD-ROM Drive Activity Lamp | J – Volume Control |
| D – Diskette Drive Disk Eject Button | K – Headphone Jack |
| E – Diskette Drive | L – Microphone Jack |
| F – Diskette Drive Activity Lamp | M – USB Port |
| G – Power/Sleep Lamp | |


PowerMate ES SlimLine Series Desktop Front Features



- | | |
|---|-------------------------------------|
| A – Diskette Drive | H – Microphone Jack |
| B – Diskette Drive Activity Lamp | I – Headphone Jack |
| C – Diskette Drive Disk Eject Button | J – Volume Control |
| D – CD-ROM Drive | K – Hard Drive Activity Lamp |
| E – CD-ROM Drive Activity Lamp | L – Power/Sleep Button |
| F – CD-ROM Tray Open/Close Button | M – Power/Sleep Lamp |
| G – USB Port | |

The system has the following devices, controls, and lamps at the front of the system (see the previous figures for device, control, and lamp locations).

- Power/sleep button — press this button to turn on system power. To turn off power, close all applications and shut down Windows®; Windows 98 and Windows 2000 automatically power down the system. For Windows NT, close all applications, shut down Windows NT, and press in the power button until the system powers down (approximately four seconds).

 **CAUTION** Do not turn off the system power until you have closed all applications and Windows or you may possibly lose data.

Press and immediately release the power button to suspend system operation and go into the power saving mode. If a VESA-compliant monitor is in use, the monitor also goes into a power-saving mode.

Press any key or move the mouse to exit the power saving mode and resume system operation.

- Power/sleep lamp — indicates if system power is on or off. Also indicates if the system is operating in a power saving mode.

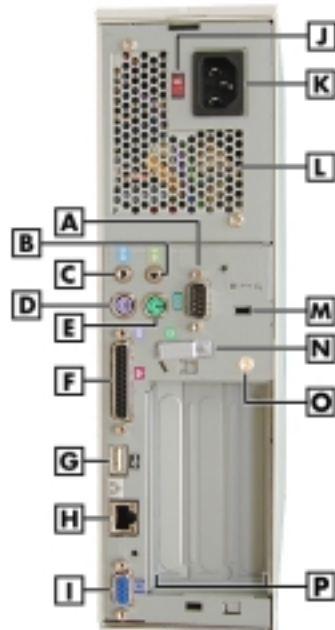
A steady green lamp indicates that power is on. An amber lamp indicates that the system is in sleep mode with full power reduction.
- Hard drive lamp — when blinking, indicates that the hard drive is active. A blinking lamp indicates that the hard drive is reading or writing data.
- CD-ROM drive — use to load and start programs from a compact disc (CD) and play audio CDs. Controls and indicators include a CD tray open button and drive activity lamp. Controls for an optional DVD-ROM drive are similar.
- Diskette drive — copy data files to and from a diskette or use as a bootable drive for loading and starting programs from a diskette. Controls and indicators include a diskette eject button and drive activity lamp.
- USB port — use this port to connect up to 127 universal serial bus (USB) devices without opening the system. A second port is on the rear of the system.
- Microphone jack — use this jack to connect an optional microphone for recording audio information in data files.
- Headphone jack — use this jack to connect an optional headphone. Plugging in the headphone disables the optional speaker set (if installed).
- Volume control — use this control to adjust the volume of an optional headphone.

Rear Features

The rear of the system contains external connectors and ports, power socket, voltage switch, expansion board slots, and security features (see “Security Features” later in this section).

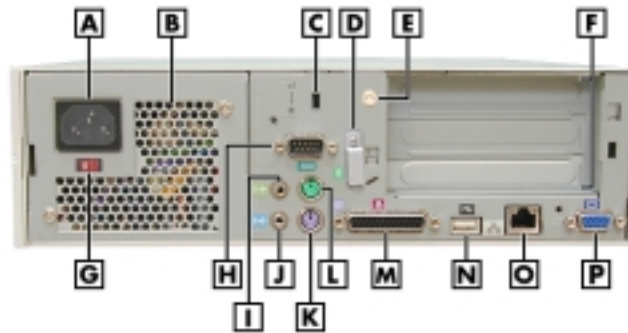
The following figures show slimtower and desktop features. Brief descriptions of each item follow the figure.

PowerMate ES SlimLine Series Slimtower Rear Features



- | | |
|-------------------|---------------------------------------|
| A – Serial Port | I – VGA Port |
| B – Line Out Jack | J – Voltage Switch |
| C – Line In Jack | K – AC Power Connector |
| D – Keyboard Port | L – Power Supply |
| E – Mouse Port | M – Kensington Lock Slot |
| F – Parallel Port | N – Keyboard/Mouse Anti-theft Bracket |
| G – USB Port | O – Anti-theft Ring |
| H – LAN Port | P – Expansion Slots (3) |

PowerMate ES SlimLine Series Desktop Rear Features



- | | |
|---------------------------------------|-------------------|
| A – AC Power Connector | I – Line Out Jack |
| B – Power Supply | J – Line In Jack |
| C – Kensington Lock Slot | K – Keyboard Port |
| D – Keyboard/Mouse Anti-theft Bracket | L – Mouse Port |
| E – Anti-theft Ring | M – Parallel Port |
| F – Expansion Slots (3) | N – USB Port |
| G – Voltage Switch | O – LAN Port |
| H – Serial Port | P – VGA Port |

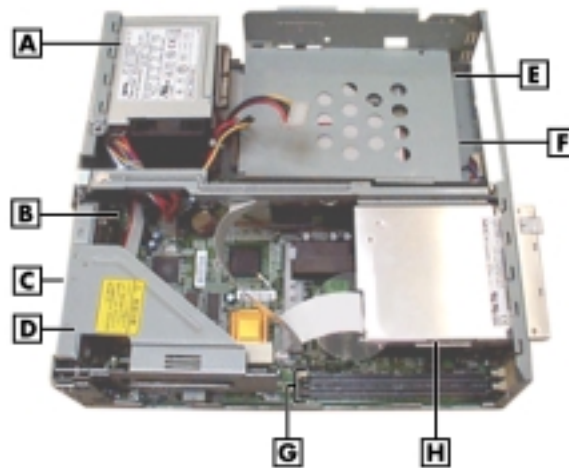
The rear of the system has the following external ports, connectors, jacks, voltage switch, and expansion slots.

- Keyboard port — attach a PS/2-compatible keyboard (101-key or 102-key) with a 6-pin mini DIN connector to this port.
- Mouse port — attach a PS/2-compatible mouse to this port.
- Printer port — attach a parallel printer with a 25-pin connector to this port.
- USB port — use the USB port to connect up to 127 USB configured peripheral devices such as a printer, monitor, modem, mouse, and scanner. A second USB port is on the front of the system.
- Serial port — Serial port 1 (COM1) allows connection of serial devices with 9-pin connectors. The devices include a pointing device, serial printer, or modem.
- LAN port — use this RJ-45 compatible port to attach a network cable to the system's onboard LAN.
- VGA monitor connector — attach a video graphics array (VGA)-compatible monitor (NEC MultiSync® monitor or other VGA-compatible monitor) with a 15-pin connector to this connector.
- Line in jack — use this jack to connect a stereo audio device such as a stereo amplifier, cassette, or minidisc player for playback or recording.
- Line out jack — use this jack to connect the optional speaker set. Also use to connect an amplified output device such as powered speakers, stereo tape recorder, or an external amplifier for audio output.
- Voltage switch — use this switch to set the voltage for the system at 115 Vac or 230 Vac.
- Expansion board slots — use these slots to install up to three optional PCI boards (for example, graphics, fax/modem, sound boards).

Inside Features

The following figure shows the interior of the system and its major areas. A list of features follow the figure.

Inside the System



A – Power Supply
B – System Board
C – Expansion Slots
D – Riser Board Bracket

E – Hard Drive (under support plate)
F – CD-ROM Drive (not shown)
G – DIMM Memory Sockets
H – Diskette Drive

The inside of the system has the following features:

- system board with a Celeron or Pentium processor, two DIMM memory sockets, two IDE connectors, diskette drive connector, riser board connector, and internal signal and power connectors
- one accessible 5 1/4-inch slot for the CD-ROM drive or DVD-ROM drive
- one accessible 3 1/2-inch slot for the 1.44-MB diskette drive
- one 3 1/2-inch internal device bay for the hard drive
- 106-watt power supply.

For more information on the above features, see “Components” in this section.

Software Features

NECC provides a variety of applications and hardware utilities with the system to let you take advantage of the system hardware capabilities.

Preloaded Software

The system comes preloaded with the Microsoft® Windows® 98 operating system or the Windows 2000/Windows NT® operating system configuration.

If you have a Windows 2000/Windows NT configuration, you must choose the operating system you want to load. The operating system you choose is your only operating system and is the one that the Product Recovery Program restores.

NECC-provided applications, drivers, and utilities come loaded on the hard drive. You can install some of the applications from icons on the Windows desktop. Software available on the system includes the following applications:

- Microsoft Internet Explorer
Internet Explorer provides a top-notch browser with preloaded links for easy access to the world wide web. Also use Internet Explorer to access one of the many new browser-based utilities.
- Norton AntiVirus™ 2000 Software
Protect the system from viruses by running Norton’s virus scan software.
- Adobe® Acrobat® Reader
Use the Adobe Acrobat Reader to read and print portable document format (PDF) files found on the Internet and PDF documents included with various software applications.
- Online Documentation
Get quick access to comprehensive information about your system in the online PowerMate SL User’s Guide. See “Online Documentation” in Section 2 for a description of the documentation and how to use it.
- Intel LANDesk® Client Manager
Use LANDesk software to track system information such as serial number, BIOS version, memory capacity, disk capacity, expansion board settings, and applications. Use LANDesk software for remote starts from a server computer using Wake-On LAN and remote boot.

NEC Product Recovery Program CD

The system comes with an NEC Product Recovery Program CD and bootable diskette. Should a problem occur that causes data loss or corruption, you can use the NEC Product Recovery Program CD to restore the system to its original factory state or you can restore just the operating system and drivers. A full system restore loads the operating system and all the factory-supplied software that comes on the hard drive. See “Product Recovery Program” in Section 2 for information about using the restore options.

NEC PowerMate Driver CD

Use the NEC PowerMate Driver CD to install drivers for NEC system options that are not part of the factory configuration. Also use the NEC PowerMate Driver CD to reinstall NECC-supplied software. See “PowerMate Driver CD” in Section 2 for information about installing drivers from the CD.

Security Features

The system has hardware, software, and mechanical security features that offer protection against unauthorized access to the system and data. The following security features are available.

Password Security

The BIOS Setup Utility includes a feature that allows a user to set either a user or supervisor password, or both.

The user password controls booting of the system and controls access to the Setup Utility and the keyboard. User access to the BIOS Setup Utility is limited when a supervisor password is set. The supervisor password allows full access to the system and the BIOS.

See Section 2, “System Configuration,” for further information on setting and using passwords.

Windows Network Security Features

The Windows Network Security feature is available through the Windows operating system. Check the Windows documentation for details.

Keyboard/mouse Anti-theft Bracket

The keyboard/mouse anti-theft bracket secures the keyboard and mouse cables to the system, making it difficult to remove the units

Security Lock Slot

The security lock slot accepts a Kensington Security Standard connector or other locking device. Secure the locking device to the lock slot and to an immovable object to protect the system from theft.

Anti-Theft Ring

Attaching and locking a padlock (not supplied) to the anti-theft ring prevents removal of the system cover, physically protecting the chassis from intrusion.

Components

The major system components are listed in the following table, along with the page number where each component is briefly described.

System Components

Component	Go to Page
System Board	1-10
System Memory	1-10
Riser Board	1-11
Diskette Drive	1-11
Hard Drive*	1-11
Power Supply	1-11
Keyboard	1-11
Mouse	1-12
AGP Graphics	1-12
CD-ROM Drive*	1-12
DVD-ROM Drive*	1-12
Speaker Set*	1-12
Onboard LAN	1-12
Network Board*	1-12

* Built-to-order component

System Board

The system board contains the Intel Celeron or Pentium III processor mounted in a Slot 370 socket, system DIMM memory mounted in up to two sockets, and an Intel 810E chipset. The chipset incorporates the 82810E Graphics Memory Controller Hub (GMCH), 82801 I/O Controller Hub (ICH), integrated Audio-Codec 97 Controller, 82802 Firmware Hub (FWH), and Dynamic Video Memory Technology (DVMT).

External connectors on the system board include one serial connector, a parallel connector, two USB ports, keyboard port, mouse port, LAN port, and external audio connectors.

The system board supports the standard 1.44-MB diskette drive, the standard IDE hard drive, and a CD-ROM drive or DVD-ROM drive.

For further information on the system board, see Section 4, "System Boards."

System Memory

The system supports up to 512 MB of high-speed memory in two DIMM sockets on the system board. Supported are 168-pin, 100-MHz SDRAM modules in 64-, 128-, and 256-MB unbuffered configurations.

The memory modules can be installed in one or two sockets, can vary in size between sockets, and can be single- and double-sided DIMMs.

Sample memory upgrade paths are given in the following table.

Sample DIMM Memory Upgrade Paths

Total Memory	DIMM 1	DIMM 2
64 MB (8 Mbit x 72)	64 MB	—
128 MB (16 Mbit x 72)	64 MB	64 MB
128 MB (16 Mbit x 72)	128 MB	—
256 MB (32 Mbit x 72)	128 MB	128 MB
256 MB (32 Mbit x 72)	256 MB	—
512 MB	256 MB	256 MB

Riser Board

All systems come with a riser board attached to a removable riser board bracket. The riser board has three PCI connectors for adding up to three optional expansion boards. The riser board plugs into the riser board connector on the system board.

For further information on the riser board, see Section 4, “System Boards.”

Diskette Drive

A single mobile-type diskette drive is supported in the system. The installed 1.44-MB, 3 1/2-inch diskette drive is connected to the system board by a two-connector ribbon cable. The cable contains both signal and power lines. There are no switches or jumpers to set.

Diskette drive specifications are given in Section 9, “Specifications.”

Hard Drive

All systems ship with one internal 3 1/2-inch EIDE hard drive installed inside the system, under the CD-ROM drive. Drives are available in 10-GB or higher Ultra DMA/66 models.

A two-connector Ultra DMA/66 cable connects the hard drive to the primary IDE channel on the system board. The drive is connected as the master device on the primary channel.

Hard drive jumper settings are given in Section 2, “System Configuration.” The location of the primary IDE connector on the system board is given in Section 4, “System Boards.” Hard drive specifications are given in Section 9, “Specifications.”

Power Supply

The 106-watt power supply is mounted inside the system unit. It supplies power to the system board, option boards, diskette drive, hard drive, CD-ROM drive, DVD-ROM drive (if installed), keyboard, mouse, and other internal options. A fan inside the power supply provides system cooling.

Power supply connector locations on the system board are given in Section 4, “System Board.” Power supply specifications are given in Section 9, “Specifications.”

Keyboard

The Windows enhanced PS/2-compatible keyboard is standard equipment for the system. The keyboard provides a numeric keypad, separate cursor control keys, 12 function keys, and is capable of up to 48 functions. Key status lamps on the keyboard include Num (Numeric) Lock, Caps (Capital) Lock, and Scroll Lock.

The keyboard’s six-pin connector plugs into the back of the system. Keyboard specifications are given in Section 9, “Specifications.”

Mouse

The system ships with a PS/2-compatible mouse as standard equipment. The mouse has a self-cleaning mechanism that prevents a buildup of dust or lint around the mouse ball and tracking mechanism.

The six-pin mouse cable connector plugs into the back of the system. Mouse specifications are given in Section 9, “Specifications.”

AGP Graphics

All systems come with Direct AGP integrated on the system board. Direct AGP provides advanced Motion Picture Experts Group (MPEG) capabilities, 3D and 2D graphics, and video accelerator for exceptional graphics and superior quality full-screen, full-motion video.

Included on the system board is a standard VGA output connector for connecting a VGA-compatible monitor to the AGP component.

Graphics modes are given in Section 2, “System Configuration.” Graphics board specifications are given in Section 9, “Specifications.”

CD-ROM Drive

All systems come standard with a 40X or higher CD-ROM drive. The drive features higher technology, affording faster data transfer and smoother animation and video. The CD-ROM drive comes with an Enhanced IDE (EIDE) interface. The drive is fully compatible with Kodak Multisession Photo CDs™, CD-I, FMV, and CD Plus, as well as standard CDs. The CD-ROM drive also plays audio CDs.

CD-ROM jumper settings are included in Section 2, “System Configuration.” Specifications for the CD-ROM drive are given in Section 9, “System Specifications.”

DVD-ROM Drive

Some systems might come with an 8X or higher DVD-ROM drive instead of a CD-ROM drive. The drive offers many improvements over the standard CD-ROM, including superior video and audio playback, faster data access, and greater storage capabilities.

DVD-ROM jumper settings are included in Section 2, “System Configuration.” Specifications for the DVD-ROM drive are given in Section 9, “System Specifications.”

Speaker Set

When ordered, two high-quality 10-watt stereo speakers come with the system. An AC adapter and connecting cables come with the speakers. One speaker has a power on/off/volume control. Volume can also be controlled by the Windows sound software. The speakers connect to the speaker line out jack at the rear of the system.

Speaker specifications are given in Section 9, “Specifications.”

Onboard LAN

Integrated on the system board is a 3COM 3C905C 10/100 LAN chipset. The chipset supports Remote Wake-up and Ethernet IEE 802.3.

The LAN chipset is ported out to the RJ-45 LAN port on the rear of the system. Use this port for connecting the system to an Ethernet LAN.

Network Board

Some systems might come with an optional 10/100 network board installed in a PCI slot.

2

System Configuration

- Interrupt Requests
- Jumper Settings
- BIOS Setup Utility
- FLASH Utility
- Online Documentation
- Product Recovery Program
- PowerMate Driver CD
- Intel Processor Serial Number Control Utility

This section provides information for configuring the system. The section includes:

- system interrupt request (IRQ) assignments
- system jumper settings
- procedures for using the American Megatrends Inc. (AMI) BIOS Setup Utility to configure the system
- descriptions and procedures for using the following utilities and applications
 - FLASH Utility
 - Online Documentation
 - Product Recovery Program
 - PowerMate Driver CD
 - Intel Processor Serial Number Control Utility.

Interrupt Requests

The following paragraphs list the system interrupts (IRQs), parallel interrupts, and serial interrupts. See Section 4, “System Boards,” for parallel and serial addresses.

System Interrupts

The system has 16 IRQs (IRQ 0 through 15) assigned to different devices (for example, printer, keyboard, mouse). Initial IRQ settings are assigned at the factory, with settings dependent on the installed device(s). Several IRQs are unassigned for the installation of add-on devices. See “BIOS Setup Utility” in this section for information on using the utility to assign or change the interrupts.

The following table lists the IRQ settings. Assignments 0 through 15 are in order of decreasing priority.

Interrupt Level Assignments*

Interrupt Priority	Interrupt Device
NMI	I/O Channel Check
IRQ00	System Timer
IRQ01	Keyboard
IRQ02	Programmable Interrupt Controller
IRQ03	User Available
IRQ04	COM1
IRQ05	User Available
IRQ06	Diskette Drive Controller
IRQ07	Parallel Port 1
IRQ08	Real-Time Clock
IRQ09	Shared Resource: ACPI IRQ Holder for PCI IRQ Steering/Intel 810e Chip Set Graphics Driver

Interrupt Level Assignments*

Interrupt Priority	Interrupt Device
IRQ10	Shared Resource: ACPI IRQ Holder for PCI IRQ Steering/Intel 82801AA USB Universal Host Controller/3COM 3C920 Controller
IRQ11	Shared Resource: ACPI IRQ Holder for PCI IRQ Steering/SCI IRQ used by ACPI Bus/Intel 82801AA AC'97 Audio Controller-Sigma Tel Codec/82801AA SMBus Controller
IRQ12	WheelMouse (PS/2)
IRQ13	Numeric Data Processor
IRQ14	Primary IDE Controller/Intel 82801AA Bus Master IDE Controller
IRQ15	Secondary IDE Controller/Intel 82801AA Bus Master IDE Controller

* IRQ settings may vary, depending on system configuration.

Parallel Port Interrupts

The parallel port I/O interrupts are given in the following table. The table lists all of the possible configurations but the port only uses one set.

Parallel Port Interrupts

Port	Interrupt
LPT1	IRQ05
LPT2	IRQ05
LPT3	IRQ05
LPT1	IRQ07
LPT2	IRQ07
LPT3	IRQ07

Serial Port Interrupts

The interrupts for serial port 1 are given in the following table. The table lists all of the possible configurations but the port only uses one set. The interrupts used for the port are not available for ISA parallel ports. Also, if the serial port shares an interrupt, verify that hardware and software added to the system can share these interrupts without problems.

Serial Port Interrupts

Port	Interrupt
COM1	IRQ04
COM2	IRQ03
COM3	IRQ04
COM4	IRQ03
COM1	IRQ03
COM2	IRQ04
COM3	IRQ03
COM4	IRQ04

Jumper Settings

Jumpers on the boards and devices in the system are used to set the system configuration. Boards and devices using jumpers include:

- system board
- hard drive
- CD-ROM drive.

The following paragraphs list the jumpers and their factory settings.

System Board Jumper Settings

System board jumpers allow configuration of the system for particular system requirements. Some conditions that might require changing jumper settings include the following situations:

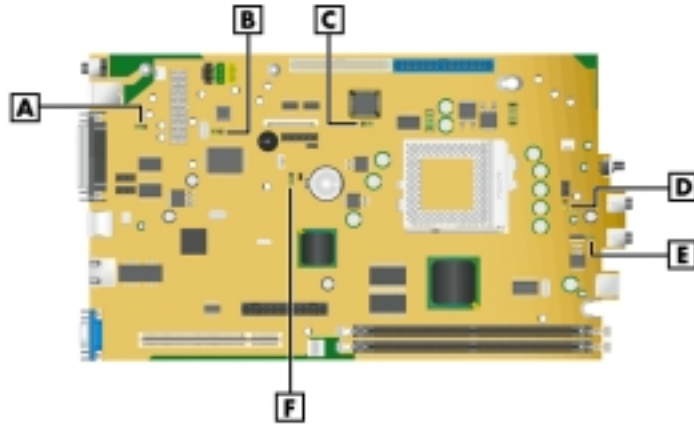
- Adding a sound board to the system
- Restoring the CMOS settings to the factory state
- Recovering a corrupted BIOS.

Use the following figures to locate the jumpers on the system board and to check their factory settings. Procedures for setting the jumpers are included in Section 4. Specifications for the system board are included in Section 9.




CAUTION Jumpers are set correctly at the factory for the system configuration. Only change or check the appropriate jumper settings. Otherwise, keep the jumpers at their factory settings.













System Board Jumper Locations



- | | |
|------------------------------------|------------------------------------|
| A – Keyboard Wakeup (JKBV1) | D – CPU Type (J23) |
| B – Onboard Audio (JP3) | E – Save-to-RAM (STR) (JP4) |
| C – BIOS Recovery (J4) | F – Clear CMOS (JBAT1) |

 **CAUTION** To prevent damage to the system board, do not set jumpers while power is on.

System Board Jumper Settings

Keyboard Wakeup		Factory setting. Wakes up the system from Suspend to RAM mode via the keyboard. Requires Windows 98 running in Advanced Configuration Power Interface (ACPI) mode.
		Normal operation. Disables Keyboard Wakeup.
Onboard Audio		Factory setting. Enables onboard audio.
		Disables onboard audio. Use this setting if you install a sound card.
CMOS Clear		Factory setting. Maintains system board configuration in CMOS RAM with onboard battery.
		Clears CMOS while system power is off. Return jumper to pins 1 and 2 before powering system on.
Caution: To prevent damage to the system board, avoid clearing CMOS while power is on.		
BIOS Recovery		Factory setting. Sets the system for normal operation. The BIOS uses current configuration information and passwords at power on.
		To enable BIOS recovery for a corrupted system, remove the jumper. Wait 10 seconds. Replace the jumper on pins 1 and 2.
		Restores Safe BIOS settings as the default BIOS settings and loads the BIOS Setup at power on.
CPU Type		Factory setting. Uses an Intel® CPU.
		Uses a Cyrix® CPU.
Save to RAM		Factory setting. Enables the Save to RAM function.
		Disables the Save to RAM function.

Maxtor EIDE Hard Drive Jumper Settings

The factory settings for the jumpers on the Maxtor EIDE hard drive are shown in the following table. The settings are for a single hard drive installed in the system as the master device on the primary channel. Specifications for the hard drive are included in Section 9.

Maxtor EIDE Hard Drive Jumper Settings

Function	Jumper Pins	Description
Master Device	J50-1, J50-2 J48-2, J46-2	Sets hard drive as master device in single drive system. Factory setting: pins J50 pins 1 and 2 jumpered; J48 pin 2 and J46 pin 2 jumpered.
Slave Device		Sets hard drive as slave. Not used.
Cable Select (CSEL)		Not used.
Cylinder Limitation		Not used.

Quantum EIDE Hard Drive Jumper Settings

The factory settings for the jumpers on the Quantum EIDE hard drive are shown in the following table. The settings are for a single hard drive installed in the system as a master device on the primary channel. Specifications for the hard drive are included in Section 9.

Quantum EIDE Hard Drive Jumper Settings

Function	Jumper Pins	Description
Master Device (DS)	Jumpered	Sets hard drive as master device in single drive system. Factory setting: DS pins jumpered.
Slave Device	Open	Sets hard drive as slave.
Cable Select (CS)		Not used.
Park (PK)		Use these pins to "park" a jumper not in use.

CD-ROM Drive Jumper Settings

The type of switch or jumpers and the settings for the CD-ROM drive depend on the manufacturer's model. The factory setting is for the CD-ROM drive installed as the master device on the secondary channel. Specifications for the CD-ROM drive are included in Section 9.

BIOS Setup Utility

The AMI BIOS Setup Utility program is used to configure the main components of the system.

The system ships from the factory with the correct system parameters for the configuration. Unless optional hardware is added, it's not necessary to run the BIOS Setup Utility to operate the system. However, the Setup Utility should be run to set features that customize the system, such as security features.

NECC recommends that the current BIOS Setup parameters be printed out or written down and the information stored in a safe place. This lets you restore the system to the current parameters if you replace the battery (see "CMOS Battery Removal" in Section 3).

How to Start BIOS Setup

Start the BIOS Setup Utility as follows.

1. Turn on or reboot the system.
2. Press **F2** as soon as you see the following message at the bottom of the NEC startup screen.

<F2> for Setup

You have about five seconds to press **F2** before the system boot continues.

3. The Setup Main Menu appears.

How to Use Setup

The Setup Utility has a Main Menu window and four top-level menus with submenus. The menu bar at the top of the Main Menu window lists the following top-level menus.

- **Main** — Use the Main Menu for basic system configuration. For example, select Main to set the system date, set diskette and hard disk parameters, or set the hard drive auto-detect feature.
- **Advanced** — Use the Advanced Menu to set up the system for advanced CMOS, advanced chipset, power management, Plug and Play, serial and parallel peripherals, and hardware monitor.
- **Security** — Use this menu to set User and Supervisor Passwords and keyboard wake-up password.
- **Exit** — Exits the Setup Utility with various save or discard options.

Use the keys listed in the legend bar on the bottom of the menu screen to make selections or exit the current menu. The following table describes the legend keys.

Navigation Keys

Key	Function
Esc	Exits the menu.
Enter	Executes Command or brings up a submenu.
F5	Loads the Default Configuration values for this menu.
F6	Selects the Original Values for the field.
F10	Saves changes and Exits the BIOS Setup Utility.
Up or down arrow keys	Moves cursor up and down in the menu.
Left or right arrow keys	Selects next menu.

To select one of the four menus from the menu bar, use the left and right arrow keys. Use the up or down arrow keys to select an item under the menu.

Menu items preceded by a > contain a submenu of selectable fields for setting system parameters. Display a submenu by using the up or down arrow keys to move the cursor to the desired submenu, then press **Enter**.

An Item Specific Help window on the right side of each menu displays the help text for the currently selected Setup option. It updates as the cursor moves to each new field.

Pressing **F1** on any menu brings up the General Help window that describes the legend keys and their functions.

Press **Esc** to exit the current window.

The following subsections describe the four top level menus and their submenus.

Main Menu

Choose the Main Menu by selecting Main in the legend bar on the Main Menu screen. Other Main Menu options are available by selecting submenu.

Use the arrow keys to select one of the Main Menu options and press **Enter** to select a submenu. Items with grayed-out text are not available. Explanations of each Main Menu item are given in the following table.

The following BIOS settings are typical and may vary between system configurations. You should record the system's BIOS settings and save in a safe place in case you need to restore or update the BIOS.



CAUTION Setting items on this menu to incorrect values can cause the system to malfunction.

Main Menu Items

Menu Item	Settings (default is bold)
System Date	<p>Set system date in this field. Press Tab or Enter to move between month, date, and year fields.</p> <p>Example: 04/28/2000</p>
System Time	<p>Set system time in this field. Press Tab or Enter to move between hour, minute, and second fields.</p> <p>Example: 09:30:50</p>
Floppy Drive A	<p>Not Installed 360 KB 5 1/4" 1.2 MB 5 1/4" 720 KB 3 1/2" 1.44 MB 3 1/2" 2.88 MB 3 1/2"</p>
Floppy Drive B	<p>Not Installed 360 KB 5 1/4" 1.2 MB 5 1/4" 720 KB 3 1/2" 1.44 MB 3 1/2" 2.88 MB 3 1/2"</p>
Primary IDE Master Primary IDE Slave Secondary IDE Master Secondary IDE Slave	<p>Auto Auto Auto Auto</p> <p>Each device menu item displays the hard drive or CD-ROM identifier if a device is installed.</p> <p>If you install a hard drive that does not feature auto IDE type detection or your IDE hard drive was formatted on another system with parameters different from those reported by the drive, enter a parameter for each of the fields in the device submenu.</p> <p>Bring up a device submenu by pressing Enter. The submenus include IDE Device Configuration and, depending on device selection, Fast Programmed I/O Mode, 32 Bit Transfer Mode, LBA Mode, and Block Mode. Each is briefly described in the following.</p>
IDE Device Configuration	<p>Auto, User, CD-ROM, Floptical, Not Installed, 1-46</p> <p>When set to Auto, the BIOS sets the correct values for the device. Selecting User allows you to configure the BIOS for the device selected. The Not Installed setting indicates that there is no IDE device present in the system.</p> <p>Depending on the option selected, one of the following submenus displays.</p>

Main Menu Items


Menu Item	Settings (default is bold)
LBA Mode	On , Off When On is selected, it causes logical block addressing to be used in place of cylinders, heads, and sectors.
Block Mode	On , Off When On is selected, it allows block mode data transfers.
Fast Programmed I/O Modes	Auto, 0 -5 Use these settings to configure the Advanced PIO Mode.
32 Bit Transfer Mode	On , Off When On, allows 32 bit IDE data transfers. Should only be On if supported by a chipset controller.
Auto Detect Hard Drives	Press Enter Auto detects all hard drive parameters.
CPU Speed	xxx MHz Not selectable, display only.
Front Side Bus Speed	xxx MHz Not selectable, display only.
Memory Size	xxx MHz Not selectable, display only.
BIOS Version	A6303P2 V1.0

Advanced Menu

Choose the Advanced Menu by selecting Advanced in the legend bar on the Main Menu screen. Advanced Menu options include:

- Advanced CMOS Setup
- Advanced Chipset Setup
- Power Management Setup
- Plug and Play Setup
- Peripheral Setup
- Hardware Monitor Setup.

Use the arrow keys to select an Advanced Menu option. Press **Enter** to display the submenu. Items with grayed-out text are not available. Explanations of each Advanced Menu option are in the following table.

 **CAUTION** Setting items on this menu to incorrect values can cause the system to malfunction.

Advanced Menu - Advanced CMOS Setup

Menu Item	Settings (default is bold)
View DMI Event Log	Status only. Press Enter to view.
Clear all DMI Events Logs	No , Yes Selecting No prevents clearing out the DMI events logs.
Event Logging	Enabled , Disabled Selecting Enabled permits event logging.
Mark DMI Events as Read	Press Enter (Yes/No) Press Enter to mark DMI event log as read.
Quick Boot	Enabled , Disabled When Enabled, the BIOS does not test system memory above 1 MB or wait for ready signals, allowing a quick boot.
Delay for Hard Drive (seconds)	3, Disabled , 1 -10 Selects the amount of time for hard drive delay.
1st Boot Device	Floppy , Disabled, IDE-0, IDE-1, IDE-2, IDE-3, LS-120/Zip, ATAPI Zip, CDROM, SCSI, Network Sets the diskette drive as the first boot device.
2nd Boot Device	IDE-0 Sets the second boot device.
3rd Boot Device	CD-ROM Sets the third boot device.
Try Other Boot Devices	Yes , No Select Yes to cause the system to try to boot from other boot devices if there is a boot failure. Selecting No causes the boot to be carried out from selected devices.
Floppy Access Control	Read-write , Read-only Select Read-write to allow the diskette drive to have read-write capabilities.
S.M.A.R.T. for Hard Disks	Disabled , Enabled Select Enabled to use the Self Monitoring Analysis and Reporting Technology (S.M.A.R.T.) for reporting a possible problem with an IDE device. After receiving the warning, the BIOS alerts you to the problem.
Boot-up Num-Lock	On , Off Select Off to lock the numeric keypad on boot up.

Advanced Menu - Advanced CMOS Setup

Menu Item	Settings (default is bold)
Password Check	Setup , Always Allows the user to determine at what moment a password check is needed.
Boot to OS/2>64 MB	No , Yes Select Yes to enable a boot to OS/2 if RAM is greater than 64 MB.
CPU Serial Number	Disabled, Enabled Controls detection of the processor serial number.
System BIOS Cacheable	Disabled, Enabled Select Enabled to allow storing of system BIOS in RAM.

Advanced Menu - Advanced Chipset Setup

Menu Item	Settings (default is bold)
USB Function	Enabled, Disabled Select Enabled to enable use of USB functions for USB devices.
USB Keyboard Legacy Support	Enabled , Disabled Select Enabled to enable the legacy keyboard functions.
Memory Hole	Enabled, Disabled Select Enabled to reserve a space in the memory, between 15 and 16 MB, for certain ISA boards.
ClkGen Spread Spectrum	Enabled , Disabled Select Enabled to enable the Clock Generator Spectrum and limit the risk of electromagnetic emissions.

Advanced Menu - Power Management Setup

Menu Item	Settings (default is bold)
ACPI Standby State	S1 , S3 Select S1 for a low wake-up latency sleeping state. In the S2 mode, the CPU, cache, and chipset contexts are lost.
USB Keyboard Wakeup From S3	Disabled , Enabled Select Enabled to allow the system to wake up from a keyboard input.
Power Management/APM	Enabled , Disabled Select Enabled to enable Power Management and Advanced Power Management (APM).

Advanced Menu - Power Management Setup

Menu Item	Settings (default is bold)
Green PC LED Status	Dual Color , Single Color, Blinking Select Dual-Color to show a green LED for normal use and an orange LED for standby use.
Video Power Down Mode	Standby , Disabled, Suspend Select Standby or Suspend to power down the video display as a power saving feature.
Hard Disk Power Down Mode	Suspend , Standby, Disabled Select Suspend or Standby to power down the hard disk as a power saving feature.
Standby Time Out (Minutes)	Disabled , 1, 2, 4, 8, 10, 20, 30, 40, 50, 60 Specifies the length of time of system inactivity while in full power on state before entering Standby state.
Suspend Time Out (Minutes)	Disabled , 1, 2, 4, 8, 10, 20, 30, 40, 50, 60 Specifies the length of time of system inactivity while in Standby state before entering Suspend power state.
Power Button Function	Suspend , On/Off Suspend sets the power switch for Suspend (Sleep) mode. With power on, pressing the switch once places the system in sleep mode. Pressing and holding the switch in for 4 seconds turns power off.
Restore on AC/Power Loss	Last State , Power Off, Power On The Power On setting automatically turns power on after a power loss. The Power Off setting requires the user to restart the system with the power button. The Last State setting restores the system to the state where it was on power loss.
Resume on Ring	Enabled , Disabled Enabled allows the system to boot up on an incoming telephone call. Disabled causes the system to ignore any incoming call from a modem.
Resume on LAN	Enabled , Disabled Enabled allows the system to boot up on an incoming LAN signal. Disabled causes the system to ignore any incoming signal from LAN.
PME Function	Enabled , Disabled Select Enabled to allow the system to react to PCI Power Management Enabled wake up events.
Resume on RTC Alarm	Disabled , Enabled When Enabled, you can choose the time the system boots up (see the following time settings).

Advanced Menu - Power Management Setup

Menu Item	Settings (default is bold)
RTC Alarm Date	15 , Every Date Sets the day that the system boots up (when Resume on RTC Alarm is Enabled).
RTC Alarm Hour	12 , 1-00 Sets real time clock alarm hour (when Resume on RTC Alarm is Enabled).
RTC Alarm Minute	30 , 0-59 Sets real time clock alarm minute (when Resume on RTC Alarm is Enabled).
RTC Alarm Second	30 , 0-59 Sets real time clock alarm minute (when Resume on RTC Alarm is Enabled).

Advanced Menu - Plug and Play Setup

Menu Item	Settings (default is bold)
Plug and Play Aware O/S	No, Yes Select No to allow the BIOS to initialize any add-on boards (Windows NT only). Select Yes to allow the operating system to initialize any add-on boards (Windows 98 and Windows 2000).
Clear NVRam	No , Yes Select No to prohibit clearing of NV Ram.
Primary Graphics Adapter	Add-on VGA , Onboard VGA Select Onboard VGA if VGA is integrated on the system board.
PCI VGA Palette Snoop	Disabled , Enabled Set to Enabled to enable PCI VGA palette snooping.
DMA Channel 0, 1, 3, 5, 6, 7	PnP , ISA Permits configuring the DMA channels either by Plug and Play or by ISA.
IRQ 3, 4, 5, ,7, 9, 10, 11, 14, 15	PCI/PnP , ISA Permits configuring the interrupt requests either by PCI/Plug and Play or by ISA.
Reserved Memory Size	Disabled , Enabled Select Enabled to reserve a non-writeable zone in memory.
Reserved Memory Address	D0000 Defines the non-writeable zone in memory.

Advanced Menu - Peripheral Setup

Menu Item	Settings (default is bold)
Onboard AC'97 Audio	Enabled , Disabled The Enabled setting allows use of onboard sound.
Onboard AC'97 Modem	Enabled, Disabled Onboard modem not available.
Onboard LAN	Enabled , Disabled Select Enabled to allow use of onboard local area network
Onboard Serial Port A	3F8/COM1 , Auto, Disabled, 2F8/COM2, 3E8/COM3, 2E8/COM4 Defines serial port A base I/O address.
Onboard Serial Port B	3F8/COM1, Auto, Disabled , 2F8/COM2, 3E8/COM3, 2E8/COM4 Defines serial port B base I/O address.
Serial Port B Mode	Normal , 1.6us, 3/16 baud, ASKIR Select Normal to set the port for normal use.
IR Duplex Mode	Half Duplex , Full Duplex This option allows the Infra red Duplex mode to function in one direction at a time (Half Duplex) or both directions (Full Duplex).
Onboard Parallel Port	378 , Auto, Disabled, 278, 3BC Select Auto to allow the BIOS to automatically assign the parallel port to an available parallel port IRQ.
Parallel Port Mode	ECP , Normal, Bi-Directional, EPP Use this mode to choose the operating mode of the onboard parallel port.
EPP Version	N/A , 1.9, 1.7 Use this setting (1.7 or 1.9) to select the EPP version.
Parallel Port IRQ	7 , 5 Allows setting of the interrupt request (IRQ) for the parallel port.
Parallel Port DMA Channel	0, 1, 3 Allows you to choose DMA channel for the onboard parallel port in ECP mode. Displays only when parallel port is enabled and in ECP mode.
Keyboard/Mouse Power On Function	Disabled , Powerkey, Specific Key, Mouse Left, Mouse Right This option, when enabled, allows system to be turned on by pressing a specific key or moving the mouse.

Advanced Menu - Hardware Monitor Setup

Menu Item	Settings (default is bold)
ACPI Shut Down Temperature	80°C/176°F ACPI gives the operating system direct control over the power management and Plug and Play functions of a computer. The system shuts down at the temperature indicated.
Chassis Intrusion	Disabled , Enabled When Enabled, the chassis cover must be in place before the system can start up. When Disabled, the system can be started without the cover in place.
Temperature, Fan Speeds, Voltages	Not selectable, information only.

Security Menu

Choose the Security Menu by selecting Security in the legend bar on the Main Menu screen. Other Security Menu options are available by selecting submenus.

Use the arrow keys to select one of the Security Menu options and press **Enter** to select a submenu. Items with a grayed-out text are not available. Explanations of each Security Menu item are in the following table.

Security Menu Items

Menu Item	Settings (default is bold)
Set Supervisor Password	[Enter] Use this field to set or change the supervisor password. Press Enter to bring up a dialog box where the password can be entered and confirmed.
Set User Password	[Enter] Use this field to set or change the user password. Press Enter to bring up a dialog box where the password can be entered and confirmed.
Set Keyboard Wake Up Password Change	[Enter] Use this field to change the keyboard wakeup password.

Exit Menu

Choose the Exit Menu by selecting Exit in the legend bar on the Main Menu. Other Exit Menu options are available by selecting submenus.

Use the arrow keys to select one of the Exit Menu options and press **Enter** to display the submenu. Explanations of each Exit Menu item are in the following table.

Exit Menu Items

Menu Item	Settings (default is bold)
Exit Saving Changes	Implements the changes just made, and exits BIOS.
Exit Discarding Changes	Reverts to the settings from before the BIOS session.
Load Optimal Settings	Reverts to the factory set optimal settings.
Load Fail Safe Settings	Reverts to the factory set fail safe settings.
Load Original Values	Reverts to the factory-shipped settings.

FLASH Utility

The system BIOS resides on a ROM chip in the system and is updated using the following procedure. Before starting the BIOS update, we recommend that you first contact NECC for assistance (see Section 8 for NECC contacts).

Update the Flash ROM with a BIOS flash diskette. The diskette contains the latest version of the BIOS code. Get the diskette from NECC or download the BIOS from the NECC website. See Section 8 for download and website information.

Update the BIOS from the BIOS FLASH diskette as follows.

1. Write down the BIOS Setup parameters currently set on your system.
2. Turn off the system.
3. Put the FLASH diskette in drive A and turn on the system.
4. At the flash upgrade menu, choose **Update Flash Memory Area from a file**.
5. When asked for a path/file name, use the arrow keys to select the “.bio” file and press **Enter**.
6. The utility asks for confirmation to load the new flash into memory. Select **Continue with programming**.
7. After the upgrade completes, remove the diskette.
8. Reboot the system and start the Setup program. Press **F5** to reset the BIOS defaults. Use the recorded Setup selections you made at the beginning of this procedure to set the parameters.

Online Documentation

NECC provides Online Documentation that can be accessed directly from an icon on the windows desktop. The Online Documentation provides quick access to information about the computer.

The Online Documentation includes the following modules.

- **Preface**
Provides navigating pointers, text conventions, legal information, safety notices, and information on setting up a healthy work environment.
- **Introducing your PowerMate SL**
Describes front and back features, the diskette drive, and important information about your system.
- **Using your PowerMate SL**
Provides pointers on system care, productivity, and system operation.
- **System Guide**
Includes information about the system board and BIOS settings, includes pointers on upgrading system components, and provides system specifications and error messages.
- **Installing Devices**
Provides safety precautions, instructions on removing and replacing system components including stabilizers, covers, 3 1/2-inch and 5 1/4-inch devices, the system board, and optional features and accessories. Also provides configuration information.
- **Solving Problems**
Provides a troubleshooting guide, with categories including
 - Problems After the System Has Been Running Correctly
 - Problems at Initial System Start-up
 - Problems Running New Application Software
 - Problems Operating Add-in Cards
 - Problems and Suggestions and Beep Codes and Error Messages.


To open the Online Documentation double click the **Online Documentation** icon on the Windows desktop. Alternately, to open the Online Documentation click **Start**, point to Programs, and click **Online Documentation**.

To uninstall or reinstall the Online Documentation, use the Smart Restore Program, if available. The Smart Restore Program is used in conjunction with the Product Recovery CD. See the following section, "Product Recovery Program" for instructions on using the Smart Restore Program.

Product Recovery Program

The PowerMate Product Recovery program offers the possibility to go back to the original software shipped on your system. You can reinstall valuable software with the original hardware settings shipped from the factory. The recovery kit includes:

- PowerMate Recovery Boot diskette
- Product Recovery CD-ROM.

 **CAUTION** Use the Recovery program only in the unlikely event of file deletion or file corruption. The Recovery program is a very powerful tool. Some options permanently delete all the data on your hard drive.

Before using the Recovery program, we recommend that you try to use the Smart Restore program to reinstall the faulty software or hardware. Smart Restore lets you reinstall software without deleting any files. See “Using the Smart Restore Program” later in this document.

Before using the Recovery program, read the following sections carefully.

Starting the Recovery Program

Start the Recovery program as follows:

1. With the system power off, insert the Recovery Boot diskette into the diskette drive.
2. Turn on system power.
3. Insert the Product Recovery CD into the CD-ROM drive.
4. When a warning message appears, read it carefully. Press **Enter** to continue or **Esc** to exit the Recovery program.


Using the Recovery Program

The Recovery Program main menu offers the following options:

- Standard System Restore – select this option to restore your system to its original factory software and settings.
- Advanced Options – select this option to only install the Microsoft Windows operating system.
- Tools – choose this option to access the MS-DOS® edit mode, a series of hard disk utilities, and a Master CD check program.
- Cancel to return to DOS – select this option to close the Recovery program and exit to MS-DOS mode.

Standard System Restore

The Standard System Restore recovery option resets your system to the original factory settings. All files that were on the hard drive when you purchased the system are restored. All the files you added or created yourself and all changes made to the original files are lost after the recovery process. Your hard disk is exactly the same as when it left the factory.

 **CAUTION** Before you begin the restoration process, back up your data files (for example, your document and art files) onto storage disks such as Zip disks or onto a network drive.

-
1. Start the Recovery program (see “Starting the Recovery Program” earlier in this document).
 2. At the Recovery Program main menu, choose Standard System Restore.

The first part of the restoration process takes about a half hour. Do not remove the Recovery Boot diskette from the diskette drive. Do not shut down the system.


3. At the message informing you that the restoration process is finished, remove the Recovery Boot diskette and the Product Recovery CD from their drives. Press **Enter** to restart your system.

The system restarts and installs the Windows operating system. This procedure can take as long as an hour to complete. During this time, your system reinstalls all your original software and hardware configuration settings.

4. When the installations are finished, perform the same procedures as when you turned on your computer for the first time.

Advanced Options

The Advanced Options menu lets you choose to reinstall only the Windows operating system or to make changes to Windows Setup.


 **CAUTION** The Advanced Options are only for use by an advanced PC user or qualified technician. If you are not completely sure that you want to continue, choose the Cancel option by pressing **Esc** or by pressing **3** on your numeric keypad.

Advanced Options are as follows:

- **Reinstall Windows Only**
This process formats your hard drive and performs a new installation of the Windows operating system with the minimum settings. All data, including your personal files, are permanently deleted. Before you begin this process, back up your data files.
- **Windows Setup (Windows 98 only)**
This process runs Microsoft Windows Setup which reinstalls your operating system.

Tools

The Tools menu includes a series of advanced tools to maintain your hard drive and to check your Product Recovery CD for potential errors.

 **CAUTION** The Tools options are only for use by an advanced PC user or qualified technician. If you are not completely sure that you want to continue, choose the Cancel option by pressing **Esc** or by pressing **3** on your numeric keypad.

Tools include the following options:

- **Edit**
Runs the Microsoft MS-DOS editor for writing, editing, and modifying MS-DOS program files.
- **ScanDisk**
Runs Microsoft ScanDisk. This program checks your hard drive and helps you fix common file and disk errors.

-
- **FDisk**
Runs the hard disk partition manager utility. Inappropriate use of FDisk can result in an irreversible loss of all data on the hard drive.
 - **Format Hard Drive**
Performs a quick format of the computer's hard disk. Inappropriate use of the Format command can result in an irreversible loss of all the data on the hard drive.
 - **Master CD Check**
Checks for errors on the Product Recovery CD. If the Master CD Check reports a Master CD error, contact NECC Technical Support.

Using the Smart Restore Program

Some systems have access to a Smart Restore program. Smart Restore lets you select which applications you wish to (re-)install or remove. When you select to install applications, Smart Restore does not destroy data on your hard drive, other than replacing old copies of the application. When you remove an application, Smart Restore removes all the files of the selected application. Smart Restore also allows you to (re-)install hardware settings.

How to Load Smart Restore

To load Smart Restore, click the Windows **Start** button, select **Programs, Tools, and Restore**.

If you have not already placed the Product Recovery CD into the CD-ROM drive, do so now. After the application loads, Smart Restore displays the main menu with a Software tab, a Hardware tab, and (in some systems) a Tools tab.

Software Restore or Removal

Select the Software tab on the main menu to restore or remove specific applications:

- Click on one or more programs to select them. Smart Restore indicates a selected program with a green check mark in front of it. Deselect a selected program by double clicking it.
- Click on the **Select All** button if you want to select all of the listed programs.
- To remove a program, double click it. A red cross in front of the program indicates it has been selected for removal. To deselect the program, click on it again.

Hardware Settings

Select the Hardware tab on the main menu to restore hardware settings:

- Click on one or more devices to select them. Smart Restore indicates a selected device with a green check mark in front of it. To deselect the device, click on it again.
- Click on the **Select All** button if you want to select all of the listed devices.

Restoration Process

Once you have selected the programs or hardware settings you want to restore, click **OK** to start the restoration process.

Each application or device you selected runs through its installation procedure. Continue as with a normal installation, selecting the options you want. Each time the application asks you if you wish to restart your system, select **Yes** to ensure all registry information is correct for the next installation.

When all the selected programs or devices are installed, remove the Product Recovery CD and store it in a safe place.

PowerMate Driver CD

The PowerMate Driver CD provides drivers for peripheral equipment that is available for purchase to use with your PowerMate system. The equipment and the drivers are fully tested by NECC to ensure their compatibility with the PowerMate system. If you need drivers for peripheral devices you are adding to your system, use this CD.

The PowerMate Driver CD is easy to use. Start the system, and then insert the PowerMate Driver CD. Follow the on-screen prompts to install the required drivers.

Intel Processor Serial Number Control Utility

The Intel Processor Serial Number Control Utility is a Windows program that enables or disables the reading of the Pentium III processor serial number by software. This function lets you control which software programs or websites have permission to read the processor serial number. When installed, the utility runs automatically each time the system powers on.

This utility places an icon in the Windows system tray. The icon provides a visual status of the processor serial number. You have the option of hiding the system tray icon. You can enable or disable the processor serial number at any time. However, enabling the serial number requires restarting the system.

The following information describes:

- system requirements
- installation procedures
- processor serial number features
- FAQs
- technical support.

System Requirements

The Intel Processor Serial Number Control Utility requires:

- a Pentium III processor-based system
- Windows 98, Windows NT 4.0 (or later), or Windows 2000
- 2 megabytes of hard drive space.

Installation

The Intel Processor Serial Number Control Utility (version 1.0) comes already installed on the system. The system ships with the processor serial number turned off.

Processor Serial Number

The Intel processor serial number, a feature of the Pentium III processor, is an identifier for the processor. The processor serial number is unique, and when used in conjunction with other identification methods, can be used to identify the system or user. This number can be used in a wide variety of applications which benefit from stronger forms of system and user identification.

The processor serial number is analogous to a conventional serial number, with these important differences:

- A software application can read the processor serial number.
- You can enable or disable the reading of the serial number via utility programs such as this one, or via the BIOS, depending on the system configuration.

For additional information about the Pentium III processor and the processor serial number, visit www.intel.com/pentiumiii.

FAQs

What are the benefits of the processor serial number?

You can use the processor serial number in applications which benefit from stronger forms of system and user identification.

Why would I want to turn off my processor serial number?

Intel believes the processor serial number can provide compelling benefits to users. They are developing features in conjunction with the processor serial number to allow responsible service providers to provide services which maintain your privacy. However, if you are concerned that a given application/service using your processor number might impact your privacy, you can turn off the processor serial number using the utility.

What is the default state of the processor serial number?

The default state of the processor serial number is on, until the Processor Serial Number Control Utility is installed. Once the Processor Serial Number Control Utility is installed, it turns the processor serial number off by default. You can use the utility to turn on the processor serial number.

Can a website read my serial number without my knowledge?

No, generally not. Websites cannot read serial numbers unless you allow them to download a program which can read the processor serial number. Almost all browsers are configured to warn users whenever they download executable software. Unless you disable the warning in the browser, you should receive a notification.

Does Intel track serial numbers?

Generally not, other than related to the manufacturing process. Intel does not, in the absence of advance and express consent of a user, collect serial number data which is otherwise identified with a user.

Which programs and/or websites currently use the processor serial number?

You can find a complete list of programs which can take advantage of the processor serial number and other new capabilities of the Pentium III processor at <http://www.intel.com/pentiumiii/utility.htm>.

How can I tell if my processor serial number is turned on?

The vast majority of Pentium III processor-based systems ship with the processor serial number enabled. The control utility allows you to check the status by:

- Viewing the icon itself. The disabled icon shows a red circle with a white “x.”
- Clicking the task tray icon and selecting the “Status” menu item. Or you can select the menu from the tool tip shown when you position the mouse over the task tray icon.

Technical Support

For world wide 7 days a week, 24 hours a day technical support, please visit the Intel support website at <http://support.intel.com>.

Email: support@intel.com.

In the United States, call **800-628-8686** from 5:00 a.m. to 5:00 p.m. Pacific Standard Time.

For world wide phone contacts, please see <http://support.intel.com/support/feedback.htm>.

3

Disassembly and Reassembly

- Slimtower Stabilizer
- System Cover
- DIMM Module
- Processor
- Expansion Board
- 5 1/4-Inch Device
- Diskette Drive
- Hard Drive
- CMOS Battery
- LED Board Assembly
- Power Supply
- System Board

This section contains step-by-step disassembly procedures for the PowerMate ES SlimLine Series system. A disassembly figure is provided with most procedures. For an illustrated parts breakdown and parts list, see Section 5, "Illustrated Parts Breakdown."

For complete disassembly of the system, follow the disassembly order listed in the following table. To reassemble, follow the table and procedures in reverse order. Where reassembly is not apparent, reassembly procedures are provided.

A small flat head screwdriver, Phillips-head screwdriver, and needle nose pliers are the only required tools.

PowerMate ES SlimLine Series Disassembly Sequence

Sequence	Part Name	See Page
1	Slimtower stabilizer	3-3
2	System cover	3-4
3	DIMM module	3-6
4	Processor	3-8
5	Expansion board	3-10
6	5 1/4-inch device	3-12
7	Diskette drive	3-13
8	Hard drive	3-15
9	CMOS battery	3-17
10	LED board assembly	3-19
11	Riser board	3-19
12	Power supply	3-20
13	System board	3-21

When disassembling the system, follow these general rules.

- Turn off the system and unplug the AC power cord.
- Disconnect all peripherals before disassembling the system.
- Before handling boards or chips, touch the frame to discharge static.
- Do not disassemble parts other than those specified in the procedure.
- All screws are Phillips-head, unless otherwise specified.
- Observe each cable connector before attempting to disconnect. Some connectors have a retainer holding them in place.
- Wherever possible, label any connector before disconnecting it. Note where the connector goes and in what position it was installed.
- Use care in disconnecting cables. To prevent cable breakage, pull only on the connector. Do not pull on the cable.
- When installing a cable, route the cable so it is not pinched by other components and is out of the path of the cover.

On completion of any reassembly, perform a power-on test. If a fault occurs, verify that the reassembly was performed correctly.

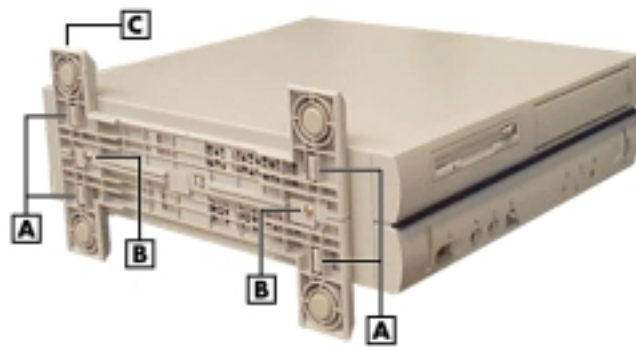
Slimtower Stabilizer Removal

If the system is configured as a slimtower, the stabilizer(s) must be removed before the system cover can be removed for access to the interior of the system.

Remove the stabilizer(s) from the slimtower as follows.

1. Turn off the system and all peripherals.
2. Unplug the system AC power cord and all peripheral power cords.
3. Disconnect all peripherals (USB devices, keyboard, mouse, monitor) from the front and rear of the system.
4. Position the system on its side on a table, with the stabilizers over the edge of the table.
5. Remove the two screws attaching the stabilizers to the system and remove the stabilizers from the system.

Removing the Slimtower Stabilizers



A – Foot (4)
B – Screw (2)

C – Stabilizer (1 of 2)

Install the stabilizer(s) as follows.

1. Set the system on the edge of a table, with the edge of the system protruding beyond the edge of the table.
2. If installing both stabilizers, join the two pieces together to form one piece and position the stabilizers over the feet on the system.
3. If installing only one stabilizer, position it over the feet on the side where the stabilizer is to be attached.
4. Secure the stabilizer(s) in place with the two previously removed screws.

System Cover Removal

Remove the system cover as follows.

! WARNING Before removing the cover, turn off system power and unplug the system AC power cable.

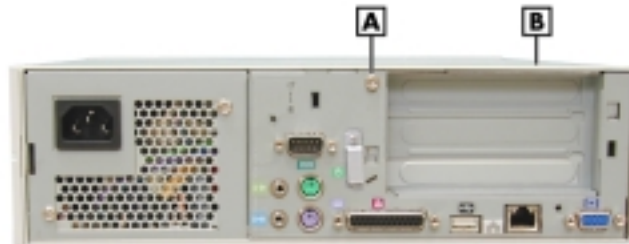
! CAUTION Before opening the system and before handling system components, reduce static discharge by touching the metal chassis.

1. Turn off the system and all peripherals.
2. Unplug the system AC power cord and all peripheral power cords.
3. Disconnect all peripherals from the front and rear of the system.

If the mouse and keyboard cables are installed in the anti-theft bracket, remove the screw fastening the bracket to the chassis. The screw is accessible from inside the chassis, after the cover is removed.

4. If the system is configured as a slimtower, remove the stabilizers (see “Slimtower Stabilizer Removal,” earlier in this section).
5. If a padlock is installed in the anti-theft ring on the rear of the system, remove it.
6. Remove the cover screw and anti-theft ring securing the cover to the rear of the chassis.

Removing the Cover Screw



A – Cover Screw B – Cover

Note The cover is a one piece unit that fits tightly to the chassis. The cover unit includes the top panel, left and right panels, and front panel. Do not attempt to separate the side panels or front panel from the cover unit.

-
- Slide the cover about one inch towards the front of the chassis, lift it up, and remove from the chassis. It might help to press in on the sides while sliding the cover towards the front of the chassis.

Removing the Cover



A – Cover

Replace the cover as follows.

⚠ CAUTION Ensure that all cables are positioned to prevent crimping, abrasion, or cutting while installing the cover. Check that the ribbon cables are folded along their fold lines and out of the direct path of the cover.

- If removed, reinstall the mouse and keyboard anti-theft bracket, with the mouse and keyboard cables inside the bracket.
- Position the cover over the chassis so that the front edge of the cover is about one to two inches beyond the front edge of the chassis.
- Align the tabs on the sides of the cover with the corresponding slots on the bottom edge of the chassis.
- Firmly press the cover against the chassis and slide the cover towards the rear of the chassis until it locks in place.

Note If the cover does not slide all the way to the rear of the chassis, check that all cables are out of the path of the cover and that the tabs on the sides of the cover are properly inserted into their slots in the chassis.

Also check that the tab on the riser board is positioned inside the chassis (see “Installing an Expansion Board” later in this section for location of the tab).

- Secure the cover in place with the previously removed cover screw and anti-theft ring.
- If the system was configured as a slimtower, reinstall the stabilizers (see “Slimtower Stabilizer Removal,” earlier in this section).
- If a padlock was installed in the anti-theft ring on the rear of the chassis, reinstall it.
- Reconnect all peripherals and plug in the power cords.

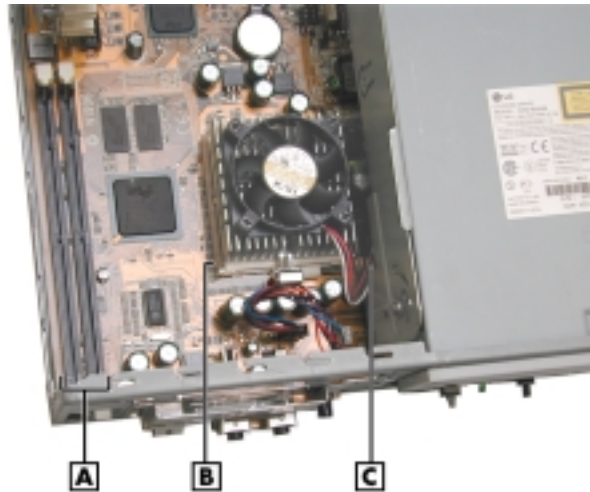
DIMM Module Removal

Remove a DIMM module from the system board as follows.

⚠ CAUTION Before removing a DIMM module, reduce static discharge by touching a metal part on the chassis.

1. Remove the system cover (see “Cover Removal” earlier in this section).
2. Locate the DIMM module sockets on the system board.

Locating the DIMM Module and Processor Sockets

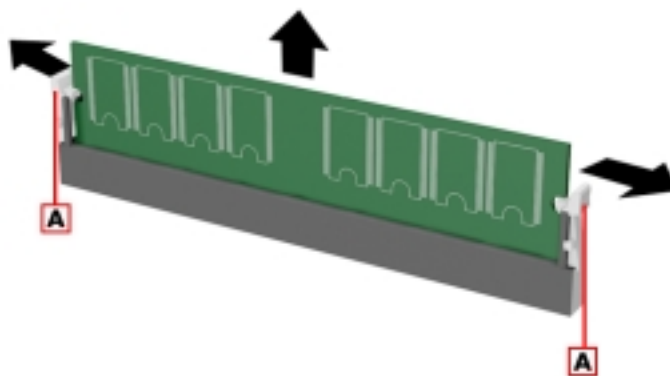


A – DIMM Module Sockets 1 and 2
B – Processor Socket 370

C – Fan Connector (under CD-ROM drive)

3. Eject a DIMM module by pressing the plastic clips at the outer edges of the socket away from the DIMM module.

Removing a DIMM Module



A – Plastic Clips

4. Remove the DIMM module from the socket and store in an anti-static bag.

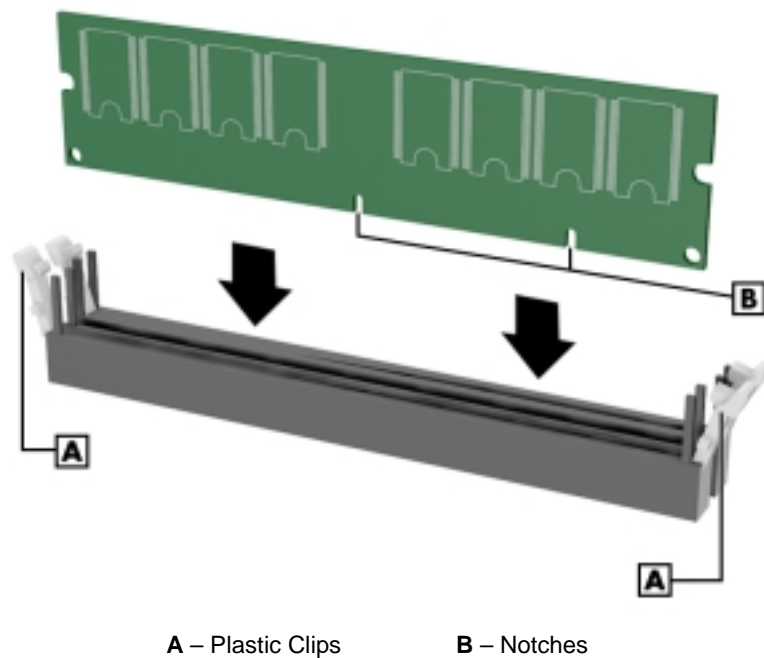
Install a DIMM module as follows.

1. Remove the cover, if not already removed.
2. As necessary, remove any installed DIMM module(s).
3. Select a DIMM module (see “System Memory” in Section 1).

⚠ CAUTION Before installing a DIMM module, reduce static discharge by touching a metal part on the chassis.

4. Align the notches on the new DIMM with the keys in an empty DIMM socket (see the following figure).

Installing a DIMM Module



5. Press the DIMM module firmly into the socket until the clips at both ends of the socket click closed.
6. Replace the cover.

Note If there is a discrepancy in the amount of memory displayed at the Power-On Self Test or in Windows with the amount of memory installed, check that the memory modules are installed correctly.

Processor Removal

Remove the processor from its socket on the system board as follows.

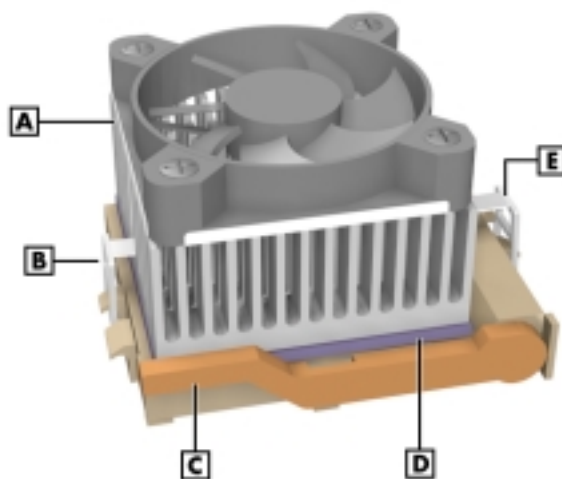
⚠ CAUTION Before handling the processor, reduce static discharge by touching a metal part on the chassis.

1. Remove the cover (see “Removing the Cover” earlier in this section).
2. Remove the diskette drive and bracket (see “Diskette Drive Removal” later in this section).
3. Locate the processor assembly (fan, heat sink, and processor) on the system board (see the figure “Locating the DIMM Module and Processor Sockets” earlier in this section).
4. Remove any expansion boards that might be in the way of the processor (see “Expansion Board Removal” later in this section).

⚠ WARNING If the system was just running, the processor and heat sink are hot. To avoid a burn, let the components cool before continuing.

5. Carefully cut the cable tie retaining the fan cable and front panel cables.
6. Tag and unplug the cooling fan cable from its connector (CPU Fan) on the system board.
7. If in the way, tag and unplug the front panel cable from the front panel connector.
8. Remove the fan and heat sink from the processor as follows.
 - Carefully press down on the flange on the right end of the retention clip (see the following figure).
 - While pressing down on the flange, unhook the clip from the tab on the processor socket.
 - Unhook the retention clip from the tab on the opposite side of the processor socket.
 - Remove the fan, heat sink, and retention clip from the processor.


Removing the Fan, Heat Sink, and Processor




A – Heat Sink
B – Retention Clip
C – Lock Lever
D – Processor
E – Flange

-
9. Remove the processor as follows.
 - Carefully pull out on the processor socket lock lever just enough to release the lever from the socket, then pivot the lever up to release the processor (see the preceding figure).
 - Carefully lift up on the processor and remove it from the socket. Store the processor in a static-free bag.

Install a replacement processor as follows.

 **CAUTION** Before picking up a processor, reduce static discharge by touching a metal part on the chassis.

1. Determine the manufacturer (Intel or Cyrix) of the processor and set CPU Type jumper J23 accordingly (see “System Board Jumpers” in Section 4).
2. Align the white triangle (or notch) on the corner of the replacement processor with the corresponding white triangle on the system board.
3. Carefully align the processor pins with the socket pin holes and set the processor into the socket.
 - If aligned correctly and the pins are not bent, the processor seats in the socket without forcing.
 - If the processor does not seat, check for correct alignment and bent pins.
4. Pivot the lock lever down and press it in towards the socket until it locks in place.

 **CAUTION** Using the wrong heatsink or no heatsink can damage the processor or system board. Ensure that the replacement processor has the correct heat sink (see the documentation that comes with the processor kit).

Additional information can be obtained from NECC (see Section 8, “NECC Information Services” for information on contacting NECC).

5. Install a replacement heat sink and fan as follows (also see any instructions that might come in the processor kit).
 - If the kit includes a thermal pad, center it on the top of the processor.
 - Align the heat sink, fan, and retention clip assembly with the processor and set it down on the processor (for alignment, see the preceding figure “Removing the Fan, Heat Sink, and Processor”).
 - Attach the heat sink retention clip by hooking the non-flange end of the clip over the socket tab.
 - Press down on the flange on the opposite end of the clip and hook the clip over the socket tab.
6. Plug the cooling fan cable into its connector (CPU Fan) on the system board. If unplugged, plug in the front panel cable.
7. Replace any expansion boards you might have removed.
8. Install the diskette drive, bracket, and cover.
9. Connect any peripherals and power cords, and power up the system.

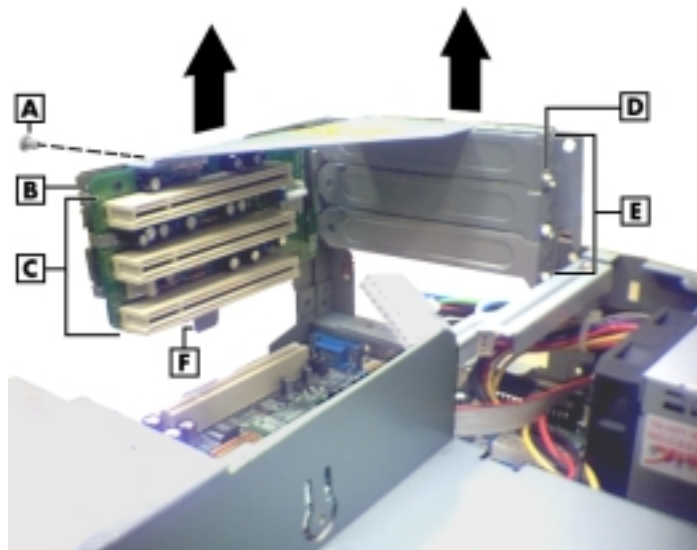
Expansion Board Removal

Remove an expansion board as follows.

⚠ CAUTION Before handling boards or chips, ground yourself to release static.

1. Remove the cover (see “Removing the Cover” earlier in this section).
2. Remove the riser board and bracket as follows.
 - Label and unplug any cable(s) connected to the expansion board.
 - Remove the upper side screw securing the bracket to the side of the chassis (see the following figure).
 - Carefully pull up on the bracket to release it from the chassis and the riser board connector on the system board. As the bracket fits tightly, you might need to rock the bracket slightly to release it from the chassis.
3. Remove the screw securing the expansion board to the riser board bracket.
4. Carefully pull the expansion board out of its connector on the riser board and out of the riser board expansion slot. Place the board in an antistatic bag.
5. Install a replacement board (see the following subsection) or install a slot cover if a board is not being replaced.
6. If not installing a replacement board, reinstall the riser board bracket and system cover (see “System Cover Removal” earlier in this section).

Removing the Riser Board Bracket



- | | |
|--------------------------------|----------------------|
| A – Upper Side Screw | D – Slot Cover Screw |
| B – Riser Board | E – Expansion Slots |
| C – Expansion Board Connectors | F – Tab |

Install an expansion board as follows.

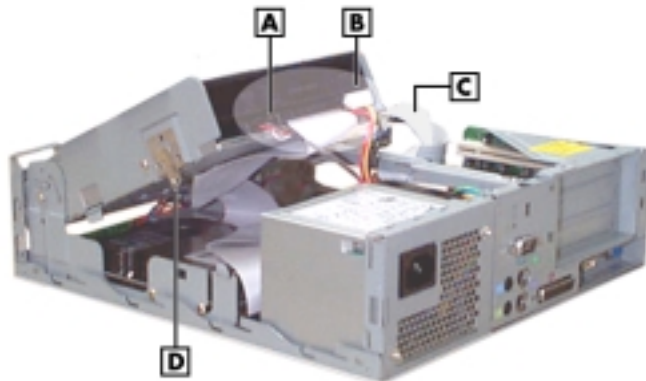
1. Remove the system cover and riser board bracket, if not already removed.
2. Locate an empty expansion slot on the riser board bracket.
3. Remove and save the screw securing the slot cover to the bracket (see the preceding figure “Removing the Riser Board Bracket”).
4. Remove and save the slot cover.
5. Follow any preinstallation instructions that come with the expansion board (such as setting jumpers or switches on the board).
6. Hold the expansion board by its edges or its bracket and insert the board into the expansion slot on the riser board.
7. Firmly press the expansion board into its connector on the riser board.
8. Secure the expansion board in place on the riser board bracket with the previously removed slot cover screw.
9. Attach any cables required by the expansion board.
10. Align the riser board bracket with the chassis and the riser board with its connector on the system board.
11. Push the riser board bracket down until the riser board and bracket seat.
12. Ensure that the tab (**F** on the preceding figure) on the riser board bracket is inside the chassis.
13. Secure the riser board in place with the previously removed upper side screw.
14. Replace the cover (see “System Cover Removal” earlier in this section).

5 1/4-Inch Device Removal

Remove a 5 1/4-inch device from the system as follows.

1. Remove the cover (see “Removing the Cover” earlier in this section).
2. While pressing on the device bracket lock, raise the bracket up enough to access the device cables.

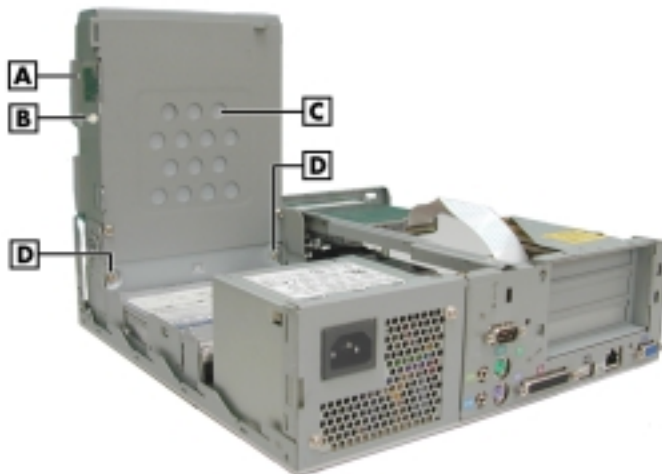
Unplugging the 5 1/4-Inch Device Cables



A – Audio Cable **C** – Signal Cable
B – Power Cable **D** – Device Bracket Lock

3. Tag and unplug the signal and power cables connected to the device. If the device is a CD-ROM or DVD-ROM, tag and unplug the audio cable from connector CDIN.
4. Raise up the device bracket (**A**) until it is vertical to the chassis (see the following figure).
5. Remove the top screw (**B**) securing the device (**C**) to the bracket.
6. Remove the two bottom screws (**D**) securing the device to the bracket.
7. Lower the device bracket until it latches in place.

Releasing the 5 1/4-Inch Device



A – Device Bracket **C** – Device
B – Top Screw **D** – Bottom Screw (2)


-
8. Slide the device out of the bracket.
 9. Install a replacement device in the bracket.

Install a 5 1/4-inch device in the system as follows.

1. Slide the replacement device through the front bezel and into the device bracket until the device is flush to the bracket.
2. Fasten the device to the bracket with the previously removed top screw (**B**).
3. Press the bracket lock on the side of the device bracket and raise the bracket up until it is perpendicular to the chassis.
4. Fasten the bottom of the device to the bracket with the two previously removed bottom screws (**D**).
5. Lower the device bracket halfway. Plug the signal cable and power cable into their respective connectors on the device. As appropriate, plug the audio cable into the device and connector CDIN on the system board.

Note Be sure to use the short power cable to connect to the device. The long power cord must be used for the hard drive.

6. Lower the device bracket all the way down until it locks in place on the chassis.

 **CAUTION** As you lower the device bracket, ensure that all cables are out of the way, are not pinched, and are folded correctly.

7. Replace the system cover (see “Removing the System Cover” earlier in this section).

Diskette Drive Removal

Remove the 3 1/2-inch diskette drive as follows.

1. Remove the system cover (see “Removing the System Cover” earlier in this section).
2. Unplug the diskette cable from the drive as follows (see the following figure).
 - Release the brown cable retainer connector on the drive by gently pulling up each end of the retainer until the cable releases.
 - Remove the cable from the drive connector.
3. Remove the screw securing the drive bracket to the chassis.
4. Lift the back end of the bracket up slightly to clear the tabs on the front panel, then slide the bracket and drive towards the rear of the chassis and out of the chassis.

Removing the Diskette Drive



A – Bracket Screw
B – Bracket
C – Diskette Drive

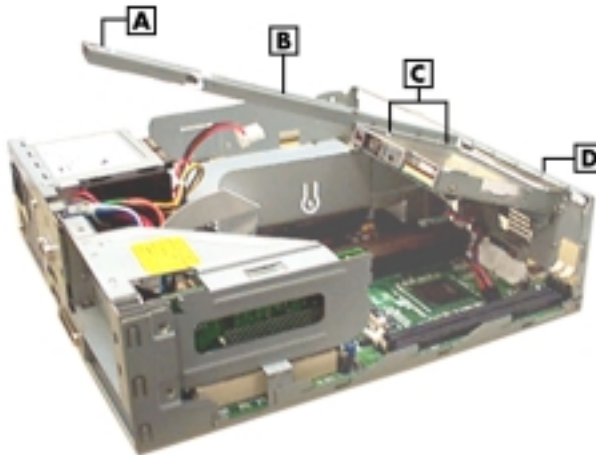
D – Diskette Drive Cable
E – Brown Cable Retainer

5. Remove the two screws fastening the drive to the bracket and set the drive aside.

Install a replacement diskette drive as follows.

1. Attach the replacement diskette drive to the bracket with the two previously removed screws.
2. Tilt the bracket and slide it into the back of the front panel until it stops.

Installing the Diskette Drive



A – Bracket Screw Hole
B – Bracket

C – Drive Fastening Screw (2)
D – Front Panel

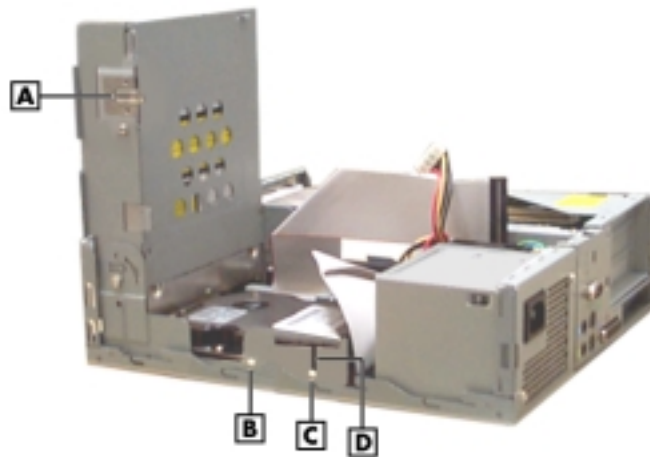
3. Lift the back of the drive slightly and slide it forward to engage the two tabs on the bracket with their slots in the front panel.
4. Align the screw hole at the end of the bracket with its corresponding hole in the chassis.
5. Install the previously removed screw through the bracket and into the chassis to fasten the bracket in place.
6. Lift up the cable retainer on the drive connector and insert the drive cable into the connector. Push down on the retainer to lock the cable into the connector. Check that the cable is secured.
7. Replace the system cover (see “System Cover Removal” earlier in this section).

Hard Drive Removal

Remove the hard drive as follows.

1. Remove the system cover (see “System Cover Removal” earlier in this section).
2. While pressing the device bracket lock on the side of the bracket, raise the bracket up enough to unplug the CD-ROM drive cables.
3. Raise the device bracket up to its vertical position (see the following figure).
4. Remove the hard drive screw (**B**). Loosen but do not remove the accessible shoulder screw (**C**).

Removing the Hard Drive



- | | |
|--------------------------------|------------------------------------|
| A – Device Bracket Lock | C – Shoulder Screw (1 of 3) |
| B – Hard Drive Screw | D – Shoulder Screw Slot (2) |

5. Remove the hard drive as follows.
 - Tilt the device bracket slightly from its vertical position, enough to allow access to the front of the drive.
 - Slide the hard drive towards the rear of the chassis until the shoulder screw is aligned with the vertical shoulder screw slot.
 - Lift the drive straight up, following the path of the shoulder screw slots on each side of the drive bay.
6. Unplug the power and signal cables from the hard drive.


-
7. Remove the hard drive from the chassis.
 8. Remove the three shoulder screws from the hard drive and install them in the same positions on the new hard drive. There is one shoulder screw on one side and two shoulder screws on the opposite side of the drive.

Install a replacement hard drive as follows.

1. If not already installed, install the three shoulder screws on the replacement hard drive, in the same position as they were on the old drive.
2. Hold the hard drive over the drive bay, with the drive connectors facing the rear of the chassis.
3. Plug the hard drive signal and power cables into their respective connectors on the hard drive.

Note Be sure to use the long power cable to connect to the hard drive. The short power cord must be used for the 5 1/4-inch accessible device.

4. Align the three shoulder screws with their respective shoulder screw slots and lower the hard drive into the chassis. Check that the screws are in the slots.
5. Slide the hard drive towards the front of the chassis, following the path of the shoulder screw slots.
6. Align the fastener hole in the hard drive with the corresponding hole in the chassis and secure the drive in place with the previously removed hard drive screw.
7. Tighten the previously loosened shoulder screw.
8. Lower the device bracket halfway, and plug in the CD-ROM drive signal and power cables. If required, plug in the CD-ROM drive audio cable.
9. Lower the device bracket into the chassis until it locks in place.

 **CAUTION** As you lower the device bracket, ensure that all cables are out of the way, not pinched, and folded correctly.

10. Replace the system cover (see “System Cover Removal” earlier in this section).
11. Set the hard drive parameters using “Autotype” in the BIOS (see Chapter 3 for BIOS procedures).

CMOS Battery Removal

Remove the 3-volt lithium battery from the system board as follows.

1. Turn off and unplug the system unit and any external options connected to the system.

⚠ CAUTION Removing the battery from the system board causes the system to lose system configuration information. If possible, run Setup and record the system configuration settings before removing the battery. Use that information to restore the system after replacing the battery.

2. Remove the system cover (see “System Cover Removal” earlier in this section).
3. Locate the battery on the system board.

Locating the CMOS Battery

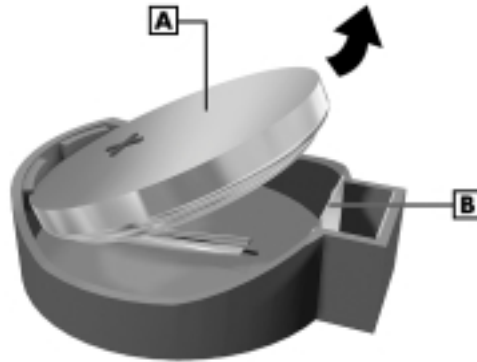


A – CMOS Battery

4. If necessary, unplug the ribbon cable from the diskette drive as follows.
 - Release the brown cable retainer connector on the drive by gently pulling up on each end of the retainer until the cable releases.
 - Remove the cable from the drive connector.

-
5. Press down on the battery clip to release the battery from its socket.

Removing the Battery



A – Battery

B – Clip

6. Remove the battery and discard in accordance with the manufacturer's instructions.


! WARNING The battery can explode if it is incorrectly replaced or improperly discarded. Use only the same type battery or an equivalent type recommended by the manufacturer when replacing the battery.

Lithium acts as a catalyst when exposed to water and causes spontaneous combustion on contact. Discard used batteries according to the manufacturer's instructions.

7. With the positive (+) side facing up, press the new battery into the socket. Be sure that you are using the same type battery as removed or an equivalent type recommended by the manufacturer.
8. If unplugged, plug in the diskette drive cable by inserting the cable into the connector and securing it in place with the brown cable retainer.
9. Replace the system cover (see "System Cover Removal" earlier in this section).
10. Connect external peripherals and power cables.
11. Run Setup to reconfigure system parameters (see Section 2, "System Configuration").

LED Board Assembly Removal


Remove the LED board and cable assembly as follows.

 **WARNING** Before removing the system cover, turn off the power and unplug the system power cable. Power is removed only when the power cable is unplugged.

1. Turn off and unplug the system unit and any external options connected to the system.
2. Remove the system cover (see “System Cover Removal” earlier in this section).
3. Remove the diskette drive (see “Diskette Drive Removal” earlier in this section).
4. Unplug the LED board cable from its connector (JFP1) on the system board.
5. Position the chassis with the front facing you and locate the LED board on the right of the chassis. Note how the LED board cable is installed in the chassis so that you can correctly reinstall the cable later.
6. Remove the screw securing the LED board to the chassis.
7. Slide the LED board out from under the tab.
8. Carefully pull the LED board and cable out of the front of the chassis.
9. Install a replacement LED board and cable assembly by reversing steps 1 through 9, above.

Riser Board Removal

Remove the riser board from the riser board bracket as follows.

 **WARNING** Before removing the system cover, turn off the power and unplug the system power cable. Power is removed only when the power cable is unplugged.

1. Turn off and unplug the system unit and any external options connected to the system.
2. Remove the system cover (see “System Cover Removal” earlier in this section).
3. Remove the riser board bracket (see “Expansion Board Removal” earlier in this section).
4. Remove the screw securing the riser board to the riser board bracket. The screw is at the top right corner of the riser board.
5. Slide the riser board out from under the three tabs and place in an anti-static bag.
6. Reinstall a riser board in the riser board bracket by reversing steps 1 through 5, above.

Ensure that the tab on the bottom of the riser board bracket is inside the chassis when installing the bracket (see “Expansion Board Removal”).

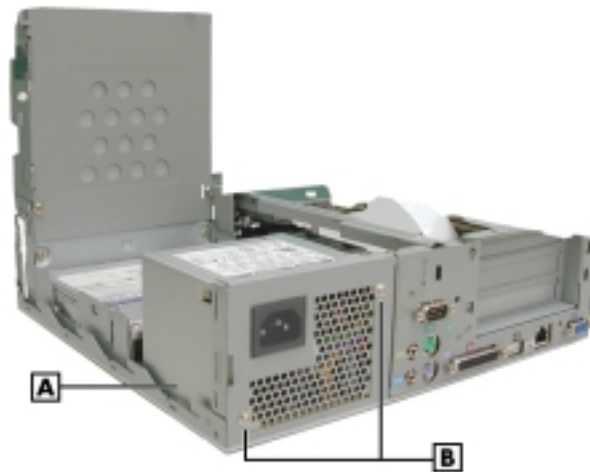
Power Supply Removal

Remove the power supply as follows.

! WARNING Before removing the system cover, turn off the power and unplug the system power cable. Power is removed only when the power cable is unplugged.

1. Turn off the system and any connected peripherals.
2. Unplug the system AC power cord and any peripheral power cords.
3. Disconnect any attached peripherals.
4. Remove the system cover (see “System Cover Removal”).
5. Press the device bracket lock on the side of the bracket, raise the bracket up enough to unplug the CD-ROM drive cables, and raise the bracket to its vertical position.
6. Remove the hard drive from its bay (see “Hard Drive Removal”).
7. Tag and unplug the power cables from the system board and from all installed devices.
8. Remove the two screws holding the power supply to the rear of the chassis.

Removing the Power Supply



A – Power Supply

B – Screws (2)

9. Slide the power supply towards the front of the chassis enough to clear the edge of the chassis and the flanges on the base of the chassis.
10. Lift the power supply out of the chassis and set aside.
11. Install the replacement power supply by reversing steps 1 through 10.

System Board Removal

Remove the system board as follows.

! WARNING Before removing the system cover, turn off the power and unplug the system power cable. Power is removed only when the power cable is unplugged.

1. Turn off the system and unplug the AC power cord.
2. Unplug and disconnect any attached peripherals.
3. Remove the following components:
 - system cover (see “System Cover Removal”).
 - diskette drive (see “Diskette Drive Removal”).
 - riser board bracket (see “Expansion Board Removal”).
4. Lift the 5 1/4-inch device bracket up enough to unplug the CD-ROM drive cables, then continue lifting the bracket to its vertical position (see “5 1/4-Inch Device Removal” earlier in this section).
5. Tag and unplug all cables from the system board.
6. Remove the following screws (see the following figure):
 - screw (A) holding the back panel to the chassis
 - screw (B) holding the system board to the base of the chassis
 - screws (C) holding the system board to the base of the back panel
 - screw (D) holding together the back panel and the right side of the chassis.

Removing the System Board



A – Back Panel Chassis Screw
B – System Board Base Screw

C – System Board Back Panel Screws (2)
D – Back Panel Lower Side Screw

-
7. Remove the system board from the chassis as follows.
 - Locate the two standoffs on the system board, towards the front of the chassis.
 - Lift the system board up enough to clear the standoffs, then slide the board towards the back of the chassis.
 - Remove the board from the chassis.
 8. Remove the screws securing the VGA, parallel, and serial ports to the back panel and remove the panel from the board.
 9. If the system board is being replaced, remove the processor assembly and the DIMM module(s) from the board. Store in anti-static bags for later installation on a new board. (See “Processor Removal” and “DIMM Module Removal” earlier in this section for removal and installation procedures.)
 10. Set the board aside for replacement.

Install the system board as follows (refer to the figure “Removing the System Board” while performing the procedure).

1. Position the base of the back panel under the port end of the system board.
2. Secure the VGA, parallel, and serial ports to the back panel with their previously removed screws.
3. Install the system board and back panel in the chassis as follows.
 - Slide the board and back panel into the rear of the chassis.
 - Lift the board slightly to clear the two standoffs.
 - Align the standoffs with their corresponding holes in the board.
 - Ensure that the standoffs are inserted into the standoff holes in the board.
 - Ensure that the system board front panel connectors are correctly aligned with their openings in the front panel.
4. Align the three screw holes in the system board with their corresponding holes in the base, then secure the board to the base with two screws (**C**) and one screw (**B**).
5. Ensure that the back panel fits squarely with the bottom of the chassis.
6. Fasten the back panel to the chassis with screw (**A**).
7. Fasten the right side of the chassis to the back panel with lower side screw (**D**).
8. Plug all previously removed cables into their respective connectors on the system board.
9. Lower the 5 1/4-inch device bracket enough to plug in the CD-ROM drive cables, then continue lowering the bracket until it locks in place in the system chassis (see “5 1/4-Inch Device Removal” earlier in this section).
10. As necessary, reinstall a processor and DIMM module(s) on the system board.
11. Reinstall the following:
 - riser board bracket (see “Expansion Board Removal”)
 - diskette drive (see “Diskette Drive Removal”)
 - system cover (see “System Cover Removal”).
12. Connect all system and peripheral power cords.

4

System Boards

- System Board
- Riser Board

This section describes the locations of connectors, jumpers, and sockets on the system board and riser board, including any external cable connectors, internal board connectors and slots, jumper locations, and upgrade sockets.

Included in this section are procedures for setting jumpers on the system board and a DIMM memory upgrade path for the DIMM sockets. Also included are descriptions of system board components, system memory map, and I/O addresses.

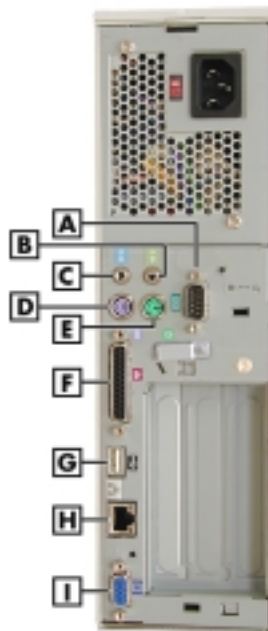
System Board

The following paragraphs show the system board external cable connector locations, internal board connector locations, jumper locations, and upgrade sockets. Included are procedures for setting jumpers on the system board and information on the upgrade path for the DIMM sockets.

External Cable Connectors

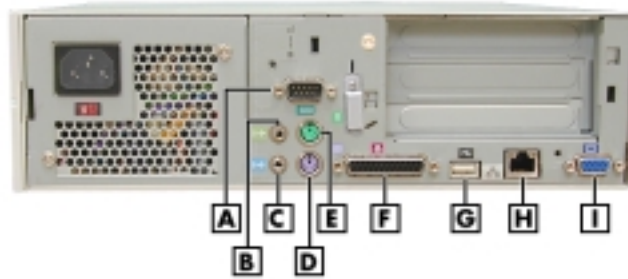
Locations of the external cable connectors on the system board at the back of the slimtower and desktop systems are shown in the following figures. For descriptions of the connectors, see Section 1, “System Overview.”

Slimtower External Connector Locations



- | | |
|--------------------------|--------------------------|
| A – Serial Port | F – Parallel Port |
| B – Line Out Jack | G – USB Port |
| C – Line In Jack | H – LAN Port |
| D – Keyboard Port | I – VGA Port |
| E – Mouse Port | |

Desktop External Connector Locations

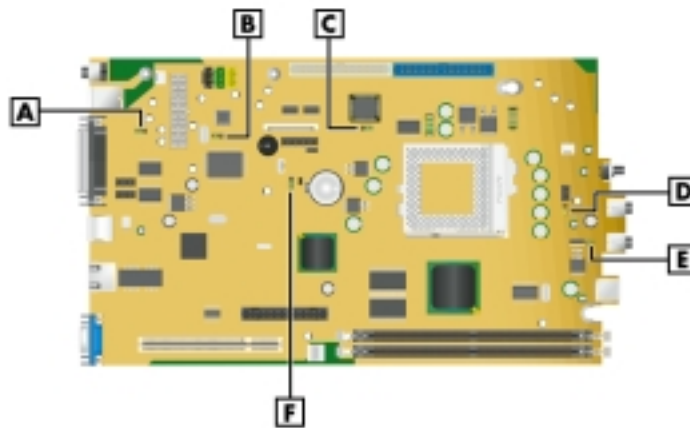


- | | |
|-------------------|-------------------|
| A – Serial Port | F – Parallel Port |
| B – Line Out Jack | G – USB Port |
| C – Line In Jack | H – LAN Port |
| D – Keyboard Port | I – VGA Port |
| E – Mouse Port | |

Internal Connectors, Sockets, and Jumpers

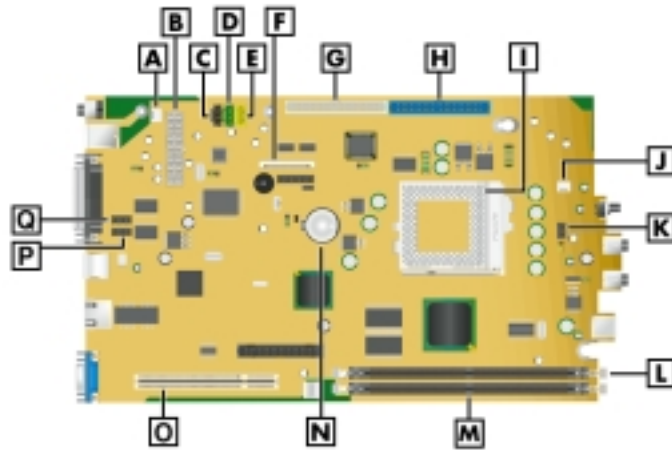
Locations of the jumpers, connectors, and sockets on the system board are shown in the following figures.

System Board Jumper Locations



- | | |
|---------------------------|----------------------|
| A – Keyboard Wakeup JKBV1 | D – CPU Type J23 |
| B – Onboard Audio JP3 | E – Save to RAM JP4 |
| C – BIOS Recovery J4 | F – CMOS Clear JBAT1 |

System Board Connector and Socket Locations



A – Power Supply Fan Connector	J – CPU Fan Connector
B – Power Connector (JWR1)	K – LED Panel Connector
C – CD IN Connector	L – DIMM Socket 1
D – Modem IN Connector	M – DIMM Socket 2
E – Aux IN Connector	N – Battery Socket
F – Diskette Drive Connector (FDD)	O – Riser Board Connector
G – Primary IDE Connector (IDE 1)	P – Serial Port Connector (COM2)
H – Secondary IDE Connector (IDE 2)	Q – Serial Port Connector (COM1)
I – Processor Socket	

System Board Jumpers

The system board has six configuration jumpers:

- Clear CMOS jumper JBAT1
- BIOS Recovery jumper J4
- Keyboard Wake Up jumper JKBV1
- Save to RAM (STR) jumper JP4
- Onboard Audio jumper JP5
- CPU Type jumper J23.

The preceding figure “System Board Jumper Locations” shows the locations of the jumpers on the system board. To reset the jumpers, use the following procedure.

Before starting, we recommend that you first contact NECC for assistance (see Section 8 for contact information).

Set the jumpers as follows.













CAUTION Jumpers are set correctly at the factory for the system configuration. Only change the appropriate jumper setting for your application. Otherwise, keep the jumpers at their factory settings.

1. If you are going to perform a CMOS Clear or BIOS Recovery, we recommend that you first access the BIOS Setup Utility and record any customized settings (see “BIOS Setup” in Section 2).
2. Power off and unplug the system and any peripherals.

! WARNING The system power must be off before removing the cover and changing a jumper setting.

3. Remove the system cover (see “System Cover Removal” in Section 3).
4. Remove the diskette drive to access the jumpers (see “Diskette Drive Removal” in Section 3 for procedures).
5. Locate the appropriate jumpers on the system board that require resetting (see the preceding figure “System Board Jumper Locations”).
6. Move the appropriate jumper(s) for the application, as shown in the following figure.

Setting System Board Jumpers

Keyboard Wakeup		Factory setting. Wakes up the system from Suspend to RAM mode via the keyboard. Requires Windows 98 running in Advanced Configuration Power Interface (ACPI) mode.
		Normal operation. Disables Keyboard Wakeup.
Onboard Audio		Factory setting. Enables onboard audio.
		Disables onboard audio. Use this setting if you install a sound card.
CMOS Clear		Factory setting. Maintains system board configuration in CMOS RAM with onboard battery.
		Clears CMOS while system power is off. Return jumper to pins 1 and 2 before powering system on.
Caution: To prevent damage to the system board, avoid clearing CMOS while power is on.		
BIOS Recovery		Factory setting. Sets the system for normal operation. The BIOS uses current configuration information and passwords at power on.
		To enable BIOS recovery for a corrupted system, remove the jumper. Wait 10 seconds. Replace the jumper on pins 1 and 2.
		Restores Safe BIOS settings as the default BIOS settings and loads the BIOS Setup at power on.
CPU Type		Factory setting. Uses an Intel® CPU.
		Uses a Cyrix® CPU.
Save to RAM		Factory setting. Enables the Save to RAM function.
		Disables the Save to RAM function.

-
7. Check all settings to ensure that they are correct for the application (see the preceding figure to check settings).
 8. Reinstall the diskette drive (see Section 3, “Diskette Drive Removal”).
 9. Reinstall the system cover (see Section 3, “System Cover Removal”).
 10. Connect any peripherals, plug in all power cords, and power up the system.
 11. Press **F2** to run the BIOS Setup Utility and recustomize the BIOS settings as necessary (see “BIOS Setup” in Section 2).

Upgrade Sockets

The system board has the following upgrade sockets:

- processor socket
- DIMM sockets.

Processor Socket

The processor installs in a 370-pin Socket 370 on the system board. The processor is held in place in the socket by a locking lever attached to the socket and a removable retention clip. The retention clip anchors both the processor and the processor heat sink to the Socket 370.

To remove or install a processor, see Section 3, “Disassembly and Reassembly.”

DIMM Sockets

The system board has two, 168-pin, gold-plated DIMM sockets (locations are shown on the figure “System Board Connector and Socket Locations” earlier in this section).

The sockets support up to 512 MB of high-speed SDRAM memory. The sockets support DIMM modules in 64-, 128-, and 256-MB unbuffered non-ECC memory configurations.

The DIMM modules

- can be installed in one or two sockets
- size can vary between sockets
- can be single- and double-sided.

See the “Sample DIMM Memory Upgrade Paths” table in Section 1 for supported DIMMs and for sample DIMM upgrade paths. To remove or install a DIMM, see Section 3, “Disassembly and Reassembly.”

If you do not know how much memory is installed in the system, check the amount as follows.

1. On the Windows 98, Windows NT 4.0, or Windows 2000 desktop, point to **My Computer** and click the right mouse button.
2. With the left mouse button, click **Properties**. Select the **General** tab to show the amount of random access memory (RAM) in the computer. For Windows 98, you can also select the **Performance** tab to show the RAM memory.

Note If a discrepancy is found in the amount of memory displayed at the Power-On Self-Test or in Windows with the amount of memory installed, check that the memory modules were installed correctly.

System Board Components

The system board has the following components:

- Intel 810E chip set used for AGP, PCI, memory, and peripheral control. The chip set incorporates
 - 82810E Graphics and Memory Controller Hub (GMCH)
 - 82801 I/O Controller Hub (ICH)
 - 82802 Firmware Hub (FWH)
 - Integrated Audio-Codec 97 Controller
 - Dynamic Video Memory Technology (DVMT)
 - System Manageability Bus
 - 66-MHz and higher system bus capability
- Winbond Super I/O controller
- American Megatrends Inc. (AMI) BIOS is a flash memory device supporting system setup and PCI auto-configuration
- 32-KB (Celeron) or 32-KB (Pentium III) L1 cache integrated on the processor
- 128-KB (Celeron) or 256-KB (Pentium III) L2 cache integrated on the processor
- 64 MB to 512 MB of SDRAM upgradeable with 64-MB, 128-MB, or 256-MB modules installed in up to two DIMM sockets on the system board
- system Setup Utility built into the BIOS
- 4-Mb FLASH ROM for fast economical BIOS upgrades
- integrated sound
- integrated local area network
- power management with power saving mode
- external connectors for connecting the following external devices:
 - VGA-compatible monitor (standard, super, high-resolution VGA) to AGP port on system board
 - personal system/2 (PS/2[®])-style mouse
 - PS/2-style keyboard
 - bi-directional Enhanced Parallel Port (EPP) and Enhanced Capabilities Port (ECP) support for a parallel printer
 - serial devices through one buffered 16C550 UART serial port (COM1), supporting up to 115.2 Kb per second
 - support for Audio Auxiliary IN and Audio Telephone IN via two onboard headers
 - two USB devices
 - microphone, headset, speaker connectors (microphone in, headset in, line in, line out).

The following table lists the major components on the system board.

System Board Components

Component	Function
Processor Celeron Pentium III	500-MHz or higher processor, 66-MHz or higher FSB 533-MHz or higher processor , 100-MHz or higher FSB
Intel 810E Chipset:	
82810E Graphics and Memory Controller Hub (GMCH)	Uses Intel graphics technology, software drivers, and Direct AGP (integrated AGP) to create vivid 2D and 3D effects and images. Features integrated Hardware Motion Compensation to improve video quality. Features processor and host bus optimized for the processor, integrated DRAM controller, integrated graphics controller, 3D graphics visual enhancements, 3D graphics texturing enhancements, digital video output, integrated 24-bit 230 MHz RAMDAC, 2D graphics, arithmetic stretch blitter video, integrated graphics memory controller, display cache interface, arbitration scheme and concurrency, data buffering, power management functions, and support for I/O bridge.
82801 I/O Controller Hub (ICH)	Uses Accelerated Hub Architecture to make direct connection from graphics and memory to the integrated AC'97 controller, IDE controller, and dual USB ports. Supports PCI bus interface, integrated IDE controller, USB, AC'97 Link for audio and telephone Codecs, interrupt controller, timers, 3.3V operation, power management logic, enhanced DMA controller, real-time clock, SM bus, and Firmware Hub.
82802 Firmware Hub (FWH)	Stores system BIOS and video BIOS, eliminating a redundant nonvolatile memory component. In addition, the 82802 contains a hardware Random Number Generator (RNG). The Intel RNG provides truly random numbers to enable fundamental security building blocks supporting stronger encryption, digital signing, and security protocols. Features Intel Platform Compatibility, Firmware Hub Hardware Interface Mode, configurable interfaces, flash memory for non-volatile storage, and address/address multiplexed interface mode.
Winbond Super I/O W83627HF-AW controller	The controller supports the following: Multimode parallel port Centronics compatible (standard mode) Enhanced capabilities port (ECP) Enhanced parallel port (EPP) One RS-232C serial port Integrated 8042A keyboard controller Mouse controller Hardware monitor Industry-standard floppy controller
Onboard 3COM LAN Chipset	3COM CC920 BR 006 LAN chipset integrated on system board
Onboard AC'97 Codec	Audio integrated on system board, compatible with Windows Sound System

Processor and Secondary Cache

The system uses an Intel Celeron or Pentium III processor with an internal clock speed of 500 MHz or higher (depending on type of processor).

The processors are advanced pipelined 32-bit addressing, 64-bit data processors designed to optimize multitasking operating systems. The 64-bit registers and data paths support 64-bit addresses and data types.

To use the processor's power, the system features an optimized 64-bit memory interface and 256 KB (128 KB for Celeron) of secondary write-back cache on the processor.

The processor is compatible with 8-, 16-, 32-, and 64-bit software written for the Intel386™, Intel486™, Pentium, Pentium II, and Pentium III processors. The processor is installed in a Socket 370 on the system board.

System BIOS

The PCI-compatible BIOS is contained in a 4-Mb flash memory device on the system board. The BIOS provides Power-On Self-Test (POST), system Setup program, PCI auto-configuration utility, and BIOS recovery code.

The FLASH ROM allows fast, economical BIOS upgrades. The FLASH ROM is a reprogrammable EPROM containing both the system and video BIOS. Using the FLASH ROM to change the ROM BIOS provides the following advantages:

- BIOS upgrade is performed quickly and easily
- expense of replacing ROM BIOS chips is eliminated, so system maintenance costs are reduced
- less chance of inadvertently damaging the system board than when physically replacing ROMs
- network administrators can exercise company-wide control of BIOS revisions.

The BIOS programs execute the Power-On Self-Test, initialize processor controllers, and interact with the display, diskette drive, hard drive, communication devices, and peripherals. The system BIOS also contains the Setup Utility.

The FLASH ROM allows the system and video BIOS to be upgraded with the BIOS Update Utility, without having to physically remove the ROM (see Section 2 for further information on the BIOS Update Utility). The FLASH ROM supports the reprogramming of the system BIOS and the video BIOS.

System Memory

The system comes with 64 MB minimum and up to 512 MB maximum of SDRAM installed in two DIMM sockets on the system board.

The DIMM sockets accept 168-pin, 64-bit (non-ECC) 64-, 128-, and 256-MB DIMMs. See the "Sample DIMM Memory Upgrade Paths" table in Section 1 for a list of supported DIMMs.

Plug and Play

The system comes with a Plug and Play BIOS in support of Plug and Play technology. Plug and Play simplifies setup procedures for installing Plug and Play expansion boards. With Plug and Play, adding a Plug and Play expansion board is done by turning off the system, installing the board, and turning on the system. There are no jumpers to set and no system resource conflicts to resolve. Plug and Play automatically configures the board. (Some Plug and Play devices might need to be jumpered if used in a system running the Windows NT® operating system.)

PCI/IDE Ports

The system board has two high-performance PCI/IDE ports: a primary port and a secondary port. The primary PCI/IDE port has an enhanced IDE interface that supports PIO Mode 4 devices with 66 MB per second maximum burst rate data transfers on the high-performance Ultra DMA bus. The port supports Ultra DMA/66.

The installed hard drive is connected as a master device on the primary PCI/IDE port. The installed CD-ROM drive or DVD-ROM drive is connected to the secondary PCI/IDE port as a master device. The hard drive is connected to the primary port with a two-connector Ultra DMA/66 40-pin, 80-conductor cable. The CD-ROM or DVD-ROM is connected to the secondary port with a two-connector IDE cable.

Parallel Interface

The system has a 25-pin bidirectional parallel port on the system board. Port specifications conform to the IBM-PC standards. The port supports Enhanced Capabilities Port (ECP) and Enhanced Parallel Port (EPP) modes for devices that require ECP or EPP protocols. The protocols allow high-speed bi-directional transfer over a parallel port and increase parallel port functionality by supporting more devices.

The BIOS has automatic ISA printer port sensing that works with most devices. If the BIOS detects an ISA printer port mapped to the same address, the built-in printer port is disabled. (Verify in the BIOS Setup that printer ports mapped to the same address are enabled or disabled appropriately.) The BIOS also sets the first parallel interface port it finds as LPT1 and the second port it finds as LPT2. The interrupt is set at IRQ7 via the BIOS Setup Utility. Software-selectable base addresses are 228h, 378h, and 278h.

Sets of I/O addresses for the parallel port are given in the following table (see Section 2, "System Configuration," for interrupt levels). This is a list of all possible configurations; the parallel port uses only one set.

Parallel Port Addresses

Starting I/O Address	Port
378	LPT1
278	LPT2
3BC	LPT3
378	LPT1
278	LPT2
3BC	LPT3

Parallel interface signals are output through the system board's 25-pin, D-subconnector. The connector is located at the rear of the system unit.

Serial Interface

The system has one 16C550 UART compatible serial port (COM1) integrated on the I/O controller. The serial port supports the standard RS-232C interface. The buffered high-speed serial port supports transfer rates up to 115.2 Kb. The port allows the installation of high-speed serial devices for faster data transfer rates.

Sets of I/O addresses for all channels are given in the following table (see Section 2, "System Configuration," for interrupt levels). Soft-selectable base addresses are 3F8h, 2F8h, 3E8h, and 2E8h.

Serial Port I/O Addresses

Starting I/O Address	Port
3F8	COM1
2F8	COM2
3E8	COM3
2E8	COM4
3F8	COM1
2F8	COM2
3E8	COM3
2E8	COM4

See Section 2, “System Configuration,” for information on resetting the port through the BIOS Setup Utility. See Section 9, “Specifications,” for the serial interface specifications.

Serial interface signals are output through the system board’s 9-pin, D-subconnector. The connector is located at the rear of the system unit.

USB Interface

The Universal Serial Bus (USB) ports allow USB serial devices to be added without having to open the system. One USB device can be plugged into each USB port for direct system connection. With a hub and the proper cabling, up to 127 USB devices per port can be addressed by the system.

The USB determines system resources for each peripheral and assigns them without user intervention. Boot support for a USB keyboard is present so the system can be booted with a USB keyboard instead of a standard keyboard.

Accelerated Graphics Port

The system board contains a direct integrated accelerated graphics port (Direct AGP) on the system board that supports graphics-intensive, 3D applications. The Direct AGP supports 133-MHz data transfer rates, allowing 33 MB of data to be transmitted per second. The port is connected to the VGA-compatible connector on the back of the system.

Connect a monitor to the board’s VGA connector on the back of the system.

Graphics Controller

The graphics controller, part of the Intel 82810E chipset, is specifically designed for graphics-intensive operations, including 3D and 2D effects, texture mapping, text and color pixel amplification, and video acceleration. The controller minimizes bus traffic by off-loading the tasks normally performed by the processor, providing 64-bit, high resolution performance for demanding True Color displays and other sophisticated graphics functions.

Motion Video Controller

The motion video controller on the 82810E chipset integrates a Windows graphical user interface (GUI) engine and motion video playback hardware. Features include:

- Hardware Motion Compensation to improve soft DVD video quality
- MPEG-2 for lifelike video and audio.

MPEG is a compression/decompression standard developed by a professional video group called the Motion Picture Experts Group. MPEG produces full-screen, 30-frames-per-second (fps), broadcast-quality digital video.

Integrated Audio

To support multimedia applications, an AC97 Codec audio chip is integrated on the system board. The chip provides 16-bit stereo, Sound Blaster Pro[®]-compatible audio.

The sound system provides all the digital and analog mixing functions required for playing and recording audio on personal computers. Features include stereo analog-to-digital and digital-to-analog converters, analog mixing, anti-aliasing and reconstruction filters, line and microphone level inputs, digital audio compression, and full digital control of all mixer and volume control functions.

System Board Resources

The system memory map, I/O addresses, and DMA settings are given in the following sections. System interrupt settings, parallel interrupt settings, and serial interrupt settings are included in Section 2, "System Configuration."

Memory Map

The system memory map is shown in the following table.

System Memory Map		
Memory Space	Size	Function
100000-18000000	383 MB	Extended memory
FC000-FFFFFF	16 KB	Boot block
FA000-FBFFF	8 KB	ESCD (Plug and Play Configuration and DMI)
F9000-F9FFF	4 KB	Reserved for BIOS
F8000-F8FFF	4 KB	OEM logo or Scan User Flash
E8000-E7FFF	64 KB	POST BIOS
E0000-E7FFF	32 KB	POST BIOS (currently available as UMB)
C8000-D7FFF	96 KB	Available HI DOS memory (open to ISA and PCI bus)
A0000-C7FFF	160 KB	Video memory and BIOS
9FC00-9FFFF	1 KB	Extended BIOS data (movable by memory manager software)
80000-9FBFF	127 KB	Extended conventional memory
00000-7FFFF	512 KB	Conventional memory

I/O Addresses

The processor communicates with I/O devices by I/O mapping. The hexadecimal (hex) addresses of I/O devices are listed in the following table.

Note In Plug and Play systems, these addresses are typical but may vary by configuration.

I/O Address Map

Address (Hex)	I/O Device Name
0000-000F	DMA controller 1 (channel 0-3)
0020-0021	Programmable interrupt controller 1
0040-0043	Counter/timer 1
0060	PC/AT Keyboard controller
0061	System speaker
0064	PC/AT Keyboard controller
0070-0071	System CMOS/real time clock
0081-0083	DMA controller
00A0-00A1	Programmable interrupt controller 2
00C0-00DF	DMA controller 2
00F0-00FF	Numeric data processor
0170-0177	Secondary IDE channel/Bus Master IDE controller
01F0-01F7	Primary IDE channel/Bus Master IDE controller
0200-0207	Gameport/Joystick
0376	Secondary IDE channel/Bus Master IDE controller
0378	ECP printer port (LPT 1)
0380-038B	Intel 810e chipset graphics driver
03C0-03DF	Intel 810e chipset graphics driver
03F0-03F3	Standard floppy disk controller
03F4-03F5	Standard floppy disk controller
03F6	Intel 82801AA Bus Master IDE controller
03F6	Primary IDE controller
03F7	Standard floppy disk controller
03F8-03FF	Communications port COM1
0540-0545	Intel 82801AA SMBus controller
0788	ECP printer port (LPT 1)
0CF8-0CFF	PCI bus
B000-BFFF	Intel 82801AA PCI Bridge
BC00-BC7F	3COM 3C920 integrated fast Ethernet controller
D400-D41F	Intel 82801AA USB universal host controller
D400-D83F	Intel 82801AA audio controller
DC0D-DCFF	Intel 82801AA AC'97 audio controller
FF00-FF07	Primary IDE controller

I/O Address Map

Address (Hex)	I/O Device Name
FF00-FF0F	Intel 82801AA Bus Master IDE controller
FF08-FF0F	Secondary IDE controller

DMA Settings

The system's DMA settings are given in the following table.

DMA Settings

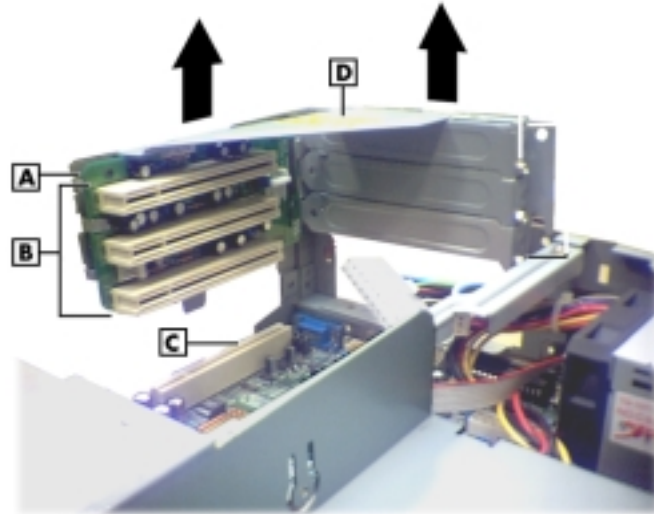
DMA Setting	Device
0	Available
1	Available
2	Diskette drive
3	Parallel port (for ECP or EPP)/audio
4	DMA controller
5	Available
6	Available
7	Available

* In Plug and Play systems, these settings are typical but may vary by configuration.

Riser Board

The riser board is attached to a removable riser board bracket that plugs into the riser board connector on the system board.

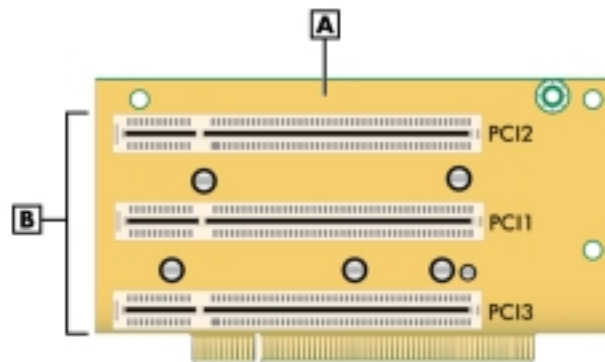
Riser Board Bracket



- A** – Riser Board **C** – Riser Board Connector (on system board)
B – Expansion Board Connectors **D** – Riser Board Bracket

The riser board has three PCI connectors for adding up to three optional PCI expansion boards. The riser board has no jumpers or switches.

Riser Board



- A** – Riser Board **B** – Riser Board Expansion Board Connectors

5

Illustrated Parts Breakdown

- Order Spare Parts
- Field Replaceable Unit List
- Illustrated Parts Breakdown

This section contains the illustrated parts breakdown (IPB) and NECC part descriptions for the PowerMate ES SlimLine Series systems.

The following lists the

- telephone number for ordering spare parts
- field-replaceable parts for the system.

The PowerMate ES SlimLine Series system illustrated parts breakdown figure is at the end of this section.

Order Spare Parts

To order spare parts, please call 1-800-632-4525.

Field Replaceable Unit List

The following table lists the field replaceable units (FRUs) for the PowerMate SlimLine Series system.

PowerMate ES SlimLine Series System FRU List

Item	Description
1	Audio Cable, CD-ROM Drive or DVD-ROM Drive
2	Logitech PS-2, 3D Button Wheel Mouse
3	Ultra DMA/66 Cable, 2-connector, Hard Drive
4	IDE Cable, 2-connector, CD-ROM Drive or DVD-ROM Drive
5	Diskette Drive Cable, 2-connector
6a	500/66-MHz or higher, 128 K Cache, Celeron Processor
6b	533/133-MHz or higher, 256 K Cache, Pentium III Processor
7	Fan, Heat Sink, and Retainer Assembly
8	CMOS Coin-Cell Battery
9a	64-MB SDRAM (8 MB x 64) DIMM
9b	128-MB SDRAM (16 MB x 64) DIMM
9c	256-MB SDRAM (32 MB x 64) DIMM
10	System Board (MS6303) with Onboard LAN
11	Diskette Drive Bracket
12	Riser Board (with 3 PCI Expansion Board Slots)
13	Riser Board Bracket
14	Chassis Top Cover/Front Bezel
15	Stand Assembly (Stabilizers)
16	Power Supply, 106 Watt
17	10-Watt Speakers w/Cables
18	AC Power Adapter, Speakers

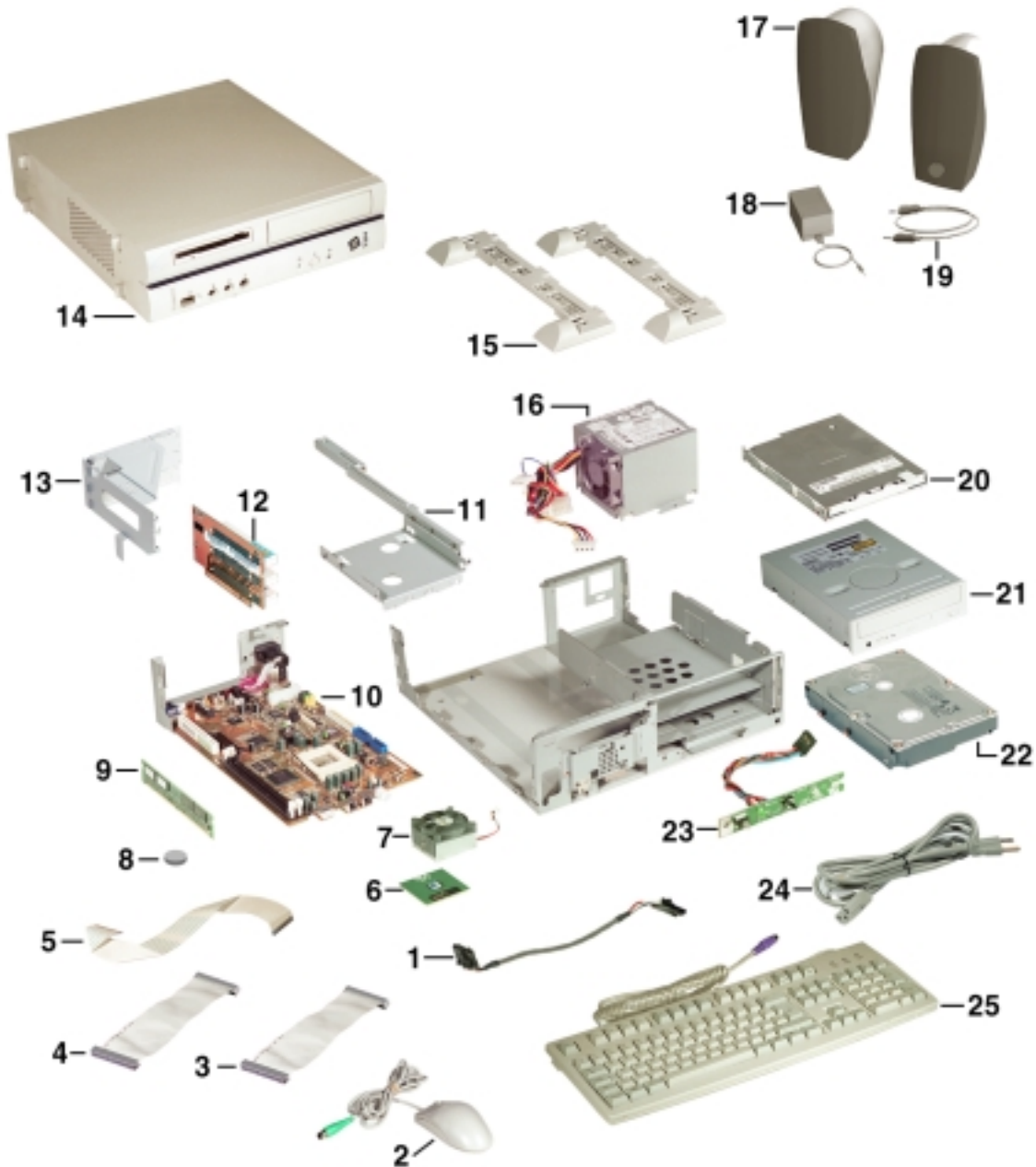
PowerMate ES SlimLine Series System FRU List

Item	Description
19	Sound Cable, Speakers
20	Mobile Type Diskette Drive, with Bezel
21a	40X or Higher CD-ROM IDE Drive
21b	8X or Higher DVD-ROM IDE Drive
22	10-GB or higher EIDE Smart Hard Drive, 5400 rpm or higher, DMA/66
23	LED Board Assembly
24	AC Power Cable
25	Windows Enhanced Keyboard
The following FRU items are not shown on the IPB	
—	Logo, NEC PowerMate
—	Volume Knob
—	Security Ring

Illustrated Parts Breakdown

The following figure shows the illustrated parts breakdown (IPB) for the PowerMate ES SlimLine Series system. Each FRU on the IPB is identified with a number that cross-references to the FRU list.

PowerMate ES SlimLine Series System Illustrated Parts Breakdown




6

Preventive Maintenance

- System Cleaning
- Keyboard Cleaning
- Mouse Cleaning

This section contains general information for cleaning and checking the system, keyboard, and monitor.

The system unit, keyboard, and monitor require cleaning and checking at least once a year, and more often if operating in a dusty environment. No other scheduled maintenance is required.

 **WARNING** Unplug all power cords before performing any maintenance. Voltage is present inside the system and monitor even after the power is off. All voltage is removed only when the power cord is unplugged.

System Cleaning

Use the following procedure for cleaning the system.


1. Power off the system and unplug all power cables.
2. Wipe the outside of the system, keyboard, mouse, and monitor with a soft, clean cloth. Remove stains with a mild detergent. Do not use solvents or strong, abrasive cleaners on any part of the system.
3. Clean the monitor screen with a commercial monitor screen cleaning kit. As an alternative, use a glass cleaner, then wipe with a clean lint-free cloth.
4. Local distributors and dealers may sell diskette drive head cleaning kits. These kits contain special diskettes and cleaning solution. Do not use the abrasive head cleaning kits (kits without cleaning solution).

Insert the diskette immediately after powering on the system, before disk bootup. Allow the diskette drive heads to clean for about 30 seconds.

Keyboard Cleaning

As necessary, inspect and clean the inside of the keyboard as follows.

1. Turn the keyboard over and remove the screws holding the keyboard enclosure together.

 **CAUTION** The keyboard and cable together are considered a whole-unit, field-replaceable assembly. Therefore, disassembly of the keyboard is necessary only when cleaning the inside.

2. Separate the two halves of the enclosure.
3. Clean the enclosure and keys with a damp cloth. Use a small, soft-bristle brush to clean between the keys.

Do not wet or dampen the keyboard's printed circuit board. If the board gets wet, thoroughly dry it before reattaching the keyboard to the system unit.

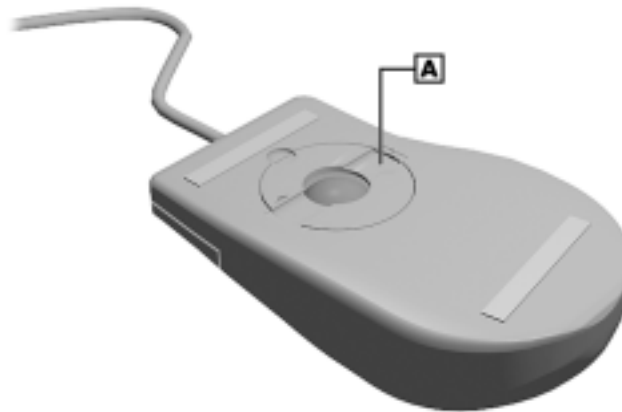
Mouse Cleaning

The mouse has a self-cleaning mechanism that prevents a buildup of dust or lint around the mouse ball and tracking mechanism under normal conditions. Periodically, however, the mouse ball must be cleaned. Use the following procedure to clean the mouse.

Note The following procedure describes cleaning of a typical mouse and should be used as a guideline. The procedure and mouse configuration might differ, depending on the type of mouse you have.

1. Power down the system and unplug the AC power cord.
2. Unplug the mouse from the system.
3. Turn the mouse upside down and locate the ball cover.

Locating a Typical Mouse Ball Cover



A – Typical Mouse Ball Cover

4. Turn the ball cover counterclockwise and remove the cover.
5. Turn the mouse over and remove the ball.
6. Clean the mouse as follows:
 - Clean the mouse ball with tap water and a mild detergent, then dry it with a lint-free cloth.
 - Remove any dust and lint from the mouse socket.
7. Replace the mouse ball in its socket.
8. Replace the ball cover and turn it clockwise until it locks in place.
9. Connect the mouse to the mouse port.
10. Plug in the AC power cord and press the power/sleep button.

7

Troubleshooting

- Checklist
- Diagnostics

This section provides information to help isolate and repair system malfunctions at the field level. The system has a built-in program that automatically checks its components when the system is powered on. If there is a problem, the system displays an error message. If this happens, follow any instructions on the screen.

If screen messages do not help or an error message does not appear, refer to the information in this section to help determine and correct the problem. For the more common problems, refer to “Checklist” for assistance. If the information in the checklist does not help, refer to “Diagnostics” for more detailed problem solving.

If disassembly is required, see Section 3, “Disassembly and Reassembly.” Jumper setting information is given in Section 2, “System Configuration” and in Section 4, “System Boards.”

Checklist

Check the following information for a match to a system or component problem and the possible cause and solution.

System Problems

- **No power and power lamp not lit.**

Check that the power switch is on.

Check that the power cable is plugged into the system power socket and that the other end is plugged into a live, properly grounded AC power outlet or surge protector.

Check the outlet or surge protector by plugging in a lamp.

- **Non-System Disk error message displays when the system is started.**

A diskette is in the diskette drive, and the diskette drive is set before the hard drive in boot order. Remove the diskette from drive A and restart the system.

- **Operating system not found error message displays when the system is started.**

If a CD is left in the CD-ROM drive, the system may not be able to boot. Try removing the CD and rebooting.

- **System does not boot and error message displayed on screen.**

Run the Setup Utility (see Section 2, “System Configuration”). Check that the parameters are set correctly, particularly if you just installed an option.

- **System emits continuous beeps.**

Turn the system off, wait at least five seconds, and turn the system on. If the beeps continue, call NECC Technical Support Center (see Section 8, “NECC Information Services” for telephone numbers).

- **System does not maintain date, time, system configuration information.**

Replace the CMOS battery (see “CMOS Battery Removal” in Section 3, “Disassembly and Reassembly”).

- **System does not boot from hard drive.**

The system usually tries to start from the diskette drive before it starts from the hard drive. Remove the diskette from the diskette drive.

Run the Setup Utility (see Section 2, “System Configuration”) and set the Boot parameter to hard disk device instead of floppy disk device.

- **System performance appears sluggish.**

Check that the system is set for optimal operation. See the operating system documentation.

Check the memory requirements of the software applications. If required, install additional DIMM memory (see Section 3, “Disassembly and Reassembly”).

If optional DIMM memory was added, check that it is correctly installed.

- **System password forgotten.**

See “Security Menu” in Section 2, “System Configuration.”

- **System shuts off instead of going into sleep mode.**

The power/sleep button might have been held in for four seconds or more. For sleep mode, press the button and immediately release.

- **System does not shut off after pressing the power/sleep button**

The power/sleep button might not have been pressed in and held long enough. Press in the button and hold for four or more seconds before releasing.

Diskette Drive Problems

Check the following problems to see the possible cause and solution.

- **Diskette won't load.**

Check that the drive does not have a diskette in it.

Check that the diskette is being loaded correctly.

Check that the system and monitor power lamps are on and the power-on screen appears.

Check that the diskette is formatted. If not, format it. See the operating system documentation.

Check that the diskette size is 1.44 MB.

If the diskette drive busy lamp does not light when loading the diskette, try a different diskette. If this loads, the problem is in the software.

- **Non-System Disk or Disk Error message displayed.**

If trying to boot from the diskette drive, insert a diskette with system files into the diskette drive.

If a bootable diskette does not boot, use the Setup Utility to verify that the initial boot parameter is set to diskette drive A and not a hard drive.

Monitor Problems

Check the following problems to see the possible cause and solution.

- **Monitor screen is dark or the display is hard to read.**

Check that the monitor is on.

Check that the monitor power cable is connected to the monitor and a power outlet, the monitor signal cable is connected to the system, and the brightness and contrast controls are adjusted.

Press the space bar or move the mouse to take the system out of the power management mode.

- **Distorted image appears on the monitor screen.**

Adjust the monitor's video controls.

If this does not help, turn the monitor off for several seconds, then back on.

- **There is constant movement on the screen.**

A magnetic field is affecting the monitor. Move any devices (fan, motor, another monitor) that generate magnetic fields away from the monitor.

- **The screen display is fuzzy or flickering; graphics characters or garbage appears on the screen.**

Check that the monitor is set up correctly and that all connections are correct.

Check that the video refresh rate and video driver are correct.

Check display properties. Click the right mouse button anywhere on the Windows desktop and a menu appears. Click **Properties** and the Display Properties window appears.

Keyboard/Mouse Problems

Check the following problems to see the possible cause and solution.

- **Mouse or keyboard does not respond.**

The mouse and keyboard might have been connected after turning on the system. Turn the system off, make sure the mouse and keyboard are connected, and turn the system back on.

- **Image appears on screen but nothing happens when using the mouse or keyboard.**

Make sure the keyboard or mouse cable is firmly connected to the rear of the system.

If this does not help, turn off the system, wait five or more seconds, and turn on the system.

- **Mouse cursor moves erratically or not at all.**

Clean the mouse (see "Section 6, "Preventive Maintenance").

If this does not help, the mouse might need to be replaced.

CD-ROM Drive Problems

Check the following problems to see the possible cause and solution.

- **The system does not see the CD-ROM drive.**

The drive designation is wrong and should be changed. The drive designation for the drive depends upon the storage device configuration in the system. To find out what drive designation letter is assigned to the drive, double click **My Computer** on the Windows desktop. The drive designation is below the drive icon.

As an alternative, open Windows Explorer and scroll down the list of folders until you locate the drive icon. The drive designation is next to the icon.

- **The CD-ROM drive is not reading a disc.**

Check that the disc is inserted in the CD tray with the printed label side up.

Check that the disc is a data disc, not a music disc.

Clean the non-label side of the disc with a soft lint-free cloth, gently rubbing from the center of the disc to the outer edge of the disc. Or use a commercial CD-ROM disc cleaner.

Try a different CD to see if the problem is limited to one CD.

- **The CD does not eject due to a power failure or software error.**

Use the emergency eject feature to open the CD tray. Remove the system cover to access the front of the CD-ROM drive (see Section 3, “Disassembly and Reassembly” for cover removal procedures). Insert the end of a paper clip into the CD-ROM emergency eject hole at the front of the CD-ROM drive. Press inward on the clip to open the CD tray.

- **The CD-ROM drive plays music CDs but the sound is not heard.**

Check that the speaker power is on (see “Speaker Problems”).

Adjust the volume control on the speakers.

Check the volume control in the system tray along the taskbar.

Check that the cable connecting the CD-ROM drive to the system board CD audio connector is in place and secure.

Speaker Problems

Check the following problems to see the possible cause and solution.

- **No sound from the speakers.**

Check that the speaker power is on. Verify that all speaker cable connections are correct and secure.

Check that the power adapter is connected to the power source and the speaker.

If using a headphone, check that it is not plugged in. Plugging in the headphone turns off the speaker set.

- **Speaker volume is too low.**

Adjust the volume control on the speaker. If the volume is still too low, adjust the volume through the system software. See the Windows Multimedia online help.

- **Sound is only coming from one speaker.**

Balance the speaker output by adjusting the balance in the sound software. See the Windows Multimedia online help.

Diagnosics

One beep indicates that the system has completed its POST test. If intermittent beeping occurs, power off the system and try again. If the beeping persists, see the following table. The table summarizes problems that may develop during system operation and lists (in sequential order) suggested corrective actions.

Problems and Solutions

Problem	Symptom	Solution
No power	Power lamp on front panel does not light.	<ol style="list-style-type: none">1. Check that the power cord is plugged into the power socket on the system. Check that the other end of the cord is plugged into a live, properly grounded AC power outlet.2. Check cable connections between the power supply and system board and between the system board and power switch.3. Systematically eliminate possible shorted PCBs by removing cables and expansion boards.4. Check +5 and +12 power supply voltages. Measure voltages with system board installed.5. Replace the LED board assembly.6. Replace the power supply.7. Replace the system board.
Power supply malfunction	Any of the following conditions could occur: Front panel lamps out, diskette and/or hard drive does not spin, monitor blank, interface ports not working, and keyboard lamp out and/or cannot input from keyboard.	<ol style="list-style-type: none">1. Perform steps 1 through 4 listed in this table under No Power.2. Check power supply voltages. Voltages should be measured with a load on them (system board plugged in).3. Replace the power supply.
Operating system does not boot	Intermittent beeping at power-on. Computer beeps more than once and is unable to complete boot-up.	<ol style="list-style-type: none">1. Check system configuration (see Section 2).2. Check all jumper settings and verify that drives are enabled (see Section 2 and Section 4).3. Reseat DIMMs, riser board, and option boards in their connectors. Inspect system board for foreign objects such as paper clips.4. Remove option boards and reboot.5. Replace system board.

Problems and Solutions

Problem	Symptom	Solution
Operating system does not boot (cont'd)	"Invalid Configuration" message displayed.	<ol style="list-style-type: none">1. Press F2 to run Setup and correct the parameters.2. Replace the CMOS battery (see Section 3) if the date and time must be set each time the system is powered on.
	System halts during loading sequence.	<ol style="list-style-type: none">1. Power the system off. Check for proper jumper settings (see Section 2 and Section 4), then power-on the system.2. Check the condition of the selected bootload device (diskette, disc, or hard disk) for bad boot track or incorrect OS files.3. Try booting OS from diskette or disc, or recopy OS files onto hard disk (see Section 2).
Diskette drive does not work	Lamp on front panel does not light when diskette is loaded.	<ol style="list-style-type: none">1. Check cable connections between diskette drive and system board.2. Check diskette drive cable. Replace as necessary.3. Check power supply.4. Replace diskette drive.5. Replace system board.
Hard drive malfunction	Hard drive lamp does not light but hard drive can be accessed.	<ol style="list-style-type: none">1. Check cable connections between lamp and system board.
	Hard drive controller failure message displayed.	<ol style="list-style-type: none">1. Check that the IDE channel and hard drive are enabled in Setup (see Section 2).
	Cannot access hard drive.	<ol style="list-style-type: none">1. Check signal/power connections between hard disk, system board, power supply.2. Check hard drive jumper settings.3. Check power supply.4. Check hard drive cable and hard drive. Replace as necessary.5. Replace system board.
Memory malfunction	Total memory not recognized.	<ol style="list-style-type: none">1. Reseat DIMMs.2. Systematically swap DIMMs.3. Check to see if the DIMM configuration is valid (see Section 4).4. Replace DIMMs.5. Replace system board.

Problems and Solutions

Problem	Symptom	Solution
Keyboard or mouse malfunction	Monitor has prompt, but cannot input data using keyboard or mouse.	1. Check keyboard/mouse plugged in.
		2. Check password (see Section 2).
		3. Disable password (see Section 2).
		4. Replace keyboard (or mouse).
		5. Replace system board.
Monitor malfunction	Unable to synchronize display.	1. Adjust the monitor's synchronization controls.
		2. Check that the monitor's resolution matches the video setting or the video driver used.
		3. Check that the utility is not selecting a refresh rate/resolution that is not supported by the monitor.
		4. Check that the driver used matches the capabilities of the built-in video controller and DRAM.
	Wavy display.	1. Check that the system and monitor are not near motors or electric fields.
	Blank display.	1. Press any key or move the mouse to ensure power management has not blanked the display.
		2. Check that the monitor power ON/OFF switch is ON.
		3. Adjust brightness and contrast controls on the monitor.
		4. Check that the monitor cable is attached to the video connector at the back of the system.
		5. Check cable connections between the AC power supply and monitor.
		6. Replace monitor.
CD-ROM drive malfunction	System power not on.	1. Turn system power on.
	Disc tray does not open.	1. System power not on. Turn system power on.
		2. System power failed. Remove the system cover, insert the end of a straightened paper clip into the emergency eject hole on the front of the CD-ROM drive, and gently press inward until the tray opens.

Problems and Solutions

Problem	Symptom	Solution
CD-ROM drive malfunction (cont'd)	No sound from CDs.	<ol style="list-style-type: none">1. Check that speaker power is on and volume is adjusted.2. Check audio software settings.3. Check the CD.4. Check the CD-ROM drive audio cable connections.5. Check the CD-ROM drive audio cable. Replace as necessary.6. Replace the CD-ROM drive.7. Replace the system board.
	Cannot access CD-ROM drive.	<ol style="list-style-type: none">1. Check that the CD-ROM driver software is loaded and not corrupted.2. Check signal and power connections between the CD-ROM drive, system board, and power supply.3. Check the master/slave jumper settings (see Section 2).4. Check the interface cable. Replace as necessary.5. Check the power supply. Replace as necessary.6. Check the system board. Replace as necessary.

8

NECC Information Services

- Service Telephone Numbers
- Technical Support

This section contains the following NECC service and support information:

- service and support telephone numbers
- technical support.

Service Telephone Numbers

The following table lists the telephone numbers for the NECC service and support functions.

<i>NECC Service and Support Telephone Numbers</i>	
Service	Telephone Numbers
To contact NECC Technical Support Center (TSC):	In the U.S. and Canada, call 1 (800) 632-4525
To order spare parts:	Call 1 (800) 632-4525
To send technical questions by email:	tech-support@nec-computers.com
To fax technical questions to customer support:	In the U.S., fax 1 (801) 981-3133
To access the NECC website:	www.nec-computers.com/
To access the NECC FTP site:	ftp.neccsdeast.com/

Technical Support

The following sections provide information for obtaining technical support from NECC. With access to a telephone, modem, and/or fax machine, you can use these services to obtain information on a 24-hour basis.

NECC Website

If you have an Internet connection, you can access the NECC website. The NECC website contains general information about NECC and its products. The website also contains press releases, reviews, and service and support information.

Look in the Service and Support area for the following:

- technical documentation, including Frequently Asked Questions, user's guides, reference manuals, and warranty information
- BIOS updates, drivers, and setup disk files to download
- contact information, including telephone numbers for Technical Support and links to vendor websites
- an automated email form for your technical support questions
- a Reseller's area (password accessible).

To access the NECC Home Page, enter the following Internet Uniform Resource Locator (URL) in your browser.

www.nec-computers.com/

NECC FTP Site

You can use the Internet to access the NECC FTP (file transfer protocol) site to download various files (video drivers, printer drivers, BIOS updates, and Setup Disk files). The files are essentially the same files as on the NECC website.

To access the NECC FTP site, enter the following Internet ftp address through your Internet Service Provider:

ftp.neccsdeast.com

Once in the file menu, follow the prompts to choose and download the file(s) you want.

Email/Fax Technical Support Service

The NECC Technical Support Center offers technical support by Internet email if you have access. The Internet email address is:

tech-support@nec-computers.com

You can also fax technical questions to the NECC Technical Support Center if you have access to a fax machine or fax/modem. The fax number is:

1 (801) 981-3133

When using the email or fax support service, please include one of the following words in the subject field for prompt response from the appropriate technical person:

- Desktop
- Monitor
- Notebook.

Provide as much specific information in your questions as possible. Also, if sending a fax, please include your voice telephone number and your fax number with the question. You should receive a response to your questions within one business day.

Technical Support Services

NECC also offers direct technical support through its Technical Support Center. (NECC technical support is for U.S. and Canadian customers only; international customers should check with their sales provider.)

Direct assistance is available 24 hours a day, 7 days a week. Call the NECC Technical Support Center, toll free, at **1 (800) 632-4525** (U.S. and Canada only) for the following support.

- System hardware — toll-free phone support is limited to the length of the standard warranty.

For hardware support after the standard warranty, obtain system hardware support for a fee.

- Preinstalled software — toll-free phone support for 90 days from the time of your first call to the NECC Technical Support Center.

After the initial 90 days, obtain preinstalled software support for a fee.

Please have available the system's name, model number, serial number, and as much information as possible about the system's problem before calling.

For callers outside the U.S. and Canada, please contact your local NECC sales provider.

9

Specifications

- System Board
- Keyboard
- Mouse
- Optional Speaker Set
- System Unit
- Diskette Drive
- Hard Drive
- Power Supply
- CD-ROM Drive
- Environmental
- Compliance

This section contains the specifications for the various components comprising the PowerMate ES SlimLine Series systems. The following table lists the specifications and the pages where the specifications can be found.

System Specifications

Specification	Go to Page
System board	9-2
Keyboard	9-3
Mouse	9-3
Speaker set	9-4
Diskette drive	9-5
Hard drive	9-5
Power supply	9-6
CD-ROM drive	9-6
Environmental	9-7
Compliance	9-7

System Board Specifications

The specifications for the system board are included in the following table.

System Board Specifications

Feature	Specification
System Board	Micro-Star International MS-6303 with onboard LAN
Processor	Celeron: 466-MHz or higher processor, 66-MHz or higher FSB Pentium III: 533-MHz or higher processor, 133-MHz or higher FSB
L1 Cache	Celeron: 32-KB primary cache (16-KB data, 16-KB instruction) Pentium III: 32-KB primary cache (16-KB data, 16-KB instruction)
L2 Cache	Celeron: 128-KB secondary cache Pentium III: 256-KB secondary cache
Flash ROM	4-Mb Flash ROM
Chip Set	Intel 810E with 82810E Graphics Memory Controller Hub, 82801 I/O Controller Hub, 82802 Firmware Hub, Dynamic Video Memory Technology (DVMT), Audio-Codec 97 Controller, and System Manageability Bus
I/O Controller	Winbond Super I/O controller
System Memory	64 MB to 512 MB in two DIMM sockets on system board
Optional DIMMs	64 MB, 128 MB, 256 MB; 168-pin, 64-bit (non-ECC) DIMMs

System Board Specifications

Feature	Specification
Graphics Memory	Shared with system memory (DVMT)
Audio	Audio-Codec (AC) 97 controller integrated on 810E chipset
Battery	Replaceable coin-type battery

Keyboard Specifications

The specifications for the keyboard are included in the following table.

Keyboard Specifications

Feature	Specification
Keyboard	Cherry Windows 95 Enhanced
Dimensions	Width: 6.7 inches (170.2 mm) Length: 18.0 inches (457.2 mm) Height: 1.4 inches (35.6 mm)

Mouse Specifications

The specifications for the mouse are included in the following table.

Mouse Specifications

Feature	Specification
Mouse	Logitech
Physical Features	Length: 4.53 inches Width: 2.6 inches Height: 1.52 inches Weight: 170 grams +/- 20 grams
Temperature Range	Operating: 5° to 35° C Storage: -20° to 60° C

Optional Speaker Set Specifications

The specifications for the optional speaker set (if ordered) are included in the following table.

Speaker Specification

Feature	Specification
Speakers	NEC
Features	Magnetically shielded 10-watt stereo speakers Power on/off/volume switch 15-volt AC power adapter
Performance	Frequency response, 90-20 kHz, 2 dB Sensitivity, 300 mV Output power, 4.5 watts

System Unit Specifications

The specifications for the system unit are included in the following table.

System Unit Specifications

Feature	Specification
Dimensions (slimtower)	Width: 3.4 inches (87 mm) Depth: 12.9 inches (332 mm) Height: 12.3 inches (315 mm)
Weight	12.8 lb. (5.8 kg)
Device Slots	One 5 1/4-inch front accessible slot One 3 1/2-inch front accessible slot One 3 1/2-inch internal bay
Expansion Board Slots	Three 32-bit PCI slots
Peripheral Interface (rear panel)	PS/2-style keyboard connector PS/2-style mouse connector One RS-232C serial port Parallel printer port VGA monitor port LAN port One universal serial bus port Two audio connectors
Front Panel	Power/sleep button Power/sleep indicator lamp Hard drive busy indicator lamp One universal serial bus port Microphone jack Headphone jack Volume control

Diskette Drive Specifications

The specifications for the diskette drive are included in the following table.

Diskette Drive Specifications

Feature	Specification
Diskette Drive	Notebook type diskette drive
Recording Capacity	High density mode: Unformatted: 2.00/1.00 MB Formatted: 1440 KB (512B 18 Sec) 720 KB (256B 18 Sec) Normal density mode: Unformatted: 1.00/0.50 MB Formatted: 640 KB (256B 16 Sec) 320 KB (128B 16 Sec)
Data Transfer Rate	High density mode: 500/250 Kbit/sec Normal density mode: 250/125 Kbit/sec

Hard Drive Specifications

Systems come with a 10-GB or higher Ultra DMA/66 hard drive with SMART technology. The following table includes the drive's general specifications.

Hard Drive Specifications

Feature	Specification
Hard Drive Capacity	10-GB or higher, 5400 rpm or higher rotational speed
Buffer Size	512 KB or higher
Power	+5V +/-5%; 100 mV peak-to-peak allowable ripple/noise 12V +/-5%; 250 mV peak-to-peak allowable ripple/noise
Temperature (non-condensing)	Operating: 5° to 55° C (41° to 131°F) Non-operating: -40° to 71°C (-40° to 160°F)
Humidity (non-condensing)	Operating: 5% to 85% rh, 30°C (86°F) Non-operating: 5% to 95% rh, 40°C (104°F)
Altitude	Operating: -200 m to 3,000 m (-650 to 10,000 ft.) Non-operating: -200 m to 12,000 m (-650 to 40,000 ft.)
Dimensions	Height: 1.02 inches (25.9 mm) Width: 4.02 inches (102.1 mm) Depth: 5.77 inches (146.6 mm)
Weight	1.3 lbs (0.59 Kg)

Power Supply Specifications

The specifications for the 106-watt power supply are included in the following table.

Power Supply Specifications

Feature	Specification
Power Supply	106-watt
AC Power Input	100 — 240 volt, 50-60 Hz
Switch Selectable	115 or 230 volts
Power Connectors	One diskette drive, one system board, two storage devices (hard drive and CD-ROM drive or DVD-ROM drive)
Power Management	Full-power reduction
Temperature Range	Operating: 10° to 50° C Storage: -40° to 70° C

CD-ROM Drive Specifications

Some systems might come with a 40X or higher CD-ROM drive. The general specifications for the drive are included in the following table.



CAUTION Use of CD-ROM drive controls, adjustments, or the performance of procedures other than those specified in this document may result in hazardous radiation exposure.

CD-ROM Drive Specifications

Feature	Specification
CD-ROM Drive	40 X or higher
Interface	ATAPI/EIDE Supports PIO Mode4, DMA Mode 2, and Ultra DMA
Average Access Time	<80 ms (typical)
Applicable Disc Format	Mixed Mode (Audio and Data Combined) ISO9660, CD-DA, Mode 1 (basic format), Mode 2 form 1 and form 2, Photo-CD (Single and Multisession), CD-I/FMV, CD-Extra, Video CD, CD-DA, CD-RW
Data Transfer Rate/Sustained Data Transfer Rate (40X)	2550 - 6000 Kbytes/sec
Voltage tolerance	+5V DC +/-5%; +12V DC +/-10%
Temperature	Operating: 5° to 45° Non-operating: -20° to 60°

CD-ROM Drive Specifications

Feature	Specification
Humidity	Operating: 20% to 80% (non-condensing) Non-operating: 20% to 90% (non-condensing)
Physical Dimensions	H x W x L: 41.3 x 145.8 x 190.5 mm max
Weight	1.2 Kg (typical)

Environmental Specifications

The system environmental and safety specifications are included in the following table.

Specifications

Feature	Specification
Operating Environment	Temperature: 32°F to 95°F (0°C to 35°C) Relative Humidity: 85% at 35°C

Compliance

The system meets the compliance standards listed in the following table.

System Compliance

Usage	Standard
Domestic	FCC CFR 47 Part 15, Subpart B UL 1950 3 rd edition
Canadian	C-UL C22.2 No. 950-95 ICES-003 Issue 2, Revision 1
Year 2000	YMARK 2000 NEC Y2KTEST.EXE WHQL
DMI	DMI 2.0 Self Certification Test Suite
Energy Star	All systems are Energy Star Compliant

Glossary

A

access time

The time period between the supply of an access signal and the output or acceptance of the data by the addressed system. Examples are the access times for DRAMs, SRAMs, hard drives, and CD-ROM drives. Hard drive access time is the time it takes for a computer to get data from the drive. A hard drive with an 11 ms access time is fast. A CD-ROM drive with a 280-ms access time is fast.

ACPI

Advanced Configuration and Power Interface. A power management specification developed by Intel, Microsoft, and Toshiba. When installed on the system, ACPI enables the operating system to control the amount of power given to each device attached to the computer. With ACPI, the operating system can turn off peripheral devices (such as CD-ROM drives) when they are not in use. As another example, ACPI enables manufacturers to produce computers that automatically power up as soon as you touch the keyboard.

adapter

An expansion board or component on the system board that communicates with peripherals (such as the display monitor or network devices).

address

A hexadecimal number that represents a location in storage or memory. Also used to identify communication ports. To communicate with a storage device.

AGP

Accelerated Graphics Port. A high-speed, high-performance video standard supported by a dedicated connector on the system board. The connector allows the connection of an AGP board to the system board's AGP bus. AGP boards feature 64- or 128-bit graphics acceleration with an integrated digital video engine and accelerated 3-D graphics, texture mapping, and shading functions. Fast refresh rates, high resolution, and color depth allow for incredible graphics suitable for multimedia and graphic intensive applications.

algorithm

Any set of instructions to be followed in order.

anti-aliasing

Making jagged edges look smoother by filling in the jags with an intermediate color. Usually used in reference to the edges of shapes, especially letters, on a computer screen.

API

Application Programming Interface. An API is a series of functions that programs can use to make the operating system do routine or repetitive tasks. Using Windows APIs, for example, a program can open windows, files, and message boxes (as well as perform more complicated tasks) by passing a single instruction. Windows has several classes of APIs that deal with telephony, messaging, and other issues.

APM

Advanced Power Management. An API developed by Intel and Microsoft that allows developers to include power management in the BIOS. APM defines a layer between the hardware and the operating system that effectively shields the programmer from hardware details.

application programs

Software designed to perform specific functions or a group of functions, like solving business or mathematical problems. Examples of applications include word processing, communications, or database management.

architecture

A general term for the design and construction of computer systems, particularly hardware, but also operating systems and networks. The circuitry within a chip is called its architecture; for example, Intel architecture can refer to a computer based on the Intel Celeron, Pentium II, or Pentium III chips.

archive

Copying one or more files to a different location for long-term data storage, especially for backup and security purposes. Files can then be added to or deleted from the archive. Also refers to the location where data is stored.

ASIC

Application Specific Integrated Circuit. A chip designed for use on a particular circuit board, or for a very narrow range of use. The digital signal processor chip on a modem is an ASIC.

asynchronous

Refers to operations that do not require the clocks of communicating devices to be coordinated. Instead, the devices send signals to each other indicating readiness to receive or send. Compare synchronous.

asynchronous cache

The slowest, most inexpensive type of secondary SRAM cache, running at speeds of 15 to 20 ns.

ATA

AT Attachment. A standard for connecting hard drives or other devices to an AT bus; synonymous with IDE.

AT bus

The AT bus system with support chips (DMA, PIC, etc) and a 16-bit bus slot. The AT bus is strictly defined by ISA.

audio

Relating to or capable of producing sound. Multimedia computers make extensive use of audio.

AVI

A digital movie format created by Microsoft. AVI is short for "audio/video interleave," a method of including a digital movie and its accompanying sound in the same file. Files in the AVI format have the .AVI extension.

B**bad sector**

Part of a hard drive or diskette drive storage medium that doesn't hold data. Formatting generally detects and marks these areas so they won't be used. Certain utility programs do, too, and it is a good idea to run this type of utility occasionally to prevent data loss if the condition of the drive changes.

bandwidth

A measure of how much information something can carry. Specifically, data path times frequency. For example, the ISA bus has a data path of 16 bits (it can send 16 bits at a time) and typically operates at 8.33 MHz, so it has a bandwidth of 133.28 megabits per second (Mbps).

base RAM

Area of system memory between 0 and 640 kilobytes available to the user for operating system and application programs.

batch file

A file that contains a series of DOS commands. Batch files have the extension .bat. If you execute a batch file, DOS attempts to carry out all the commands in the file, in order.

baud

A unit of measure for modem speed. Literally, the number of voltage transitions per second. Phone line limitations limit the actual baud rate of modems to 2400 baud, although the data transmission rate (bps) may be higher because of data compression.

BBS

Short for Bulletin Board Service. Software that serves as a communication and information source for computers that communicate by modem.

BIOS

Basic Input/Output System. A program or set of programs permanently stored in ROM chips installed on the system board. The BIOS contains functions that control the real-time clock, keyboard, disk drives, video display, and other peripheral devices. For example, the BIOS Setup utility program is contained in the BIOS, and when you change the drive type, you change the BIOS.

bit

Binary digit. The smallest unit of computer data. A single digital piece of information, generally represented by the numeral 0 or 1. Usually the transition between the states of +5V and -5V within a computer, the charge of a transistor in an integrated circuit, or the change in polarity of a magnetic region on a disk. See byte. Data compression schemes can enable the transmission of more than one bit per voltage transition.

bit block transfer

Moving part of a screen image as a single block rather than moving a pixel at a time. Bit block transfers are much faster than moving the same pixels individually, and it is common in accelerated video cards.

bitBLT

Bit Block Transfer.

bitmap

Any occurrence where a single location in memory and a single pixel correspond. Usually applies to screen or printer output. .BMP files are bitmapped graphics files.

bits per second

(bps) A unit of transmission. Also called baud rate.

block

A contiguous section of bits considered as a whole, especially in memory. On a disk, the data in one sector; in modem data transfer, the bits between checksums.

board

Printed circuit board. Board onto which computer components are soldered and thin wires are printed to connect the components.

boot

To start up a computer. The computer is generally booted in one of three ways: by turning on the power switch (cold boot), by pressing the reset switch, or by simultaneously pressing the Ctrl, Alt, and Del keys (warm boot). Booting the system after it has already been powered up and booted is referred to as rebooting. Also the process of booting itself. Boot is from "bootstrap," a reference to a computer's ability to set itself up, or pull itself up by its own 'bootstraps.' See cold boot and warm boot.

bootable device

Any type of hardware that carries the information (software) required by the computer to start properly. This device must also have the capacity to be recognized by the computer in the first stages of the boot process.

boot block

The part of a disk that contains the software (such as the operating system loader) that enables the computer to start.

boot sector

The part of the boot block that contains the operating system loader, a program that starts by itself and loads the operating system.

bps

Bits per second. The number of bits of data that can be transmitted in one second. Because data compression schemes enable more than one bit per voltage transition, bps is equivalent to baud only if no compression is used.

buffer

A place, especially in RAM, for the temporary storage of data for the purpose of speeding up an operation such as printing or drive access. Data from a buffer is available more quickly than data from where the buffer got it. Typically buffers get data before it is needed so it is ready quickly when needed. Similar to cache.

burst mode

When a device seizes control of the bus, sends data, then relinquishes control of the bus. Any time a device sends data without interruption instead of taking turns with other devices.

bus

A parallel electrical pathway on the system board, connecting and shared by the parts of a computer system (especially the CPU, its support circuitry, memory, and expansion cards), used for transmitting data or electrical power from one device to another. Typically the lines in a bus are dedicated to specific functions, such as control lines, address lines, and data lines. Different bus architectures have different numbers and arrangements of these lines, and different names (for example, ISA, PCI). The most useful way of distinguishing bus architectures is by the number of simultaneous data bits they can carry. The ISA is a 16-bit bus, while PCI is a 32-bit bus.

bus master

The ability of an expansion card to control the bus without needing intervention from the CPU.

byte

Group of eight contiguous bits. Frequently written as an eight-digit binary number or a two-digit hexadecimal number. One letter of the alphabet in ASCII code takes one byte.

C**cache**

A special block of fast memory used for temporary storage of frequently used data for quick retrieval. A memory cache, sometimes called a cache store or RAM cache, is a portion of memory made of high-speed static RAM (SRAM) instead of the slower and cheaper dynamic RAM (DRAM) used for system memory. Memory caching is effective because most programs access the same data or instructions over and over. By keeping as much of this information as possible in SRAM, the computer avoids accessing the slower DRAM. See “write-back” and “write-through.”

chassis

The metal frame to which the electronic components of the computer (such as the system board, power supply, and drive bays) are attached. The chassis goes inside the system unit cover.

checksum

A number, calculated from a block of data, used to verify the integrity of that data. For example, a modem could send a block of data and include the number of 1's that occur in the block. The receiving modem could count the number of 1's it receives and compare its own number with the transmitted number. If the numbers are the same, the transmission was probably OK.

clock

Electronic timer (oscillator) used to synchronize computer operations. The oscillator generates the timing pulses that coordinate and enable the flow of data within a digital device. Also a circuit powered by battery that keeps track of the date and time for human and various system requirements.

clock speed

The frequency at which a clock oscillates. In microcomputers, measured in MHz. The faster the clock, the faster the computer can compute.

CMOS

Complementary Metal Oxide Semiconductor. A chip on the system board that contains nonvolatile memory. CMOS is backed up by an internal lithium battery that preserves clock/calendar data and system configuration parameters stored in CMOS.

codec

Coder-decoder. Used primarily with Internet phone and video conferencing products, this software compresses digitized data and decompresses it at the other end, allowing for faster data transfer and less delays

cold boot

Process of starting up the computer by turning on the power. If power is already on, the process means to turn off the computer and turn it on again. A cold boot reinitializes all devices.

compression

Any scheme for recording data with fewer bits. For example, stating how many times something occurs can be shorter than stating each occurrence. It is shorter to say “print a million white pixels” than to say “print white pixel number one, print white pixel number two . . .”

D**default**

The system’s factory setting for a specific device feature or system function. A setting that a computer uses if it has not been modified by a user.

DIMM

Dual Inline Memory Module. Circuit board with pins connecting to different memory chips on both sides of the board, which allows for wider and faster data transfer (128-bit). See SIMMs.

DMA

Direct Memory Access. A method for transferring data, usually between memory and a disk drive, without going through the CPU.

DMI

Desktop Management Interface. A standard for PCs that allows manipulation of PC components over a network from a centralized location.

DRAM

Dynamic Random Access Memory. Memory used to store data in most computers. DRAM is temporary and must be continually refreshed. It is only active when the computer is turned on.

driver

A software program that enables peripheral devices (for example, printer, monitor, mouse, CD-ROM drive) to work with computers.

DVD

Digital versatile disc or digital video disc. A type of CD-ROM that holds a minimum of 4.7 GB, enough for a full-length movie. The DVD specification supports disks with capacities of from 4.7 GB to 17 GB and access rates of 600 Kbps to 1.3 Mbps. One of the features of DVD drives is that they are backward-compatible with CD-ROM disks. This means that DVD players can play old CD-ROMs, CD-I disks, and video CDs, as well as new DVD-ROMs. Newer DVD players can also read CD-R disks. DVD uses MPEG-2 to compress video data. See MPEG.

E

ECC memory

Error Checking and Correcting memory. Advanced type of memory that can find and correct certain types of single-bit memory errors, providing greater data integrity. Advanced ECC can correct some double-bit errors.

ECP

Extended Capabilities Port. A parallel-port standard for PCs that supports bidirectional communication between the PC and attached devices (such as a printer). ECP is about 10 times faster than the older Centronics standard. Another modern parallel port for PCs that offers similar performance is the EPP (Enhanced Parallel Port).

EDO memory

Extended Data Out memory. A faster type of asynchronous computer memory that holds its last-requested data in a cache after releasing it. EDO memory is designed for use with the Intel Pentium processors.

EIDE

Extended Integrated Drive Electronics. The EIDE specification is an enhanced version of IDE that allows for faster transfer rates and supports larger hard drive sizes

enhanced VGA

A video interface that offers more colors or higher resolution than VGA.

EPP

Enhanced Parallel Port, a parallel port standard for PCs that supports bidirectional communication between the PC and attached device (such as a printer). EPP is about 10 times faster than the older Centronics standard. Another modern parallel port for PCs that offers similar performance is the ECP (Extended Capabilities Port).

extended RAM

The area of RAM above the first megabyte of memory in the system available for enhancing system performance.

F

FAT

File Allocation Table. A table near the beginning of a drive that identifies the location of everything on the drive.

flash ROM

Method in which a computer's BIOS ROM can be upgraded without replacing the ROM BIOS chip.

FTP

File Transfer Protocol. A method of transferring files between two computers on a TCP/IP network (such as the Internet). "Anonymous FTP" (the most common usage on the Internet) allows a user to download files without having an account at the remote computer.

function key

The set of keys on the keyboard (usually F1 through F12) that let you get help and error message information or quickly select frequently used commands.

G

graphics accelerator

A term referring to a higher end video controller that handles high-speed graphics and usually contains several megabytes of onboard video memory.

GUI

Graphical User Interface. Method of presenting information on a computer screen utilizing icons, pull-down menus, and a mouse.

H

hertz

(Hz) A unit of frequency equal to one cycle per second.

hexadecimal

A number system that uses 16 as the base. (Place value indicates powers of 16.) It uses the digits 0-9 and A-F. Used around computers because a byte (eight binary digits) easily converts to a two digit hexadecimal number. Hexadecimal numbers are often indicated with the letter H, a dollar sign, or a subscripted 16 after the number. Compare binary, decimal.

host adapter

An expansion board that serves as a controller for SCSI devices.

hot key

Combination of two or three keys (such as **Ctrl-Alt-D**) that you press simultaneously for a particular function.

hot plugging

The ability to add and remove devices to a computer while the computer is running and have the operating system automatically recognize the change. The Universal Serial Bus (see USB) external bus standard supports hot plugging. This is also a feature of PCMCIA. Hot plugging is also called hot swapping.

I

IDE

Intelligent Drive Electronics. A hard drive type that has controller electronics built into the drive and delivers high throughput.

interface

A connection that enables two devices to communicate.

interrupt

A signal from part of a system, such as an I/O device, asking to use the CPU. Interrupts are hierarchical, which prevents interrupts from interrupting each other. (Whichever interrupt has higher priority makes the other interrupt wait.) When the CPU receives an interrupt signal, it saves what it is doing, processes the routine associated with the interrupt, then returns to what it was doing.

I/O address

Input-Output address. How the CPU sees an I/O port. It puts data into this address or reads the data in it. The device at the other end of the I/O port gets the data from that address or puts the data there, respectively.

IRQ

Interrupt Request. A signal that, when received by the CPU, makes it stop what it is going to do something else. An interrupt is a way in which a particular device in a computer communicates with the CPU. PCs have 16 IRQ lines that can be assigned to different devices (for example, printers, scanners, modems). No two devices can have the same IRQ address. See interrupt.

ISA

Industry Standard Architecture. The bus architecture used in the IBM PC/XT and PC/AT. The AT version of the bus is called the AT bus and has become an industry standard. The apparent successor is the PCI local bus architecture found in most of today's computers. Most modern computers include both an AT bus for slower devices and a PCI local bus for devices that need better bus performance. In 1993, Intel and Microsoft introduced a new version of the ISA specification called Plug and Play ISA. Plug and Play ISA enables the operating system to configure expansion boards automatically so that users do not need to fiddle with DIP switches and jumpers. See plug and play.

isochronous

A form of data transmission in which individual characters are only separated by a whole number of bit-length intervals.

K**kilobyte**

(KB) 1024 bytes.

L**L2 cache**

Refers to "level 2" or "secondary" cache. A type of cache that resides on the motherboard except when referring to a Pentium machine, where it resides on the CPU module.

LAN

Local Area Network.

LPT1

Name assigned to the parallel port by the Windows operating system. A second parallel device is assigned LPT2 (if there is another parallel port). Also called the printer port.

M**master**

Part of a two-sided communication that initiates commands (to a "slave" that carries out the commands).

megabyte

(MB) 1,048,576 bytes.

memory

Electronic storage area in a computer that retains information and programs. A computer has two types of memory: read-only memory (ROM) and random access memory (RAM).

microprocessor

A semiconductor central processing unit that is the principal component of a microcomputer. Usually contained on a single chip that includes an arithmetic logic unit, control logic, and control-memory unit.

MIDI

Musical Instrument Digital Interface. An interface for connecting suitably equipped musical instruments to suitably equipped computers.

MIF

Management Information File. A file stored on a PC that holds system data such as a model ID and serial number that can be manipulated over a network from a centralized location.

MMX

A processor architecture that enhances multimedia and communications. This technology processes multiple data elements in parallel, speeding up such things as image processing, motion video, speech synthesis, telephony, and 3-D graphics.

modem

MODulator-DEModulator. A device that links computers over a telephone line.

MPC

Multimedia Personal Computer, a software and hardware standard developed by a consortium of computer firms led by Microsoft. There are three MPC standards, called MPC, MPC2, and MPC3, respectively. Each specifies a minimum hardware configuration for running multimedia software.

MPEG

Motion Pictures Expert Group. Audio/Video technology that allows for better than VHS quality video and almost CD quality audio by using advanced compression techniques. MPEG files allow for more realistic motion with a smaller file size than earlier formats, making it a popular format for digital full-length movies. Files in the MPEG format have an .MPG extension.

N**nonvolatile memory**

Storage media that retains its data when system power is turned off. Nonvolatile memory is a complementary metal oxide semiconductor (CMOS) chip that is backed up by an internal battery. The backup battery preserves the clock/calendar data and system configuration parameters stored in CMOS. See volatile memory.

O**operating system**

Set of programs that manage the overall operation of the computer.

overwrite

Storing information at a location where information is already stored, thus destroying the original information.

P

page

A type of message transmission in which a message is sent or received via modem to a paging device from a computer (with paging communications software) or telephone.

parallel interface

Interface that communicates eight bits at a time.

parallel printer

A printer with a parallel interface.

parameter

A characteristic of a device or system determined by a command or setting whose purpose is to define or limit the characteristic.

password

A string of characters that the user must enter before the system allows access or system privileges.

PCI

Peripheral Component Interface/Interconnect. A self-configuring personal computer local bus designed by Intel. Most modern PCs include a PCI bus in addition to a more general ISA expansion bus. PCI is a 32-bit bus, but supports a 64-bit extension for new processors, such as the Pentium II. It can run at clock speeds of 33 or 66 MHz. At 32 bits and 33 MHz, it yields a throughput rate of 133 megabits per second. 64-bit implementations running at 66 MHz provide 524 Mbps. See ISA.

peripheral

Input or output device not under direct computer control. A printer is a peripheral device.

pixels

Picture elements. Tiny dots that make up a screen image. A pixel is the smallest spot on the screen that a computer can address.

plug and play

Refers to the ability of a computer system to automatically configure expansion boards and other devices. This enables a user to plug in a device and use it, without worrying about setting DIP switches, jumpers, and other configuration elements.

port

Any connection by which data can enter or leave a computer or peripheral. Provides the means for an interface between the microprocessor and external devices. A cable connector is usually plugged into the port to attach the device to the computer.

processor

In a computer, a functional unit that interprets and executes instructions.

prompt

A special symbol indicating the beginning of an input line. Also a message that appears on the screen indicating that the user must take a certain action.

R

RAM

Random Access Memory. A storage device into which data is entered and from which data is retrieved in a nonsequential manner. On the system board, RAM is semiconductor-based memory that can be read and written to by the microprocessor or other hardware devices. In RAM, data can be directly and randomly read or written (with any choice for the address). It's the storage location for data that needs to be immediately available for every application in use on your computer.

read

To extract data from a storage device such as a diskette.

ROM

Read-Only Memory. Memory in which stored data cannot be modified by the user except under special conditions.

reset

The process of returning a device to zero or to an initial or arbitrarily selected condition.

resolution

The degree of screen image clarity. Video display resolution is determined by the number of pixels on the screen. Resolution is usually specified in pixels by scan lines, for example, 640 by 480. See pixels.

RS-232C

Standard interface for serial devices.

S

SEC

Single-Edge Contact. The SEC cartridge containing the Pentium processor. See Slot 1.

serial interface

An interface that communicates information one bit at a time.

serial printer

A printer with a serial interface.

SGRAM

Synchronous Graphic Random Access Memory. A type of DRAM used increasingly on video adapters and graphics accelerators. Like SDRAM, SGRAM can synchronize itself with the CPU bus clock at speeds of up to 100 MHz. In addition, SGRAM uses several other techniques, such as masked writes and block writes, to increase bandwidth for graphics-intensive functions. Unlike VRAM and WRAM, SGRAM is single-ported (it can only be accessed by one device at a time). However, it can open two memory pages at once, which simulates the dual-port nature of other video RAM technologies (access by two different devices simultaneously). See VRAM and WRAM.

SIMM

Single Inline Memory Module. A small circuit board holding a group of memory chips. Typically, SIMMs hold up to nine RAM chips. On PCs, the ninth chip is for parity error checking. Unlike memory chips, SIMMs are measured in bytes rather than bits. In today's SIMMs, each chip holds 2 MB, so a single SIMM holds 16 MB. SIMMs are easier to install than individual memory chips. The bus from a SIMM to the actual memory chips is 32 bits wide. A newer technology, called dual in-line memory module (DIMM), provides a 64-bit bus. To take advantage of the 64-bit bus on Pentium processors, use either DIMMs or pairs of SIMMs. See DIMMs.

Slot 1

The form factor for Intel Pentium processors. The Slot 1 package replaces the Socket 7 and Socket 8 form factors used by previous Pentium processors. Slot 1 is a 242-pin daughter card slot that accepts a processor packaged as a Single Edge Contact (SEC) cartridge. A system board can have one or two Slot 1s. See SEC.

SMART

Self-Monitoring Analysis and Reporting Technology. A hard drive feature that works in conjunction with system software (for example, LANDesk Client Manager, NEC Auto Backup) for identifying a potential problem on the hard drive and automatically backing up system files to a user-specified device, such as a tape or Zip drive.

sound card

An expansion card designed for sound input and output. Sound cards can record and play back digital audio. Most also have a MIDI synthesizer, which means they can play MIDI files; some also have MIDI inputs and outputs.

super video graphics array (SVGA)

A color bit-mapped graphics display standard that provides a resolution of 1024x 768 with up to 256 colors displayed simultaneously.

synchronous

Refers to protocols that require the clocks of the communicating machines to be coordinated.

system board

The main printed circuit board inside the system unit into which other boards and major chip components, such as the system microprocessor, are connected.

T**tpi**

Tracks per inch.

track

Any of many concentric circular regions on a disk for storing data. Tracks are divided into sectors. One measure of storage density of a disk is tpi.

U

Ultra DMA

A protocol developed by Quantum Corporation and Intel that supports burst mode data transfer rates of 33.3 MBps and 66 MBps. Ultra DMA/33 is twice as fast and Ultra DMA/66 is four times as fast as the previous disk drive standard for PCs. Increasing the transfer rates is necessary to take advantage of the faster Ultra ATA disk drives.

USB

Universal Serial Bus. An external bus standard that supports data transfer rates of 12 Mbps (12 million bits per second). A single USB port can be used to connect up to 127 peripheral devices, such as mice, modems, and keyboards. USB also supports Plug-and-Play installation and hot plugging. It is expected to eventually replace serial and parallel ports.

V

VESA

Video Electronics Standards Association. The source of a SuperVGA standard used on many video boards.

virus

Software that copies itself onto hard drives and diskettes without user intervention, usually when a diskette is placed into the drive of a computer. Viruses usually trigger a harmless or destructive occurrence on the system, activated by some preset condition. Viruses are frequently written with antisocial intent.

VGA

Video Graphics Array. Graphics technology that supports up to 256 K colors and a graphics resolution of 640 by 480 pixels.

volatile memory

Storage media that loses its data when system power is turned off. Standard memory and memory added to the system are volatile memory. See nonvolatile memory.

VRAM

Video RAM. VRAM is special-purpose memory used by video adapters. Unlike conventional RAM, VRAM can be accessed by two different devices simultaneously. This enables a video adapter to access the VRAM for screen updates at the same time that the CPU provides new data. VRAM yields better graphics performance but is more expensive than normal RAM. A special type of VRAM, called Windows RAM (WRAM), yields even better performance than conventional VRAM. See SGRAM and WRAM.

W

warm boot

Process of resetting the computer without turning off the power through keyboard input (pressing **Ctrl**, **Alt**, and **Del** keys simultaneously) or the reset button. The system returns to an initial or arbitrarily selected condition.

WRAM

Windows RAM. A type of RAM that supports two ports. This enables a video adapter to fetch the contents of memory for display at the same time that new bytes are being pumped into memory. This results in much faster display than is possible with conventional single-port RAM. WRAM is similar to VRAM, but achieves even faster performance at less cost because it supports addressing of large blocks (windows) of video memory. See VRAM and SGRAM.

write

To record or store information to a storage device.

write-back

Also called copy back. A cache strategy where write operations to data stored in the internal microprocessor L1 cache aren't copied to system memory until absolutely necessary. In contrast, a write-through cache performs all write operations in parallel; data is written to system memory and the L1 cache simultaneously. Write-back caching yields somewhat better performance than write-through caching because it reduces the number of write operations to main memory. See cache and write-through.

write-through

Also write-thru. Write-through characterizes a cache strategy where data is always written into system memory when data is written by the CPU. See cache and write back.

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Regulatory Statements

The following regulatory statements include the Federal Communications Commission (FCC) Radio Frequency Interference Statement, compliance statements for Canada and Europe, battery disposal and replacement information, and the Declaration of Conformity.

FCC Statement for United States Only

 **WARNING** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note 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 to an outlet on a circuit different from the one to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Canadian Department of Communications Compliance Statement

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations (pursuant to ICES-003 Issue 2, Revision 1).

Avis de conformité aux normes du ministère des communications du Canada


Cet équipement numérique de la Classe B respecte toutes les exigences du Règlement sur le matériel brouillage du Canada (en conformité avec ICES-003 Emission 2, Révision 1).


European Community Directive Conformance Statement

This product is in conformity with the protection requirements of EC Council Directive 89/336/EEC on the approximation of laws of the Member States relating to electro-magnetic compatibility. This product satisfied the Class B limits of EN55022.

Battery Replacement

A lithium battery maintains system configuration information. In the event that the battery fails to maintain system configuration information, NECC recommends that you replace the battery (see Section 3, “Disassembly and Reassembly,” for battery replacement procedures). For additional battery replacement information, call NECC Technical Support Services.

 **WARNING** There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer’s instructions.

 **AVERTISSEMENT** Il y a danger d’explosion s’il y a un remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d’un type recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

Battery Disposal

The CMOS battery is made of lithium. Contact your local waste management officials for other information regarding the environmentally sound collection, recycling, and disposal of the batteries.

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