

A New Direction In Cutting-Edge Technology

DIRECTION™ SP B-SERIES



SERVICE AND REFERENCE
MANUAL

NEC

Proprietary Notice and Liability Disclaimer

The information disclosed in this document, including all designs and related materials, is the valuable property of NEC Computer Systems Division, Packard Bell NEC, Inc. (hereinafter "NEC CSD") and/or its licensors. NEC CSD and/or its licensors, as appropriate, reserve all patent, copyright and other proprietary rights to this document, including all design, manufacturing, reproduction, use, and sales rights thereto, except to the extent said rights are expressly granted to others.

The NEC CSD product(s) discussed in this document are warranted in accordance with the terms of the Warranty Statement accompanying each product. However, actual performance of each such product is dependent upon factors such as system configuration, customer data, and operator control. Since implementation by customers of each product may vary, the suitability of specific product configurations and applications must be determined by the customer and is not warranted by NEC CSD.

To allow for design and specification improvements, the information in this document is subject to change at any time, without notice. Reproduction of this document or portions thereof without prior written approval of NEC CSD is prohibited.

FaxFlash is a service mark of NEC Computer Systems Division, Packard Bell NEC, Inc.

Direction and VistaScan are trademarks of Packard Bell NEC, Inc.

NEC and MultiSync are registered trademarks of NEC Corporation, used under license.

All other product, brand, or trade names used in this publication are the trademarks or registered trademarks of their respective trademark owners.

First Printing — April 1999

Copyright 1999
NEC Computer Systems Division
Packard Bell NEC, Inc.
1 Packard Bell Way
Sacramento, CA 95828-0903
All Rights Reserved

Contents

Preface	ix
Abbreviations	xi
1 Technical Information	
System Overview	1-2
System Board	1-5
Processor.....	1-5
System Cache/Memory.....	1-5
Chipset.....	1-6
PCI Local Bus	1-6
Expansion Bus	1-6
BIOS.....	1-6
Plug and Play Support.....	1-7
CMOS Memory/Real-Time Clock Battery	1-7
DMA/IRQ Settings.....	1-7
IDE Ports	1-9
I/O Ports.....	1-9
Sound System.....	1-9
Modem Board (optional)	1-10
Diskette Drive	1-10
Hard Drive	1-10
CD-ROM/DVD Drive	1-10
Zip Drive.....	1-10
Power Supply	1-10
Power Management	1-11
2 Utilities	
BIOS Setup Utility	2-2
When to Use Setup.....	2-2
How to Start Setup	2-3
How to Use Setup.....	2-3
Menu Bar	2-4
Legend Bar.....	2-5
Selecting a Menu Item	2-5
Displaying a Submenu.....	2-5
Getting Help.....	2-5
Main Menu.....	2-6
Advanced Menu	2-7
Peripheral Configuration Submenu.....	2-7
IDE Configuration Submenu	2-8
Floppy Options Submenu	2-10
DMI Event Logging Submenu.....	2-11
Video Configuration Submenu	2-11
Resource Configuration Submenu	2-12
Security Menu	2-12
Power Menu	2-13

Boot Menu	2-13
Hard Drive Submenu	2-14
Removable Devices Submenu	2-14
Exit Menu	2-15
Intel Processor Serial Number Control Utility	2-15
System Requirements	2-16
Processor Serial Number	2-16
FAQs	2-16
Errata	2-18
Technical Support	2-18

3 Option Installation

General Rules	3-2
Precautions	3-2
Access Cover Removal	3-3
Access Cover Replacement	3-4
Expansion Boards	3-5
Expansion Slot Locations	3-6
Expansion Board Installation	3-6
Expansion Board Removal	3-8
Memory Upgrade	3-8
DIMM Removal	3-10
DIMM Installation	3-11
Data Storage Devices	3-11
Device Slots	3-12
Device Preparation	3-12
Device Cables	3-13
Diskette Drive Signal Cable	3-14
IDE Signal Cables	3-14
System Power Cables	3-15
Device Cabling	3-16
Cabling an IDE Device	3-16
Cabling an Accessible 5 1/4-Inch Device	3-16
Storage Device Installation	3-17
Removing the Front Panel	3-17
Removing the CD-ROM/DVD Drive	3-18
Installing a 3 1/2-Inch Device	3-19
Installing a 5 1/4-Inch Device	3-23
Replacing the Front Panel	3-24
External Options	3-25
Parallel Printer	3-25
RS-232C Device Connection	3-26

4 Maintenance and Troubleshooting

Maintenance	4-2
System Cleaning	4-3
Keyboard Cleaning	4-3
Mouse Cleaning	4-3
Troubleshooting	4-4
Diagnosing and Solving Problems	4-4
Beep Codes	4-9
CMOS Battery Replacement	4-10

5 Disassembly and Reassembly

Disassembly	5-3
System Access Cover	5-3
Expansion Board Removal	5-3
Front Panel Removal	5-4
Side Panel Removal.....	5-5
Device Cage Removal	5-5
Diskette Drive Removal.....	5-6
5 1/4-Inch Device Removal	5-6
Optional 3 1/2-Inch Hard Drive Removal.....	5-7
Standard 3 1/2-Inch Hard Drive Removal	5-8
Fan Assembly Removal	5-9
DIMM Module Removal	5-9
Power Supply Removal	5-9
System Board Removal	5-10
Illustrated Parts Breakdown.....	5-12

A System Specifications

Processor.....	A-2
Random Access Memory.....	A-2
Read-Only Memory	A-3
Video Memory	A-3
Calendar Clock.....	A-3
Input/Output Facilities	A-3
Expansion Slots.....	A-4
Keyboard and Mouse.....	A-4
Storage Devices.....	A-4
Device Slots	A-4
Graphics.....	A-5
Sound System.....	A-6
Dimensions	A-6
Weight	A-6
Power.....	A-6
Recommended Operating Environment.....	A-7

B Connector Pin Assignments

Serial Interface Connectors.....	B-5
Parallel Interface Connector.....	B-5
Power Supply (Primary)	B-6
Keyboard and Mouse Connectors	B-7
Front Panel.....	B-7
Diskette Drive Interface Connector	B-8
IDE Interface Connector.....	B-9
DIMM Sockets	B-10
AGP Connector	B-11
ISA Expansion Bus Connectors	B-13
PCI Expansion Bus Connectors	B-15
Universal Serial Bus (USB) Connectors.....	B-16

C System Resources

IRQ Settings	C-2
System Resource Information	C-2
Jumper Settings	C-3
Clearing Your Password	C-4
Recovering the BIOS	C-5

List of Figures

Front Features – Desktop Models	1-2
Rear Features – Desktop Models	1-3
Audio Connectors – Desktop Models	1-3
Front Features – Minitower Models.....	1-4
Rear Features – Minitower Models.....	1-4
Audio Connectors – Minitower Models.....	1-5
Main Setup Menu.....	2-3
Releasing the Cover	3-4
Aligning the Tabs	3-5
Locating Expansion Slots	3-6
Removing the Slot Cover	3-7
Installing a Board.....	3-8
Removing a DIMM.....	3-10
Installing a DIMM	3-11
Locating Device Slots	3-12
System Board Cable Connectors	3-13
Diskette Drive Signal Cable	3-14
IDE Signal Cable	3-15
Power Cable Connectors	3-15
Connecting IDE Device Cables.....	3-16
Connecting an Accessible 5 1/4-Inch Device.....	3-17
Releasing the Front Panel.....	3-18
Locating the Device Cage Screw.....	3-18
Locating Device Slots	3-19
Removing the Bracket Screws.....	3-20
Aligning the Holes and Tabs	3-20
Securing the Drive	3-21
Inserting the Device	3-21
Removing the Blank Panel.....	3-22
Installing the Device	3-24
Locating the Parallel Port.....	3-25
Locating the Serial Ports	3-26
Locating the Mouse Ball Cover.....	4-4
Locating the Battery.....	4-10
Removing a Board	5-4
Releasing the Front Panel.....	5-4
Locating the Device Cage Screw.....	5-5
Locating the Two Diskette Drive Clips.....	5-6
Removing the 5 1/4-Inch Device Screws	5-7
Removing the Bracket Screws.....	5-7
Removing the Securing Screw.....	5-8
Removing the Drive.....	5-8
Removing a DIMM.....	5-9
Removing the Power Supply Screws	5-10
Removing the System Board Screw.....	5-11
Direction SP B-Series Desktop Illustrated Parts Breakdown	5-14
Direction SP B-Series Minitower Illustrated Parts Breakdown.....	5-17
System Board Expansion Slot, Memory, and I/O Connectors	B-3
System Board Connectors and Jumper.....	B-3
Locating the Jumper.....	C-3

List of Tables

System Memory Map.....	1-7
Interrupt Level Assignments	1-8
DMA Assignments.....	1-8
Setup Key Functions	2-5
Sample Memory Configurations.....	3-9
NEC CSD Service and Information Telephone Numbers	4-2
Problems and Solutions.....	4-5
Beep Code Descriptions	4-9
Disassembly Sequence.....	5-2
Direction SP B-Series Desktop Field-Replaceable Parts List	5-12
Direction SP B-Series Minitower Field-Replaceable Parts List.....	5-15
System Board Connectors	B-2
System Board Internal Connectors	B-4
System Board Connector Numbers and Types	B-4
RS-232C Serial Port Connector Pin Assignments	B-5
Parallel Port Connector Pin Assignments.....	B-5
Primary Power Supply Connector Pin Assignments.....	B-6
Keyboard and Mouse Connector Pin Assignments.....	B-7
Front Panel Connector Pin Assignments.....	B-7
Diskette Drive Connector Pin Assignments	B-8
IDE/PCI Connector Pin Assignments	B-9
DIMM Socket Pin Assignments	B-10
AGP Connector Pin Assignments.....	B-11
ISA Expansion Slot Pin Assignments	B-13
PCI Expansion Slot Pin Assignments	B-15
USB Connectors	B-16
System Board Jumper Settings	C-3

Preface

This service and reference manual contains technical information necessary for servicing and repairing Direction™ SP B-Series systems. The manual includes system setup information, procedures for installing options, and troubleshooting. The manual is written for NEC CSD-trained customer engineers, system analysts, service center personnel, and dealers.

The manual is organized as follows:

Section 1 — Technical Information, provides an overview of the computer features, hardware design, interface ports, and internal devices.

Section 2 — Utilities, includes procedures for configuring the system through the Setup utility program and information on the Intel® Processor Serial Number Control utility.

Section 3 — Option Installation, provides installation procedures for adding optional expansion boards, diskette and hard drive storage devices, and system memory.

Section 4 — Maintenance and Troubleshooting, includes recommended maintenance information, lists possible computer problems and their solutions, and has battery replacement procedures.

Section 5 — Disassembly and Reassembly, includes computer disassembly and reassembly procedures.

Appendix A — System Specifications, provides a list of the system specifications including dimensions, weight, environment, safety compliance, power consumption, and memory.

Appendix B — Connector Pin Assignments, provides a list of the internal and external system board connector pin assignments.

Appendix C — System Resources, includes information on IRQ settings and system board jumpers.

Abbreviations

A	ampere	DMAC	DMA controller
AC	alternating current	DOS	disk operating system
AT	advanced technology (IBM PC)	DRAM	dynamic RAM
BBS	Bulletin Board Service	ECC	error checking and correction
BCD	binary-coded decimal	EDO	extended data output
BCU	BIOS Customized Utility	EGA	Enhanced Graphics Adapter
BIOS	basic input/output system	EPROM	erasable and programmable ROM
bit	binary digit	EVGA	Enhanced Video Graphics Array
BUU	BIOS Upgrade Utility	F	Fahrenheit
bpi	bits per inch	FAX	facsimile transmission
bps	bits per second	FCC	Federal Communications Commission
C	capacitance	FG	frame ground
C	centigrade	FM	frequency modulation
Cache	high-speed buffer storage	FP	fast page
CAM	constantly addressable memory	FRU	field-replaceable unit
CAS	column address strobe	FSB	front side bus
CD-ROM	compact disk-ROM	GB	gigabyte
CG	character generator	GND	ground
CGA	Color Graphics Adapter	HEX	hexadecimal
CGB	Color Graphics Board	HGA	Hercules Graphics Adapter
CH	channel	Hz	hertz
clk	clock	IC	integrated circuit
cm	centimeter	ID	identification
CMOS	complementary metal oxide semiconductor	IDE	intelligent device electronics
COM	communication	IDTR	interrupt descriptor table register
CONT	contrast	in.	inch
CPGA	ceramic pin grid array	INTA	interrupt acknowledge
CPU	central processing unit	IPB	illustrated parts breakdown
DAC	digital-to-analog converter	IR	infrared
DACK	DMA acknowledge	IRR	Interrupt Request register
DC	direct current	ISA	Industry Standard Architecture
DIP	dual in-line package	ISR	In Service register
DLAB	Divisor Latch Address bit	I/O	input/output
DMA	direct memory access		

IPC	integrated peripheral controller	PLL	phase lock loop
ips	inches per second	p-p	peak-to-peak
IRQ	interrupt request	PPI	programmable peripheral interface
K	kilo (1024)	PROM	programmable ROM
k	kilo (1000)	QFP	quad flat pack
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
LED	light-emitting diode	RGBI	red green blue intensity
LSB	least-significant bit	ROM	read-only memory
LSI	large-scale integration	rpm	revolutions per minute
M	mega	R	read
mA	milliamps	RTC	real-time clock
max	maximum	R/W	read/write
MB	megabyte	S	slave
MDA	Monochrome Display Adapter	SCSI	Small Computer System Interface
MFM	modified frequency modulation	SG	signal ground
MHz	megahertz	SIMM	single inline memory module
mm	millimeter	SPM	standard page mode
ms	millisecond	SRS	Sound Retrieval System
MSB	most-significant bit	SVGA	Super Video Graphics Array
NASC	National Authorized Service Center	SW	switch
NC	not connected	TAC	Technical Assistance Center
NMI	Non-maskable Interrupt	TSC	Technical Support Center
ns	nanosecond	TTL	transistor/transistor logic
NSRC	National Service Response Center	tpi	tracks per inch
PAL	programmable array logic	USB	universal serial bus
PC	personal computer	V	volt
PCB	printed circuit board	Vac	volts, alternating current
PCI	Peripheral Component Interconnect	Vdc	volts, direct current
PDA	personal digital assistant	VESA	video electronics standards association
PFP	plastic flat package	VFC	VESA-compliant feature connector
PIO	parallel input/output	VGA	Video Graphics Array
pixel	picture element	VRAM	video RAM
PLCC	plastic leaded chip carrier	W	watt

1

Technical Information

- Overview
- System Board
- Modem Board (optional)
- Diskette Drive
- Hard Drive
- CD-ROM/DVD Drive
- Zip Drive
- Power Supply
- Power Management

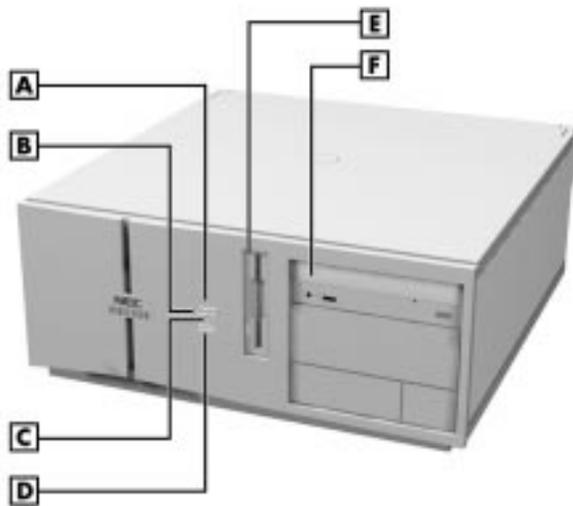
The section provides an overview of the NEC Direction™ SP B-Series computers. Information includes:

- an overview of system features
- description of system components.

System Overview

NEC Direction SP B-Series systems support the Intel® Pentium® II processor with MMX™ technology. The following figures show system features on the front and rear of the desktop and minitower systems. The subsections that follow provide more detailed information on system features.

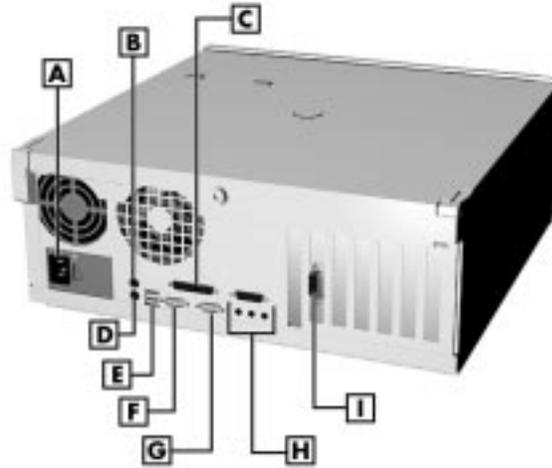
Front Features – Desktop Models



A – Power Lamp
C – Disk Lamp
E – Diskette Drive

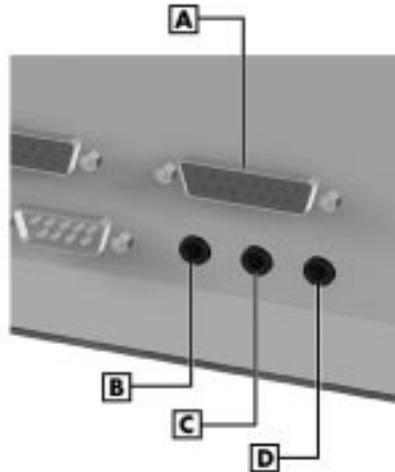
B – Power Button
D – Reset Button
F – CD-ROM/DVD Drive

Rear Features – Desktop Models



- | | |
|----------------------------|-----------------------------|
| A – Power Socket | B – Mouse Port |
| C – Parallel Port | D – Keyboard Port |
| E – USB Ports | F – Serial Port 1 |
| G – Serial Port 2 | H – Audio Connectors |
| I – Video Connector | |

Audio Connectors – Desktop Models



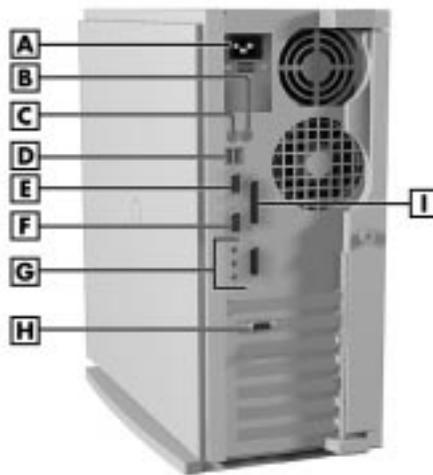
- | | |
|---------------------------|----------------------------|
| A – MIDI/Game Port | B – Line Out Jack |
| C – Line In Jack | D – Microphone Jack |

Front Features – Minitower Models



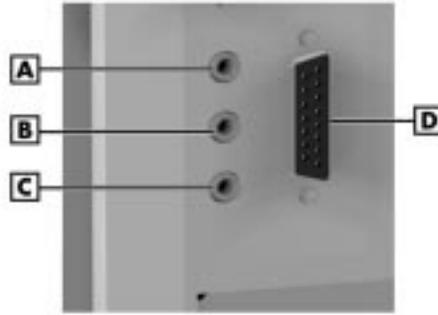
- | | |
|-----------------------------|---------------------------|
| A – CD-ROM/DVD Drive | B – Diskette Drive |
| C – Power Lamp | D – Power Button |
| E – Disk Lamp | F – Reset Button |

Rear Features – Minitower Models



- | | |
|-----------------------------|----------------------------|
| A – Power Socket | B – Mouse Port |
| C – Keyboard Port | D – USB Ports |
| E – Serial Port 1 | F – Serial Port 2 |
| G – Audio Connectors | H – Video Connector |
| I – Parallel Port | |

Audio Connectors – Minitower Models



A – Line Out Jack
C – Microphone Jack

B – Line In Jack
D – MIDI/Game Port

System Board

The system board contains most of the components that provide system functions. The following subsections provide a description of these components.

Processor

The system board uses a 350-MHz, 400-MHz, or 450-MHz Intel Pentium II processor or a 500-MHz Intel Pentium III processor. All use MMX technology. The MMX processor improves audio, video, and 3D graphics performance.

Each processor is packaged in a Single Edge Contact (SEC) cartridge that plugs into the system board's slot 1.

System Cache/Memory

To use the processor's power, the system features an optimized 64-bit memory interface and provides support for a second level cache to complement the processor's internal cache.

High-performance features include:

- pipeline 32-bit addressing
- 64-bit data
- 512-KB of pipeline burst secondary cache; direct mapped write-back and write-through organization.

The system comes with 32 to 384 MB of main system memory. Three sockets on the system board support up to 384 MB of high-speed memory using industry-standard gold-plated dual in-line memory modules (DIMMs).

The system supports PC100-MHz Synchronous DRAM (SDRAM) only.

The system supports the following DIMM configurations:

- 4-Mbit by 64 (32-MB DIMM)
- 8-Mbit by 64 (64-MB DIMM)
- 16-Mbit by 64 (128-MB DIMM).

Chipset

The Intel 440BX chipset provides DMA, memory, and bus control. The chipset includes the following chips:

- Intel 82443BX PCI/AGP (PAC) — provides bus-control signals, address paths, and data paths for transfers between the processor's host bus, PCI bus, Accelerated Graphics Port (AGP), and main memory.
- Intel 82371EB PCI ISA IDE Xcelerator (PIIX4E) — implements the PCI-to-ISA bridge, PCI IDE functionality, Universal Serial Bus (USB) host/hub functions, and enhanced power management.

PCI Local Bus

The 32-bit industry-standard PCI bus is a highly-integrated input/output (I/O) interface that offers the highest performance local bus available for the Pentium II processor. The PCI bus supports burst modes that send large chunks of data across the bus, allowing fast displays of high-resolution images.

The high-bandwidth PCI local bus eliminates data bottlenecks found in traditional systems, maintains maximum performance at high clock speeds, and provides a clear upgrade path to future technologies.

The PCI bus contains two embedded PCI devices: the PCI local bus IDE interface and the PCI video/graphics controller. The PCI bus also contains a connector for attaching the bus expansion board.

Expansion Bus

The expansion bus contains one ISA slot, three PCI slots, one PCI/ISA slot, and one AGP video slot. The PCI ISA IDE Xcelerator chip (PIIX4E) provides the logic that enables the ISA bus functions. With 24-bit memory addressing, a 16-bit data path, and an 8-MHz clock, the ISA bus is designed to support all peripherals compatible with the IBM® AT™ standard. For PCI functions, the Xcelerator chip provides 32-bit memory addressing, 32-bit data path, and a 33-MHz clock speed.

BIOS

The BIOS (Basic Input Output System) is stored in the Flash EPROM. The Flash EPROM is reprogrammable and allows fast, economical BIOS upgrades.

The system memory map is shown in the following table.

System Memory Map

Memory Address	Size	Function
100000-18000000	383 MB	Extended memory
E8000-FFFFFF	96 KB	System BIOS
E0000-E7FFF	32 KB	System BIOS (available as UMB)
C8000-DFFFF	96 KB	Available high DOS memory (open to ISA and PCI bus)
A0000-C7FFF	160 KB	Video memory and BIOS
00000-9FFFF	640 KB	Conventional memory

Plug and Play Support

The system comes with Plug and Play BIOS technology. Plug and Play eliminates complicated setup procedures for installing Plug and Play expansion boards.

To add a Plug and Play expansion board, simply power off the system, install the board, and power on the system. There are no jumpers to set and no system resource conflicts to resolve. Plug and Play automatically configures the board for the system. The system also supports non-Plug and Play boards.

Plug and Play is controlled by the Plug and Play BIOS and the system's operating system. The Plug and Play BIOS is stored in the Flash EPROM on the system board.

The Plug and Play BIOS adds several steps to the POST process. During POST, the Plug and Play evaluates the configuration of installed boards and assigns available system resources to the devices. On completion of Plug and Play POST, the operating system checks to see if there are any additional resources required, then assigns available resources to the devices.

CMOS Memory/Real-Time Clock Battery

The 82371EB PCI ISA IDE Xcelerator (PIIX4E) on the system board stores system information in non-volatile CMOS memory. The chip also contains the system's real-time clock. Both are maintained by a 3-volt coin cell lithium battery on the system board. The battery is replaceable.

DMA/IRQ Settings

The system automatically configures, with minimal user intervention, interrupt requests (IRQ), direct memory access (DMA) channels, and other parameters when adding PCI boards.

The following tables list system IRQ and DMA default settings.

Interrupt Level Assignments

IRQ	System Resource
NMI	I/O channel check
00	Reserved, interval timer
01	Reserved, keyboard controller
02	Reserved, cascade interrupt from slave PIC
03	COM2*
04	COM1*
05	LPT2 (Plug and Play option)/audio/user available
06	Diskette drive
07	LPT1*
08	Real-time clock
09	Reserved
10	USB/user available
11	Windows Sound System*/user available
12	PS/2 mouse port (if present, else user available)
13	Reserved, numeric processor
14	Primary IDE (if present, else user available)
15	Secondary IDE (if present, else user available)

* Default; setting can be changed.

DMA Assignments

DMA	Resource
00	Audio
01	Audio/parallel port
02	Diskette drive
03	ECP parallel port/audio
04	Reserved, cascade channel
05	Available
06	Available
07	Available

IDE Ports

The system board provides two fast IDE ports: primary channel and secondary channel.

Each port supports two devices for a total of four IDE devices. The system board allows the connection of an IDE CD-ROM drive for system configuration flexibility without the addition of a controller.

The IDE ports feature an enhanced IDE interface which supports up to 16.7 MB per second 32-bit wide data transfers on the high-performance PCI local bus. The standard hard drive and Zip[®] drive (in some systems) are connected to the primary channel. The CD-ROM drive is attached to the secondary channel.

I/O Ports

The system board features an enhanced parallel port, two buffered high-speed serial ports, and two Universal Serial Bus (USB) ports.

The enhanced parallel port supports Enhanced Capabilities Port (ECP) and Enhanced Parallel Port (EPP) modes for devices that require ECP or EPP protocols. These protocols allow high-speed bi-directional transfer over a parallel port and increase parallel port functionality by supporting more devices.

The two buffered high-speed serial ports use a fast 16C550 UART which supports transfer rates up to 115.2 kilobits (Kb) per second. These ports allow the installation of high-speed serial devices for faster data transfer rates.

The two USB ports allow additional new plug and play serial devices without removing the system cover. Simply plug the USB device into the port. The speed varies between 12 megabits per second (Mbps) for printers and 1.5 Mbps for mice and keyboards. Up to 127 USB devices can be connected to the computer.

The combination of the enhanced parallel port, buffered serial ports, and USB ports ensure optimum performance for future peripheral devices and operating systems.

Sound System

The system board features the Yamaha[®] DS1-L PCI accelerator and Analog Devices AD1819A SoundPort codec. The chips provide the following:

- 32-voice XG wavetable
- 3D stereo enhancement
- Support for DirectX
- Full-duplex audio
- PC/PCI support for legacy DMAC emulation.

The optional AWE64D PCI sound board replaces the integrated audio system. It provides FM synthesis and 64 simultaneous voices.

Modem Board (optional)

Optional modem boards include: U.S. Robotics® 56-Kbps V.90 x2-capable Winmodem, U.S. Robotics 56-Kbps V.90 x2-capable Sportster, and the Diamond Supra 56i K56Flex V.90 PCI modem. Each modem board contains fax and modem capabilities. The Winmodem provides only fax and modem capabilities. The other two boards provide modem, fax, full-duplex speakerphone, and voicemail capabilities. Each board provides receive transfer rates of 56-Kbps (kilobytes per second) for data and 14.4-Kbps for fax.

Diskette Drive

The system comes standard with a 1.44-MB high-density diskette drive preinstalled in the 3 1/2-inch accessible device slot (drive A). The drive is connected to the system board via a two-connector cable.

Hard Drive

The system supports up to three IDE hard drives: the standard hard drive and two optional hard drives (if a Zip drive does not come standard with the system).

CD-ROM/DVD Drive

The CD-ROM or DVD drive can be used to load programs from a CD or it can be used to play audio CDs. The drive operates at different speeds depending on whether the CD contains music or data. The drive is fully compatible with Kodak Multisession Photo CDs™ and standard CDs.

The drive is connected to the secondary IDE/PCI port on the system board.

Zip Drive

Some systems come with the Iomega® Zip 100 ATAPI drive. The Zip drive features removable 100-MB data disks and has a data transfer rate up to 1.4 MB per second.

Power Supply

The 235-watt power supply is mounted inside the system unit. It supplies power to the system board, option boards, diskette drives, hard drives, keyboard, and mouse. A fan inside the power supply provides system ventilation. The power supply has several cables for attaching to the various devices requiring power.

Power Management

The Advanced Power Management (APM) program, located on the 82371EB PCI ISA IDE Xcelerator (PIIX4E) chip, reduces system power consumption when there is no activity detected from the keyboard, mouse, diskette drive, CD-ROM/DVD drive, or hard drive after a predefined period of time. As soon as activity is detected, the system resumes where it left off.

In the CMOS Setup utility, an inactivity timer is available for setting the length of time before the system enters a low-power mode.

2

Utilities

- BIOS Setup Utility
- Intel Processor Serial Number Control Utility

This section provides information on configuring the computer. The section includes information on the

- BIOS Setup Utility for configuring the system
- Intel Processor Serial Number Control utility for enabling or disabling the Pentium III processor serial number (for Pentium III based systems only).

BIOS Setup Utility

The BIOS Setup utility is used to configure the main components of the computer. The system ships from the factory with the correct system parameters for the configuration. Unless adding optional hardware, it's usually not necessary to run the BIOS Setup utility. However, it might be necessary to run the BIOS utility to set features that customize the system, such as setting the time and date or setting security features.

System configuration information is stored in nonvolatile memory. A nonvolatile memory device retains its data when system power is turned off. Nonvolatile memory is a complementary metal-oxide semiconductor (CMOS) chip backed up by a battery on the system board. The battery supplies continuous power to CMOS memory and maintains configuration information when system power is off.

When to Use Setup

The Setup utility allows the user to view and set system parameters. Use the Setup utility program to:

- set the time and date.
- update or check system parameters when adding or removing expansion options.
- change or set power management features.
- correct a hardware discrepancy when the Power-On Self-Test (POST) displays an error message and a prompt to run Setup.
- check the installation of optional memory by comparing the amount of memory installed with the amount of memory displayed by Setup.
- change certain system operating parameters, such as boot device sequence and keyboard parameters.
- configure system connections for peripherals such as the diskette drive, hard drives, and devices connected to the printer port and serial port.
- customize the system with security features such as passwords.
- set system parameters after replacing the CMOS battery.

How to Start Setup

To start the Setup utility, follow these steps:

1. Turn on or reboot the system.
2. Press **F2** after POST begins, but before the system boots up. You have about five seconds to press **F2**.

Setup's Main Menu window appears similar to the following screen.

 **Note:** The screen shown is typical of a system. The actual settings on the Main Menu depend upon the hardware installed in the system.

Main Setup Menu

BIOS Setup					
Main	Advanced	Security	Power	Boot	Exit
BIOS Version	xxxxxxxxxx			Item-Specific Help	
Processor Type	Pentium® II Processor			<Tab>, <Shift-Tab>, or <Enter> selects field.	
Processor Speed	350 MHz				
System Memory	32 MB				
Memory Bank 0	Not Installed				
Memory Bank 1	32 MB SDRAM				
Memory Bank 2	Not Installed				
Language:	[English (US)]				
ECC Configuration:	[Non-ECC]				
L2 Cache ECC Support	[Enabled]				
System Time:	[13:46:18]				
System Date	[09/28/98]				
F1 Help	↑↓ Select Item	-/+ Change Values	F9 Defaults for Page		
ESC Exit	←→ Select Menu	Enter Select	> Sub-Menu	F10 Previous Values	

How to Use Setup

The Setup utility has a Main Menu window and six top-level menus with submenus.

The Main Menu window contains the following areas:

- A title line — the top line of the Main Menu. This line displays the Setup utility name and copyright message.
- The menu bar — the line under the Setup title line. The menu bar contains six top-level menus to set system parameters.

-
- A Main Menu summary window — the area on the left side of the screen. This area provides a summary of Main Menu Setup parameters. Some Main Menu parameters can be set from this window or they can be set from submenus.
 - The help and navigation window — the area on the right side of the screen. This area provides help information for the Setup option currently selected. The navigation keys provide a summary of commands available for making selections.
 - The General Help window — a window that appears any time during Setup after pressing **F1**. This help window provides general information about using Setup.

The following subsections describe how to use the Main Menu window to set system parameters.

Menu Bar

The menu bar at the top of the Main Menu window lists these menus:

- Main — Use the Main menu for basic system configuration. For example, select “Main” to verify processor type and speed and to set the system time and date. Use this menu to check memory parameters.
- Advanced — Use the Advanced menu to set serial port and printer port addresses and interrupts, diskette drive, and hard drive parameters, and to enable/disable the system’s IDE and diskette drive interfaces.

The Advanced menu also provides submenu items for setting keyboard features, video configurations, and DMI event logging.
- Security — Use this menu to set User and Administrator Passwords and the Unattended Start feature.
- Power — Use the Power menu to set power management parameters.
- Boot — Use this menu to set boot options.
- Exit — Exits the Setup utility with various save or discard options.

A Maintenance Menu appears when the system is in configure mode. See “Jumper Settings” in Appendix C for information on putting the system in configure mode. This menu allows you to change the processor speed and to clear user and administrator passwords.

To select an option from the menu bar, use the left and right arrow keys. See “Exiting Setup” in this section for a description on exiting the Main Menu.

Legend Bar

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

Setup Key Functions	
Key	Function
F1 or Alt-H	Provides help for the parameter field being displayed.
Esc	Exits the menu.
← or → arrow keys	Selects next menu.
↑ or ↓ arrow keys	Moves cursor up and down for item selection.
Home or End	Moves cursor to top or bottom of window.
PgUp or PgDn	Moves cursor to top or bottom of window.
F5 or -	Selects the previous value for a field.
F6 or + or Space	Selects the next value for a field.
F9	Loads the default configuration values for the current menu.
F10	Saves the current values and exits Setup.
Enter	Executes a command or selects submenu.

Selecting a Menu Item

To select a menu item, use the up/down arrow keys to move the cursor to the desired field. Then press **Enter**. The Exit Saving Changes command in the Exit Menu saves the values currently displayed in all the menus.

Displaying a Submenu

To display a submenu, use the up/down arrow keys to move the cursor to the desired submenu. Then press **Enter**. A pointer (a right-pointing triangle) marks all selectable submenus.

Getting Help

A Field Help window or 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.

Main Menu

This section describes the Main Menu parameters. Other menu parameters are available by selecting submenus. Use the arrow keys to move the cursor to a parameter and press **Enter** to select a submenu. Items with lighter text are not available.

- BIOS Version
This field displays your system's BIOS version number.
- Processor Type
This field displays your computer's processor type, including the Pentium III processor (if installed).

 **Note:** Windows incorrectly identifies the Pentium III processor as a Pentium II or Pentium Pro on the General tab of the Windows System Properties sheet. This does not effect the performance of the Pentium III processor. The BIOS correctly detects the Pentium III processor at startup. Check for a patch to fix the identification in the General tab at Microsoft's website (www.microsoft.com) or the NEC CSD website (www.nec-computers.com).

- Processor Speed
This field displays your processor's speed.
- System Memory and Memory Banks 0 - 2
This field displays the total amount of memory installed on your system board and in which banks the memory is installed.
- Language
This field displays the current default language used by the BIOS.
- ECC Configuration
This field specifies ECC memory operation.
- L2 Cache ECC Support
This option allows error checking on data accessed from the L2 cache.
- System Time and Date
These two fields specify the correct time and date. To change them, press **Tab** to highlight the field you want to change, then press the + or – keys to change the setting.

To return to the Main Menu, press **Esc**. To move to the Advanced Menu, press the right arrow key.

Advanced Menu

This section describes the Advanced Menu parameters. Other menu parameters are available by selecting submenus. Use the arrow keys to move the cursor to a parameter and press **Enter** to select a submenu. Items with lighter text are not available.

- Plug & Play O/S
This option lets you specify whether the operating system or system BIOS will handle the Plug and Play. Choose “Yes” or “No.”
- Reset Configuration Data
This option clears the BIOS configuration data on the next boot. The options include “No” or “Yes.”
- NumLock
This option controls whether the NumLock key on the keyboard is on or off at boot up. The choices are “Auto,” “On,” or “Off.”

Peripheral Configuration Submenu

This submenu can be used to configure your system’s ports or peripheral devices. To enter the submenu, highlight this field, then press **Enter**. The following options appear:

- Serial Port A/Serial Port B
These options let you configure your system’s Serial Port A or Serial Port B. You can choose “Auto,” “Enabled” (default), or “Disabled.” The “Enabled” default setting is 3F8h, IRQ4. Note that if you set a specific serial port address, it does not appear in the list of options for the other serial port.



CAUTION

An asterisk symbol appearing next to an option indicates that the selected IRQ is set to conflict with another device.

 **Note:** If you select the Enabled option, you can see additional options that allow you to specify the Base I/O address and IRQs for the port you are configuring.

- Parallel Port
This option configures the system’s Parallel Port. Choose “Auto,” “Enabled” (default), or “Disabled.” The “Enabled” default setting is LPT1, 378h, IRQ7.

 **Note:** If you select the Enabled option, you can see additional options that allow you to specify the Base I/O address and IRQs for the port you are configuring.

-
- **Mode (Parallel Port)**
This option sets the mode for the parallel port. The options include “Output Only” (AT-compatible mode), “Bidirectional” (PS/2-compatible mode), “EPP” (Extended Parallel Port – high speed bidirectional), and “ECP” (Enhanced Capabilities Port – high speed bidirectional).

 **CAUTION**

An asterisk symbol appearing next to an option indicates that the selected IRQ is set to conflict with another device.

- **Audio**
This option configures the onboard audio system. Select “Enabled” (default) or “Disabled.”
- **Legacy USB Support**
This option configures support for legacy USB devices. Select “Enabled” or “Disabled.”

To return to the Advanced Menu, press **Esc**.

IDE Configuration Submenu

This submenu can be used to auto-configure or manually configure IDE devices, usually hard drives or CD-ROM drives. Depending on the system purchased, the available options may include “User,” “Auto” (default), “CD-ROM,” “ATAPI Removable,” “Other ATAPI,” “IDE Removable,” or “None.”

The standard hard drive (drive C) shipped with the system is configured as “Primary IDE Master.” The standard CD-ROM drive is configured as “Secondary IDE Master.”

 **Note:** Jumpers on the IDE device must be set to the master or slave device (see the documentation that comes with the device).

- **IDE Controller**
This option configures the system’s integrated IDE controller. Select from “Primary,” “Secondary,” “Both” (default), or “Disabled.”
- **Hard Disk Pre-Delay**
This option sets the time delay to allow the hard drive to spin up. The choices in seconds are “3,” “6,” “9,” “12,” “15,” “21,” and “30.”

These entries let you check or change the following hard drive parameters. They are not available if “Auto” is selected.

- **Maximum Capacity**
This field displays the maximum capacity of your hard drive, a value based on the number of cylinders, heads, and sectors.

- **Multi Sector Transfers**

This option determines the number of sectors per block for multiple sector transfers. If necessary, check the specification for your hard drive to determine the best setting for optimum drive performance. The options include:

- 2 Sectors
- 4 Sectors
- 8 Sectors
- 16 Sectors
- Disabled.

- **LBA Mode Control**

This option specifies the LBA mode control. You can enable or disable (default) this option. This option cannot be changed when “Auto” is selected.



CAUTION

Do not change the translation mode setting from the option selected when the hard drive was formatted. Changing the option after formatting can corrupt data!

- **Transfer Mode**

This option specifies the method for transferring data between the hard drive and system memory. This option cannot be changed when “Auto” is selected. The options include:

- Standard
- Fast PIO 1
- Fast PIO 2
- Fast PIO 3
- Fast PIO 4
- FPIO 3/DMA 1
- FPIO 4/DMA 2.

-
- **Ultra DMA**
This option sets the Ultra DMA Mode for the hard drive. This option cannot be changed when “Auto” is selected. The options include:
 - Mode 0
 - Mode 1
 - Mode 2
 - Disabled.

To return to the Advanced Menu, press **Esc**.

Floppy Options Submenu

This submenu can be used to configure your system’s diskette drives. To enter the submenu, highlight the Floppy Options field, then press **Enter**. Select Floppy Disk Controller, Diskette A:, and Floppy Write Protect options.

- **Floppy Disk Controller**
This option configures the system’s diskette drive controller. Select “Enabled” (default) or “Disabled.”
- **Diskette A:**
These fields specify the capacity and physical size of Diskette Drive A. To change these, highlight the field for the drive, press **Enter** and select from the following options:
 - Disabled
 - 360KB, 5.25 inch
 - 1.2MB, 5.25 inch
 - 720KB, 3.5 inch
 - 1.44/1.25 MB, 3.5 inch (default)
 - 2.88 MB, 3.5 inch.
- **Floppy Write Protect**
This option enables or disables write protection for the diskette drive(s). Choose the desired setting to enable or disable this option.

To return to the Advanced Menu, press **Esc**.

DMI Event Logging Submenu

This submenu can be used to view and modify DMI Event Logs. To enter the submenu, highlight the DMI Event Logging field, then press **Enter**. The following options appear:

- **Event Log Capacity/Event Log Validity**
These fields indicate whether space is available in the Event Log and whether the contents of the log are valid.
- **View DMI Event Log**
If there are no event logs stored, you cannot access this log.
- **Clear All DMI Event Logs**
This option clears the DMI Event Log after rebooting the system. Choose “No” (default) or “Yes.”
- **Event Logging**
This option enables logging of DMI events. Choose “Disabled” or “Enabled” (default).
- **ECC Event Logging**
This option enables logging of ECC events. Choose “Disabled” or “Enabled” (default).
- **Mark DMI Events as Read**
This option is used to mark off all DMI Events as read. If necessary, press **Enter** to access the Confirmation dialog box and confirm your preference.

To return to the Advanced Menu, press **Esc**.

Video Configuration Submenu

This submenu can be used to configure specific video features. To enter the submenu, highlight the field, then press **Enter**. The following options appear:

- **Palette Snooping**
This option controls the ability of a primary PCI graphics controller to share a common palette with an ISA add-in video board. Select “Enabled” or “Disabled” (default).
- **AGP Aperture**
This option specifies the aperture size for the AGP video controller. The choices are “64 MB” and “256 MB.” The default size is “64 MB” for the AGP video controller.
- **Default Primary Video Adapter**
This option specifies the type of video board used for the boot display device.

To return to the Advanced Menu, press **Esc**.

Resource Configuration Submenu

This option allows you to reserve specific resources for use by legacy ISA devices. To enter the submenu, highlight this field, then press **Enter**. The following options are displayed:

- Memory Reservation Submenu

This option lets you configure memory blocks for use by legacy ISA devices. When selected, the submenu displays a list of addresses from which specific addresses can be selected. Use the arrow (cursor) keys to highlight an upper memory block, then press **Enter**. Select “Available” (default) or “Reserved” with the cursor keys, then press **Enter** to change the setting.

To return to the Resource Configuration submenu, press **Esc**.

- IRQ Reservation Submenu

This option lets you reserve specific IRQs (interrupt requests) for use by legacy ISA devices. To do so, highlight this field, then press **Enter**. Use the arrow (cursor) keys to highlight the specified IRQ, then press **Enter**. Select “Available” (default) or “Reserved” with the arrow keys, then press **Enter** to change the setting.



An asterisk symbol appearing next to an option indicates that the selected IRQ is set to conflict with another device.

To return to the Advanced Menu, press **Esc** twice. Then press the right arrow (cursor) key to move to the Security Menu.

Security Menu

The Security Menu can be used to set a user password and/or an administrator password.

A User Password controls access to the system and Setup Utility program at boot up. If the User Password feature has been enabled, you need to enter your User password correctly whenever you boot the system before you can use it.

An Administrator Password controls access to the BIOS and Setup Utility program. If the Administrator Password feature has been enabled, an Administrator password must be entered correctly before all options in the Setup Utility program are available (for example, to disable password protection).

The Unattended Start feature allows the system to boot up and run but the keyboard and mouse are both locked. You must enter the User Password to use the keyboard and mouse.

Press the right arrow (cursor) key to move to the Power Menu.

Power Menu

The Power Menu is used to enable or disable the system's power management features. When the power management option is enabled, the following options appear in the Power Menu:

- **Power Management**
This feature lets you enable or disable BIOS power management.

- **Inactivity Timer**
The Inactivity Timer lets you set the length of time that the system needs to be inactive before entering its low-power or Standby mode. The low-power mode powers down various devices in the system until you resume using it. You can select from "Off," or intervals from 1 to 120 minutes. A setting of 1 minute achieves maximum power savings, while a setting of 120 minutes allows maximum time before the system enters its low-power mode.

- **Hard Drive**
This option controls whether or not a spin down command is issued to the hard drives when the system goes into a low-power mode. Your choices are "Enabled" (default) or "Disabled."

- **VESA Video Power Down**
This option controls power to the monitor during the low-power modes. Your choices are "Disabled" or "Enabled."

- **Fan Always On**
This option controls the fan when the system is in a power-managed state. Your choices are "Yes" or "No."

Press the right arrow (cursor) key to move to the Boot Menu.

Boot Menu

The Boot Menu can be used to adjust the system's boot features. The Boot Menu features the following options:

- **Boot-Time Diagnostic Screen**
This option controls the display of the diagnostics screen during boot. Your choices are "Disabled" or "Enabled."

- **Quick Boot Mode**
This option configures the system to boot without running certain POST tests. The choices are "Enabled"(default) and "Disabled."

-
- **Scan User Flash Area**
This option configures the BIOS to scan the flash memory for user binary files that are executed at boot time. The choices are “Enabled” and “Disabled” (default).
 - **After Power Failure**
This option specifies whether or not to restore power to the system if it is turned on and there is a power failure. The options are “Stay Off” which keeps the power off (default setting), “Power On” which restores the system’s power, and “Last State” which restores the previous power state.
 - **On Modem Ring**
This option specifies how the system responds when power is off and the modem detects an incoming call. The options are “Stay Off” and “Power On” (default).
 - **On LAN**
This option controls how the system responds to a LAN wake-up call when power is off. The options are “Stay Off” and “Power On” (default).
 - **First/Second/Third/Fourth Boot Device**
You can select the sequence of boot devices by type. Pressing your keyboard’s + (plus) or – (minus) key allows you to select the order. For maximum system accessibility, Removable Device should always be set as the First Boot Device.

Hard Drive Submenu

This submenu lists the system’s available hard drives. Your computer tries to boot to the operating system on the first device listed on the Hard Drive submenu. If no operating system is found, the system continues trying the drives in the order they are listed until an operating system is located.

To see a list of available drives, highlight this field and press **Enter**. You can select the boot device by pressing your keyboard’s + or – key. To exit from the Hard Drive submenu, press **Esc**.

Removable Devices Submenu

This submenu lists any available removable devices (if included). One common option is Legacy Floppy Drives. The operating system assigns drive letters to these devices in the order listed. You can change the sequence (and drive lettering) by highlighting this field and pressing **Enter**. Then press your keyboard’s + or – key to move a device up or down the list. To exit from the Removable Devices submenu, press **Esc**.

Press the right arrow (cursor) key to move to the Exit Menu.

Exit Menu

The Exit Menu allows you to choose how to exit the Setup program. Press the arrow (cursor) keys to select the desired option, then press **Enter** to make your choice (or use the arrow key to select another one).

- **Exit Saving Changes**
This option exits the Setup program and saves your changes to the BIOS.
- **Exit Discarding Changes**
This option exits the Setup program without saving your changes to the BIOS.
- **Load Setup Defaults**
This option loads the Setup program's default values.
- **Load Custom Defaults**
This option loads Custom default settings.
- **Save Custom Defaults**
This option saves your changes to Custom default settings.
- **Discard Changes**
This option loads previous values from CMOS RAM for all BIOS settings.

 **Note:** If your system's CMOS fails, the BIOS will load custom default settings (if you've saved them) or factory default settings.

Finally, press **Enter** again to confirm and exit the Setup program.

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.

 **Note:** The Intel Processor Serial Number Control Utility is for use with systems shipping with the Intel Pentium III processor. Installing this utility on a system which does not contain a Pentium III processor generates an error message.

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 disable the processor serial number at any time. However, enabling the serial number requires restarting the system.

The following information describes:

- system requirements
- processor serial number features
- FAQs
- errata
- technical support.

System Requirements

The Intel Processor Serial Number Control utility requires:

- a Pentium III processor-based system
- Windows 95, Windows 98, or Windows NT[®] 4.0 (or later)
- 2 megabytes of hard drive space.

Processor Serial Number

The Intel processor serial number, a new feature of the Pentium III processor, is an identifier for the processor. The processor serial number is designed to be 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 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, please 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.

Errata

The technical support number in the help file is incorrect. The correct telephone number for Customer Support for Japan is **0298-47-0800** (Intel HotLine Service).

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

Option Installation

- General Rules
- Precautions
- Access Cover Removal
- Access Cover Replacement
- Expansion Boards
- Memory Upgrade
- Data Storage Devices
- External Options

This section provides instructions for installing the following options:

- expansion boards
- memory upgrade
- data storage devices
- external options.

All options (except external options) require removal of the access cover. Procedures for removing the cover are included in this section.

General Rules

Follow these general rules when installing system options.

- Turn off system power and unplug the power cable.
- Turn off and disconnect all peripherals.
- When handling boards or chips, touch the metal of the system unit to discharge static.
- Do not disassemble parts other than those specified in the procedure.
- Use a Phillips-head screw driver, unless otherwise specified.
- Label any removed connectors. Note where the connector goes and in what position it was installed.

Precautions

Take care when working inside the system and when handling computer components. Avoid electric shock or personal injury by observing the following warning.

 **WARNING**

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

Static electricity and improper installation procedures can damage computer components. Protect computer components by following the safety instructions in this section.

 **CAUTION**

Electrostatic discharge can damage computer components. Discharge static electricity by touching a metal object before removing the access cover.

-
- Avoid carpets in cool, dry areas. Leave an option, such as a board or chip, in its anti-static packaging until ready to install it.
 - Dissipate static electricity before handling any system components (for example, boards and chips) by touching a grounded metal object, such as the system's unpainted metal chassis.

If possible, use anti-static devices, such as wrist straps and floor mats.

- Always hold a chip or board by its edges. Avoid touching the components on the chip or board.
- Take care when connecting or disconnecting cables. A damaged cable can cause a short in the electrical circuit. Misaligned connector pins can cause damage to system components at power-on.

When installing a cable, route the cable so it is not pinched by other components and is out of the path of the system unit cover. Prevent damage to the connectors by aligning connector pins before you connect the cable.

- When disconnecting a cable, always pull on the cable connector or strain-relief loop, not on the cable.

Access Cover Removal

The following procedure describes how to remove the access cover from the desktop or minitower system.

WARNING

Before removing the access 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 computer.
2. Disconnect the keyboard, mouse, monitor, and any other external options (such as a printer) from the rear of the computer.

Label all cables to make reinstallation easier.

CAUTION

Electrostatic discharge can damage computer components. Discharge static electricity by touching a metal object before you remove the system access cover.

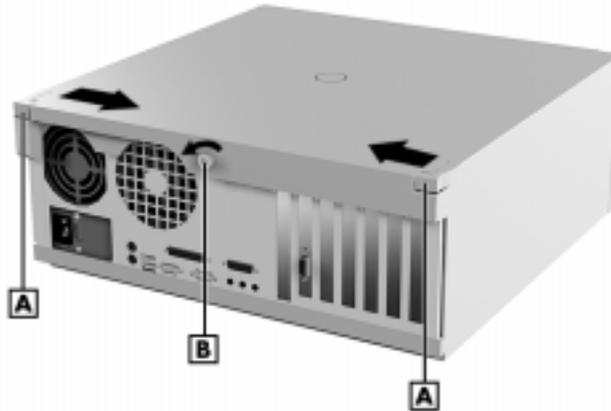
3. If the system is a minitower, place the system down on its right side.

-
4. Loosen the thumb screw at the rear of the system by turning it counterclockwise. If you installed a lock on the back of the system, unlock the lock and remove it.

Press the right release tab. While pressing the tab, push down and back on the right rear of the cover. The cover slides back about a half inch.

Press the left release tab. While pressing the tab, push down and back on the left rear of the cover. The cover slides back about a half inch.

Releasing the Cover



A – Release Tab

B – Thumb Screw

5. Lift the access cover off the system.

Access Cover Replacement

To replace the access cover, use the following procedure.

1. Gently set the access cover inside the edge of the case, taking care not to bend the metal tabs.
2. Align the tabs on the access cover with their corresponding slots on the system.

Insert the tabs on the edge of the access cover into their slots on the system.

Aligning the Tabs



A – Tabs

B – Slots

3. Slide the access cover forward to meet the front panel.
4. Tighten the thumb screw.

 **Note:** The cover fits tightly. If it does not slide all the way to the front panel, place one hand on the front of the unit while you slide the cover forward from the rear.

5. Reconnect all external peripherals.
6. Plug in power cables.

Expansion Boards

Your computer's system board features several expansion slots that can accommodate accessory adapter boards, such as a modem board. Depending on the system you purchased, some of these devices may be installed in your system.

The Direction SP B-Series supports ISA Plug and Play expansion boards. Plug and Play allows the installation of a board in an expansion slot without changing the hardware settings. There are no system resource conflicts to resolve. Plug and Play automatically configures the board for the system.

Industry-standard 8-bit and 16-bit ISA, and 32-bit PCI expansion boards are supported in the system unit. ISA expansion boards can be Plug and Play or non-Plug and Play boards.

PCI expansion boards run at one half the system host's bus speed. The PCI bus handles 32 bits of data at a time, being wider as well as faster than the standard ISA bus. PCI boards can send and receive data much faster, thereby boosting system performance.

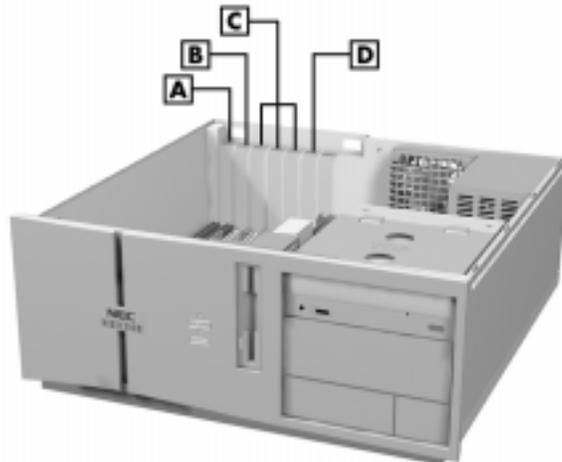
Expansion Slot Locations

Your system has six expansion slots:

- one ISA slot
- three PCI slots
- one shared ISA/PCI slot
- one AGP slot.

The following figure shows expansion slot locations.

Locating Expansion Slots



A – ISA Slots
C – PCI Slots

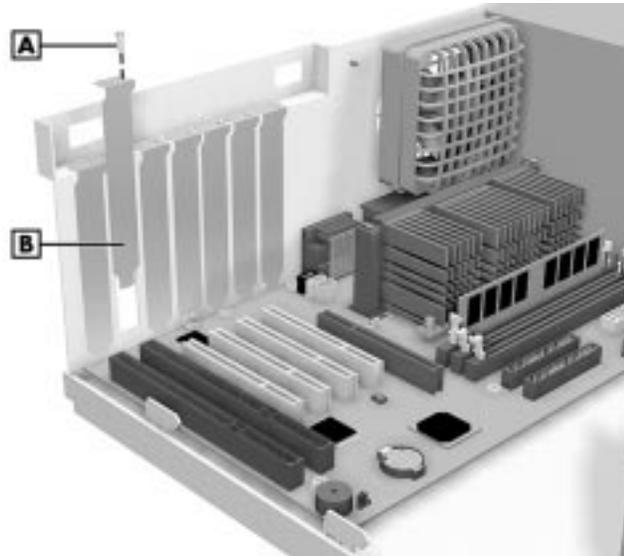
B – PCI/ISA Slot
D – AGP Slot

Expansion Board Installation

Install expansion boards in the system as follows.

1. Remove the access cover.
2. Follow any preinstallation instructions that come with the expansion board (such as setting switches or jumpers on the board).
3. Remove the screw securing an expansion slot cover and remove the cover.

Removing the Slot Cover



A – Screw

B – Slot Cover

Save the screw for installing the expansion board. Be sure to save the slot cover for future use.



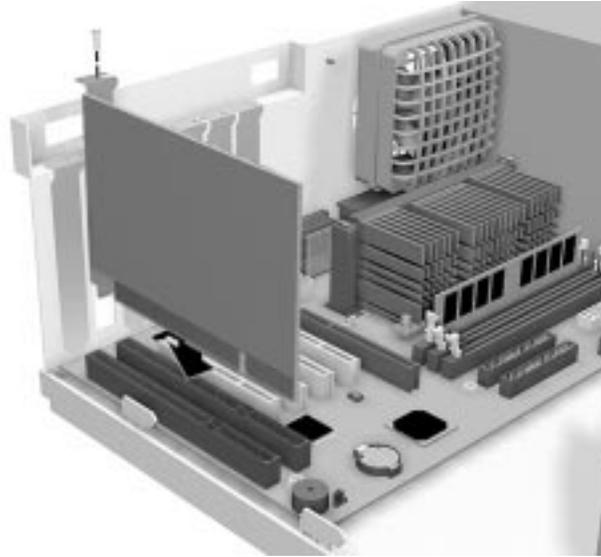
CAUTION

A slot cover can damage the system board or any option board if it falls into the system. Take care to keep the slot cover from falling when removing the screw.

If the slot cover does fall into the unit, remove it before replacing the cover.

4. Hold the board by its edges and insert it into the expansion slot.
5. Press the board firmly into the expansion slot connector. Gently rock the board from side-to-side to seat it into the connector.
6. Insert the screw removed earlier to secure the expansion board to the support bracket (see the following figure).

Installing a Board



7. Attach any cables required by the expansion board.
8. Replace the access cover.

Expansion Board Removal

Use the following steps to remove a board from the system.

1. Remove the system access cover.
2. Label and remove any cables connected to the board.
3. Remove the screw that secures the board to the support bracket.
4. Pull the board out of the connector. Gently rock the board from side-to-side to release it from its connector.
5. Replace the access cover.

Memory Upgrade

Your system comes factory-installed with 32 MB to 384 MB of main system memory. Memory is factory-installed in one to three 168-pin Dual In-line Memory Module (DIMM) sockets on the system board.

Install memory in one, two, or three sockets. The memory size and speed may vary between sockets. Single- and double-sided DIMMs are supported.

Depending on product upgrade availability, your system memory can be upgraded to a total of 384 MB.

When upgrading your system memory, note the following conditions:

- Be sure to use 168-pin 3.3V DIMMs with gold-plated contacts.
- Bus speed of 100 MHz is supported.
- Non-Error Correcting and Checking (64-bit) DIMMs are supported.

 **Note:** Although memory size may vary, the SDRAM DIMMs must meet the Intel 4-clock, 100-MHz, unbuffered SDRAM DIMM specification for 64-bit SDRAM.

Use the following procedure to:

- Check the memory installed in the system
- Determine the DIMM configuration needed to increase memory
- Identify DIMM sockets.

 **Note:** If any cables block access to the DIMM sockets, label and disconnect them. If any boards block access to the sockets, remove them.

1. Locate the three DIMM sockets: J7J1–Bank 0, J6J2–Bank1, and J6J1–Bank 2. See Appendix B to identify the sockets.
2. Use the following table to determine the DIMM configuration needed to upgrade memory. The table provides sample memory configurations; it is not a complete list of all memory configurations.

Sample Memory Configurations

Bank 0	Bank 1	Bank 2	Total RAM
32 MB	Empty	Empty	32 MB
32 MB	32 MB	Empty	64 MB
64 MB	Empty	Empty	64 MB
32 MB	32 MB	32 MB	96 MB
64 MB	32 MB	Empty	96 MB
128 MB	Empty	Empty	128 MB
64 MB	32 MB	32 MB	128 MB
64 MB	64 MB	Empty	128 MB
128 MB	32 MB	Empty	160 MB
64 MB	64 MB	32 MB	160 MB
64 MB	64 MB	64 MB	192 MB

Sample Memory Configurations

Bank 0	Bank 1	Bank 2	Total RAM
128 MB	32 MB	32 MB	192 MB
128 MB	64 MB	Empty	192 MB
128 MB	64 MB	32 MB	224 MB
128 MB	64 MB	64 MB	256 MB
128 MB	128 MB	Empty	256 MB
128 MB	128 MB	32 MB	288 MB
128 MB	128 MB	64 MB	320 MB
128 MB	128 MB	128 MB	384 MB

DIMM Removal

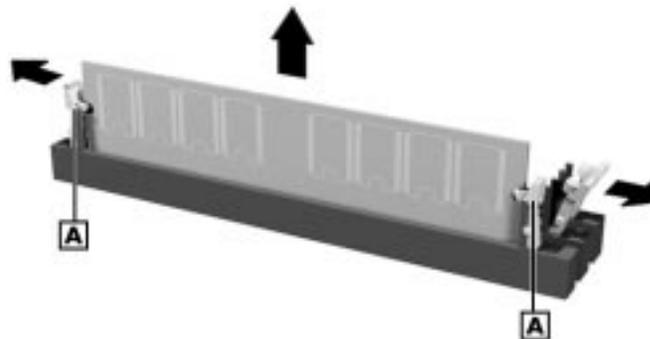
Use the following procedure to remove a DIMM.

 **CAUTION**

Reduce static discharge by touching the system's metal chassis.

1. Remove the access cover.
2. Locate the DIMM sockets.
3. To remove a DIMM from its socket, press the plastic clips at the outer edges of the socket away from the DIMM.
4. Carefully rock the DIMM to pull it from the socket.

Removing a DIMM



A – Plastic Clip

5. Store the DIMM in an antistatic bag (available at electronic supply stores) or a cardboard box.

DIMM Installation

Use the following procedure to install a DIMM.

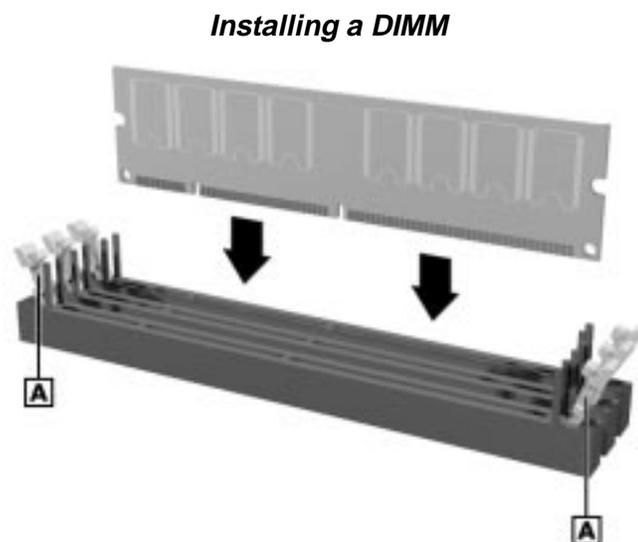
1. Remove the access cover.
2. Locate the DIMM sockets.
3. Remove any currently-installed DIMMs that are not needed. See the previous section “DIMM Removal.”



CAUTION

Before installing a DIMM, reduce static discharge by touching the system’s metal chassis.

4. To install a DIMM, align the module with an empty socket. Make sure that the notches on the DIMM line up with the keys in the sockets.
5. Insert the DIMM into the socket. Close the plastic clips at both ends of the socket.



A – Plastic Clip

6. Replace any cables or boards that may have been removed.
7. Replace the access cover.

Data Storage Devices

The system board in your computer supports the following storage devices:

- standard 1.44-MB diskette drive and an optional tape backup unit
- up to four IDE drives.

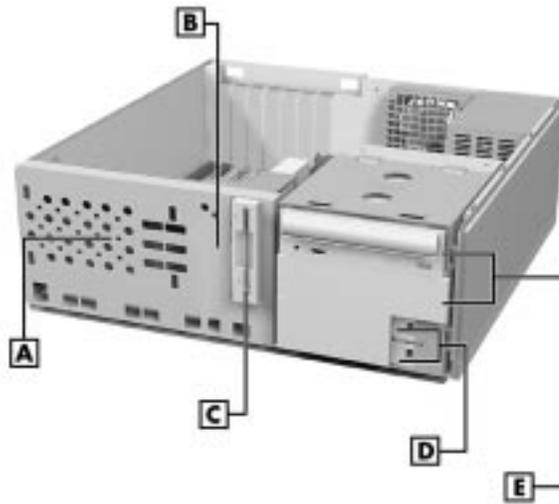
Device Slots

Your computer has seven storage device slots:

- one 3 1/2-inch accessible device slot (contains the standard 1.44-MB diskette drive)
- two internal 3 1/2-inch hard drive slots (one contains the hard drive)
- four accessible device slots
 - two accessible 5 1/4-inch device slots (one contains the standard CD-ROM/DVD drive)
 - two 3 1/2-inch device slots; the lower 3 1/2-inch slot is not accessible on the desktop model.

The following figure shows the device slot locations in the system.

Locating Device Slots



- | | |
|----------------------------------------|--------------------------------------------|
| A – 3 1/2-Inch Internal Device Slot | B – Second 3 1/2-Inch Internal Device Slot |
| C – 3 1/2-Inch Diskette Drive | D – 3 1/2-Inch Device Slots |
| E – 5 1/4-Inch Accessible Device Slots | |

Device Preparation

Before installing a storage device in the system, follow any preinstallation instructions that come with the device. For example, check the following:

- IDE device — check the jumper settings on the device before installing it. See the documentation that comes with the device for jumper setting information.
 - An IDE device, such as an IDE hard drive or IDE CD-ROM drive, must be set correctly as the first (master) or second (slave) device on the IDE channel.

— The standard IDE hard drive is set as the master device on the primary IDE connector. The standard CD-ROM drive is the master device on the secondary IDE connector.

- Installation hardware — check to be certain you have the screws necessary to secure the drive in an accessible drive slot.

Device Cables

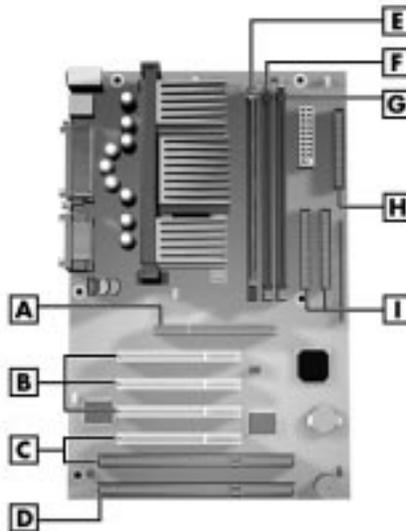
The cables used for the installation of optional storage devices include:

- diskette drive signal cable
- IDE signal cables
- system power cables.

The addition of a tape backup unit might require the replacement of the existing diskette drive cable. The addition of an IDE device does not require the replacement of the existing IDE cable. The existing IDE cables support two devices on each cable.

Cable connector locations are shown in the following figure.

System Board Cable Connectors



A – Diskette Drive Cable Connector
C – Secondary IDE Cable Connector

B – Primary IDE Cable Connector

Diskette Drive Signal Cable

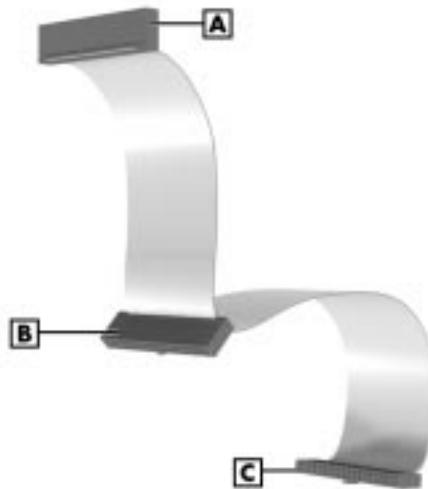
A two-connector diskette drive signal cable comes attached to the system board and to the standard 1.44-MB diskette drive.

Depending on your system, installation of an accessible device, such as a tape backup unit, may require the replacement of the existing diskette drive signal cable with a three-connector cable. Connect an optional 5 1/4-inch accessible device to the middle connector on the three-connector diskette drive signal cable.

The colored edge of the cable goes to pin 1 on the cable connector. Align the red edge of the cable with pin 1 (the notched end) on the drive connector.

The following figure shows a three-connector diskette drive signal cable.

Diskette Drive Signal Cable



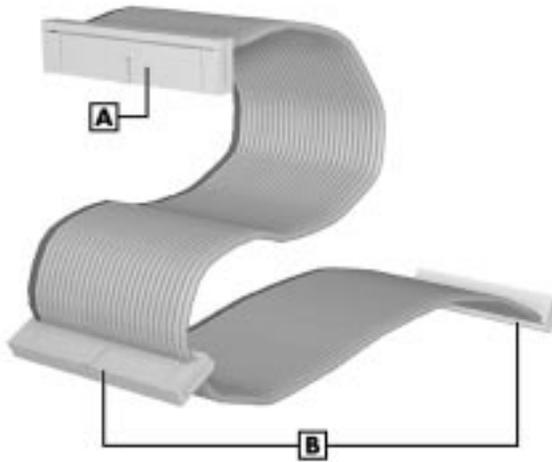
- A – Connects to 1.44-MB Diskette Drive
- B – Connects to Optional Tape Backup Unit
- C – Connects to System Board

IDE Signal Cables

Each system comes with a three-connector IDE interface cable attached to the primary IDE connector and the installed hard drive. A second IDE cable connects to the CD-ROM drive and to the secondary IDE connector. In some systems, a Zip drive also comes attached to the primary IDE cable.

The following figure shows a typical three-connector IDE cable. If the IDE cable is not keyed with a connector tab, align the colored edge of the cable with the pin 1 side of the drive connector.

IDE Signal Cable



A – Connects to System Board IDE Port
B – Connects to IDE Devices

System Power Cables

Power cables come from the power supply and are attached to the standard storage devices. System power cables vary in length and provide connector sizes to accommodate a variety of supported storage configurations.

Power cable connectors are keyed to fit only in the correct position. The following figure shows the power cable connectors.

Power Cable Connectors



A – Small Power Cable Connector
B – Large Power Cable Connector

Device Cabling

All storage devices require a power and signal cable connection. Devices shipped with the system are already connected. Cable optional devices as follows.

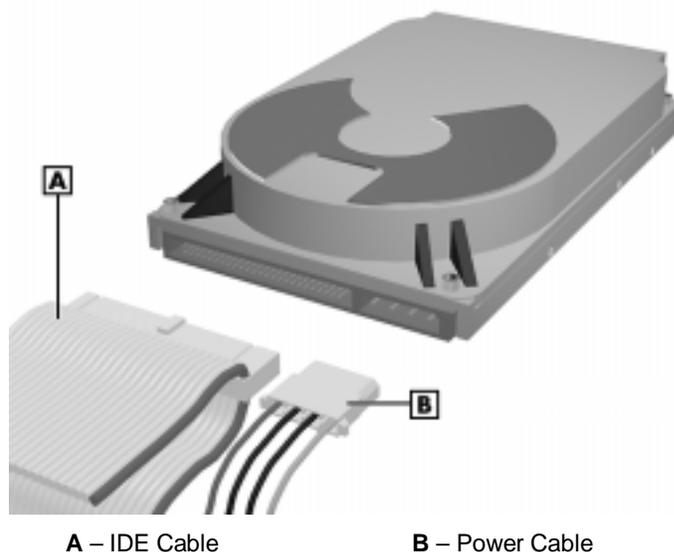
Cabling an IDE Device

1. Connect the IDE signal cable connector to the connector on the IDE device.

Take care to prevent bending drive connector pins. Align the IDE cable connector as shown in the following figure.

2. Locate an available power connector coming from the power supply.
3. Connect the appropriate power cable to the power connector on the IDE device.

Connecting IDE Device Cables

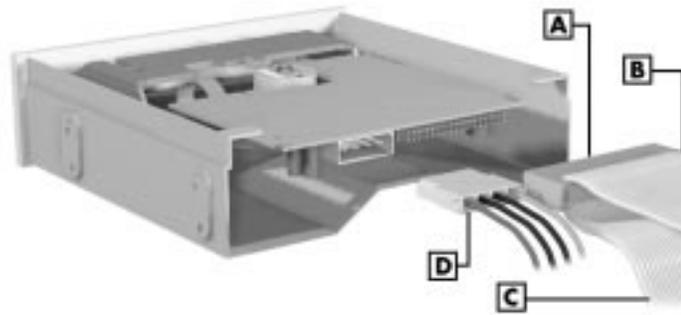


4. If installing an IDE CD-ROM drive, also connect the audio cable (see the instructions that come with the drive).

Cabling an Accessible 5 1/4-Inch Device

1. Connect the diskette drive signal cable connector to the signal connector on the device (see the following figure).
2. Locate an available power connector.
3. Connect the power cable to the power connector on the device.

Connecting an Accessible 5 1/4-Inch Device



A – Device Connector
C – Signal Cable

B – Red Edge
D – Power Cable

Storage Device Installation

The following subsections describe how to install 3 1/2-inch and 5 1/4-inch devices. The installation procedures include:

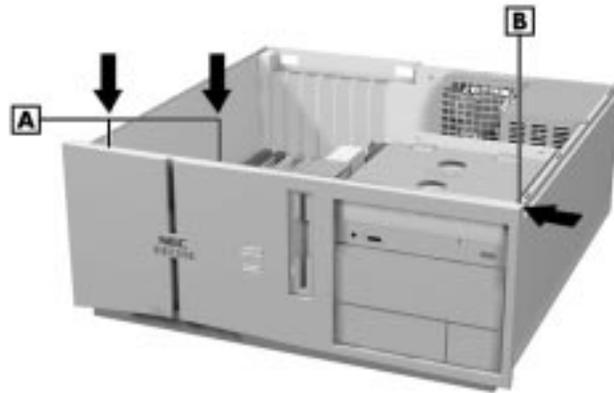
- removing the front panel
- removing the CD-ROM/DVD drive
- installing a 3 1/2-inch device
- installing a 5 1/4-inch device
- replacing the front panel.

Removing the Front Panel

Use the following procedure to remove the front panel.

1. Locate the two plastic tabs at the front of the chassis. They are indicated by two arrows engraved on the chassis.
2. Press down on the two tabs and press in a third tab at the end of the panel to release the panel (see the following figure).

Releasing the Front Panel



A – Two Release Tabs

B – Release Tab

- 3.** Pull the panel away from the chassis.

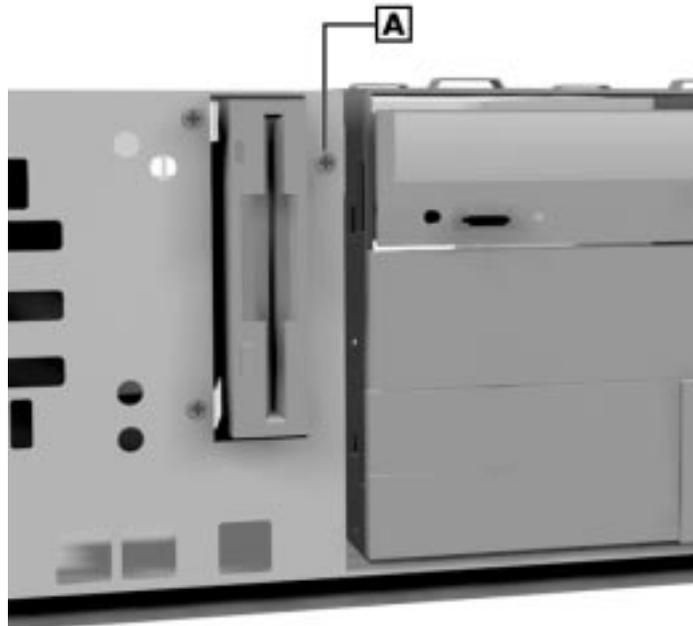
Removing the CD-ROM/DVD Drive

If you need to remove the CD-ROM/DVD drive, you need to remove the accessible device cage.

Use the following procedure to remove the accessible device cage.

- 1.** Locate the screw on the front of the system between the 3 1/2-inch blank panel and diskette drive (see the following figure). Remove the screw.

Locating the Device Cage Screw



A – Device Cable Screw

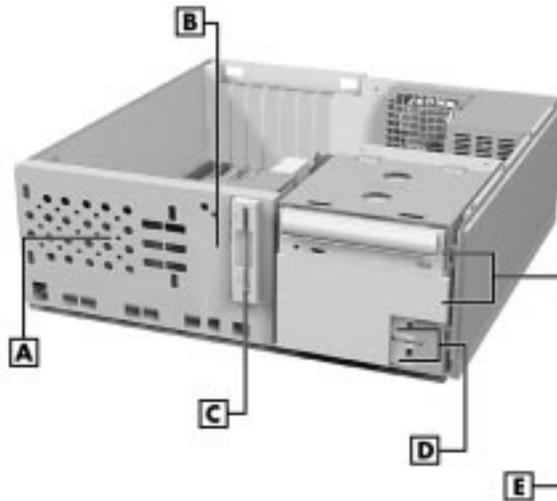
2. Slide the cage towards the front of the system and lift it out of the unit.

Installing a 3 1/2-Inch Device

Use the following procedure to install a 3 1/2-inch device.

1. Follow the preinstallation instructions that came with the device, such as setting jumpers and switches.
2. Remove the access cover.
3. Remove and label any cables that interfere with installing the device.
4. Remove the front panel (see the previous section).
5. Choose the slot for the device being installed (see the following figure).

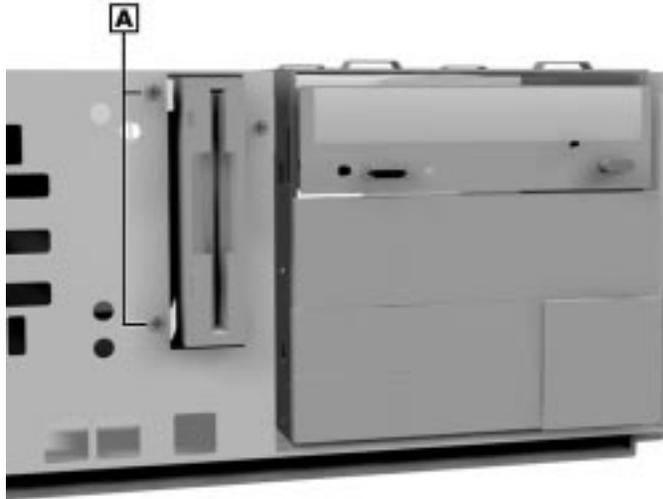
Locating Device Slots



- A** – 3 1/2-Inch Internal Device Slot **B** – Second 3 1/2-Inch Internal Device Slot
C – 3 1/2-Inch Diskette Drive **D** – 3 1/2-Inch Device Slots
E – 5 1/4-Inch Accessible Device Slots

- If you are installing the device in the second 3 1/2-inch internal device slot, remove the two screws securing the 3 1/2-inch hard drive bracket to the front of the system unit (see the following figure).

Removing the Bracket Screws

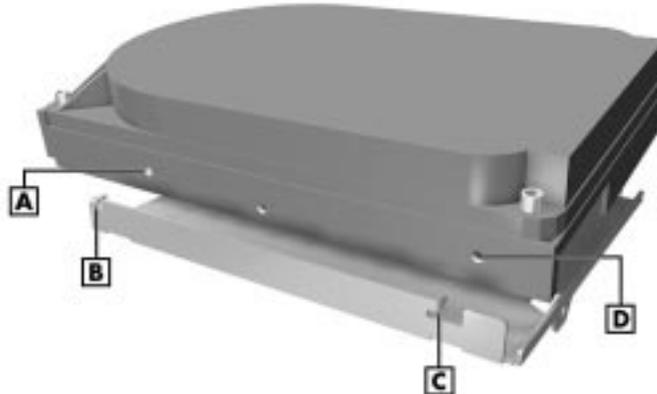


A – Two Drive Bracket Screws

Slide the 3 1/2-inch hard drive bracket towards the back of the system unit until it is free of the molded plastic.

Align the two screw holes on the hard drive with the two tabs on the bracket (see the following figure). Slide the hard drive onto the tabs.

Aligning the Holes and Tabs

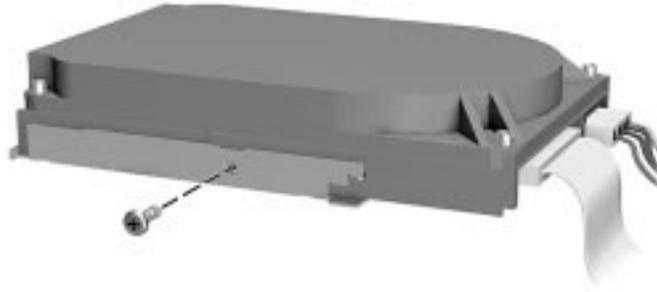


A – Hole
C – Tab

B – Tab
D – Hole

Place the hard drive into the bracket and secure with the screw.

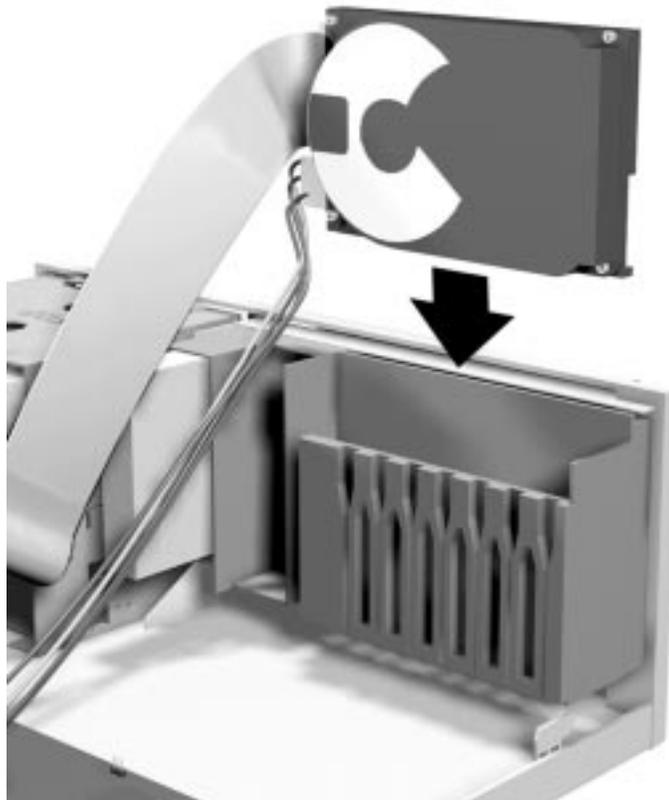
Securing the Drive



Slide the bracket into the molded plastic drive slot. Secure the bracket to the front panel with the two screws shown in “Removing the Bracket Screws.”

- If you are installing the device in the standard 3 1/2-inch internal device slot, simply insert the drive into the opening until it is secured (see the following figure). Secure the drive with two screws inserted into the front of the system.

Inserting the Device



- If you are installing a device in an accessible slot, go to step 6. Otherwise, continue to step 7.

-
6. To install a 3 1/2-inch device in an accessible slot:
- Remove the plastic blank panel from the selected slot by pressing the panel tab inward and swinging the blank panel out (see the following figure).

Removing the Blank Panel



A – Blank Panel Tab

- Use a screw driver to remove the metal slot cover by carefully pressing it until it breaks away from the chassis.

 **CAUTION**

Be careful of sharp edges!

- Slide the device into the slot and secure the device.
7. Connect the device cables (see “Cabling an IDE Device”).
 8. Replace the front panel.
 9. Replace the access cover.

Installing a 5 1/4-Inch Device

Install an accessible device into the device slot as follows.

1. Follow the preinstallation instructions that came with the device, such as setting jumpers and switches.

 **Note:** If your 5 1/4-inch device comes with drive rails, do not attach them. Remove any rails attached. See the documentation that comes with the device.

2. Remove the access cover.
3. Remove the device cage (see “Removing the CD-ROM/DVD Drive”).
4. Remove and label any cables that interfere with installing the device.
5. Remove the front panel.
6. Remove the plastic blank panel. If you are installing a hard drive, keep the panel handy.
7. Use a screw driver to remove the metal slot cover by carefully pressing it until it breaks away from the chassis.



Be careful of sharp edges!

8. From the front of the system, slide the device, connector end first, into the device slot.

 **Note:** To easily access device connectors for cabling, do not insert a 5 1/4-inch device all the way into the slot.

9. Connect the device cables (see “Cabling Storage Devices”).
10. Align the holes in the device with the holes in the chassis.
11. Secure the device with the screws that came with the device (see the following figure).

Installing the Device



 **Note:** If you removed the accessible device cage, replace it. Secure the device cage with the screw.

- 12.** If you installed a hard drive in the 5 1/4-inch slot, replace the plastic panel.
- 13.** Replace the front panel.
- 14.** Replace the access cover.

Replacing the Front Panel

To replace the front panel, follow this procedure.

- 1.** Align the front panel's six tabs with their corresponding slots on the system (three of the tabs have holes, the others have prongs).
- 2.** Press the front panel squarely into position until the tabs lock the panel in place.
- 3.** Replace the access cover.
- 4.** After securing your system, reboot it and run the Setup program to set the new configuration.

External Options

External connectors on the back of the system unit allow for a variety of industry-standard options

This subsection provides the installation procedures for the most commonly used external options, which are as follows:

- parallel printer
- serial device.

For other external devices, see the instructions that come with the option.

Parallel Printer

 **Note:** Before connecting a printer to the system, be sure the printer is set up correctly. Follow the setup instructions that come with the printer.

Connect a parallel printer to the system as follows.

1. Turn off power to the system and printer.
2. Connect the printer cable to the printer port on the rear of the system unit (see the following figure).
3. Secure the cable with the screws provided.
4. Connect the other end to the printer.
5. Turn on the printer and the computer.

Locating the Parallel Port



A – Parallel Port

RS-232C Device Connection

 **Note:** Before connecting a serial device to the system, be sure the serial device is set up correctly. Follow the setup instructions that come with the option.

1. Turn off power to the system and to the serial device.
2. Connect one end of the serial cable to one of the serial ports on the rear of the computer (see the following figure).
3. Secure the cable with the screws provided.
4. Connect the other end to the serial device.
5. Turn on the serial device and the computer.

Locating the Serial Ports



A – Serial Port 1

B – Serial Port 2

4

Maintenance and Troubleshooting

- Maintenance
- Troubleshooting

This section provides information on maintaining and troubleshooting the Direction SP B-Series computers.

Also included in this section are system error beep code descriptions and a procedure for replacing the CMOS battery.

The following table lists NEC CSD service and information telephone numbers.

NEC CSD Service and Information Telephone Numbers

Service	Telephone Number
To contact the NEC CSD Direction Technical Support Center (TSC):	In the U.S., call 1 (888) 632-2678
To order spare parts:	In the U.S., call 1 (800) 233-6321 In Canada, call 1 (800) 727-2787
To contact Customer Service about service and contract warranty issues:	Call 1 (888) 632-9128
To log onto the NEC CSD Electronic Bulletin Board System (BBS) to download drivers and the latest BIOS for ROM flashing:	Call 1 (916) 379-4499
For information about NEC CSD products, call FaxFlash SM (use the automated service to have the latest Technical Information Bulletins sent to your fax machine 24 hours a day):	In the U.S., call 1 (888) 329-0088 call 1 (888) FAX-0088 Outside the U.S., call 1 (916) 379-4780
To send technical questions over email:	tech-support@neccsd.com
To fax technical questions to customer support:	In the U.S., fax 1 (801) 578-5101
To access the NEC CSD website:	www.nec-computers.com
To access the NEC CSD FTP site:	ftp.neccsdeast.com

Maintenance

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

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

WARNING

Unplug all power cords before performing any maintenance. Voltage is present inside the system and monitor even after the power button 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. Periodically 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. Or 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 the 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. Remove the eight screws holding the keyboard enclosure together.

 **Note:** 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.

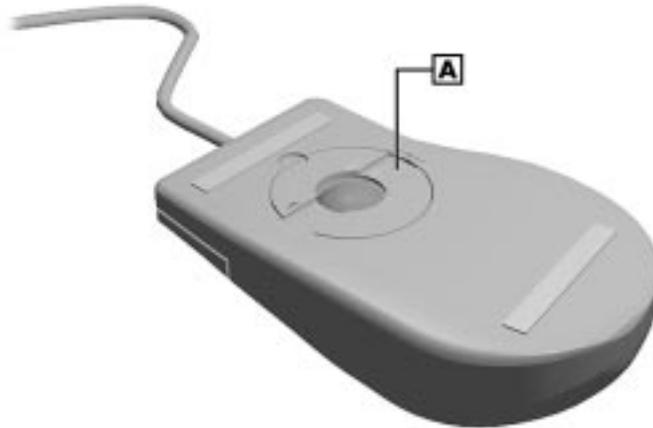
2. Separate the two halves of the enclosure. Clean the enclosure and keys with a damp cloth. A small, soft-bristle brush may be used to clean between the keys. Do not wet or dampen the keyboard's printed circuit board (PCB). If the PCB accidentally gets wet, thoroughly dry it before reattaching the keyboard to the system unit.

Mouse Cleaning

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

1. Unplug the mouse from the system.
2. Turn the mouse upside down and locate the mouse ball cover (see the following figure).
3. Turn the ball cover clockwise and remove the cover.

Locating the Mouse Ball Cover



A – Mouse Ball Cover

4. Turn the mouse over and remove the ball.
5. 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.
6. Replace the mouse ball in its socket.
7. Replace the ball cover and turn it counterclockwise until it locks in place.

Troubleshooting

This subsection provides information that helps isolate and repair system malfunctions at the field level. Step-by-step instructions for diagnosing and solving system hardware problems are provided. Technical support is available at 1-888-632-2678.

If disassembly is required, see Section 5, “Disassembly and Reassembly.” Connector pin assignments are given in Appendix B, “Connector Pin Assignments.” Jumper settings are given in Appendix C, “System Resources.”

Diagnosing and Solving Problems

One beep indicates that the system has completed its power-on self-test (POST) test. If intermittent beeping occurs, power off the system and try again. If the beeping persists, see the “Beep Code Descriptions” table later in this section.

The following 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 computer does not light.	<p>Check that the power cord is plugged into the AC connector on the computer.</p> <p>Check that the other end of the cord is plugged into a live properly grounded AC power outlet.</p> <p>Check cable connections between the power supply and the system board.</p> <p>Systematically eliminate possible shorted boards by removing cables and expansion boards.</p> <p>Check the +5 and +12 power supply voltages (see Appendix B, "Connector Pin Assignments"). Measure voltages with the system board installed.</p> <p>Replace the power supply.</p> <p>Replace the system board.</p>
Power supply malfunction	<p>Any of the following conditions can occur:</p> <p>Front panel lamps out, diskette and/or hard drives do not spin, monitor blank, interface ports not working, and keyboard lamp out and/or cannot input from the keyboard.</p>	<p>Perform the first four checks in the solution for the "No power" problem in this table.</p> <p>Check power supply voltages. Voltages should be measured with a load on them (system board plugged in). See Appendix B, "Connector Pin Assignments."</p> <p>Replace the power supply.</p>
Operating system does not boot	<p>Intermittent beeping at power on. Computer beeps more than once and is unable to complete bootup.</p> <p>"Invalid Configuration" message displayed.</p>	<p>Check system configuration (see Section 2, "Setup Utility").</p> <p>Check all jumper settings and verify that drives are enabled (see Section 2, "Setup Utility" and Appendix C, "System Resources").</p> <p>Reseat DIMMs and option boards in their connectors. Inspect system board for dropped objects.</p> <p>Remove option boards and reboot.</p> <p>Replace system board.</p> <p>Press F2 to run Setup and correct the parameters.</p> <p>Replace the CMOS battery if the date and time must be set each time the computer is powered on.</p>

Problems and Solutions

Problem	Symptom	Solution
	Computer halts during loading sequence.	Power the computer off. Check for proper jumper settings, then power on the computer. Check condition of selected bootload device (diskette or hard drive) for bad boot track or incorrect OS files. Try booting OS from diskette or recopy OS files onto hard drive. Verify correct hard drive is selected.
Diskette drive does not work	Lamp on drive panel does not light when diskette is loaded.	Check power and signal cable connections between diskette drive, system board, and power supply. Check diskette drive jumpers. Check diskette cable. Replace as necessary. Check power supply. Replace diskette drive. Replace system board.
Hard drive malfunction	Hard drive lamp does not light but hard drive can be accessed. Hard drive controller failure message displayed. Cannot access the hard drive.	Check cable connections between lamp and system board. Check that the IDE port and hard drives are enabled in Setup. Check signal/power connections between hard drive, system board, and power supply. Check hard drive jumper settings. Check power supply. Check hard drive cable and hard drive. Replace as necessary. Replace system board (or hard disk controller board if the system board controller is not used).
Memory malfunction	Total memory not recognized.	Reseat DIMMs. Systematically swap DIMMs. Check to see if the DIMM configuration is valid (see Section 3, "Option Installation"). Replace DIMMs. Replace system board.

Problems and Solutions

Problem	Symptom	Solution
Modem board malfunction	No output from board.	<p>Check interrupts (see Appendix C, "System Resources").</p> <p>Check DMA channels (see Section 1, "Technical Information").</p>
Keyboard or mouse malfunction	Monitor has prompt, but cannot input data.	<p>Check that keyboard/mouse is plugged in.</p> <p>Check password (see Section 2, "Setup Utility").</p> <p>Disable password (see Appendix C, "System Resources").</p> <p>Replace keyboard (or mouse).</p> <p>Replace system board.</p>
Monitor malfunction	<p>Unable to synchronize display.</p> <p>Wavy display.</p> <p>Blank display.</p>	<p>Adjust the monitor's synchronization controls.</p> <p>Check that the monitor's resolution matches the video setting or the video driver used.</p> <p>Check that the utility is not selecting a refresh rate/resolution that is not supported by the monitor.</p> <p>Check that the driver used matches the capabilities of the video controller and memory.</p> <p>Check that the computer and monitor are not near motors or electric fields.</p> <p>Press any key and move the mouse to ensure power management has not blanked the display.</p> <p>Check that the monitor power switch is on.</p> <p>Check that the monitor cable is attached to the video connector at the back of the system.</p> <p>Check cable connections between the AC power supply and monitor.</p> <p>Adjust brightness and contrast controls on the monitor.</p> <p>Check connections between the monitor connector and the system board.</p> <p>Replace system board.</p> <p>Replace monitor.</p>
CD-ROM/DVD drive malfunction	System power not on.	Turn system power on.

Problems and Solutions

Problem	Symptom	Solution
	Disc tray does not open.	System power not on. Turn on system power. System power failed. Insert about an inch of a straightened paper clip into the emergency eject hole, until the tray opens.
	Cannot access CD-ROM/DVD drive.	Check that the driver software is loaded and not corrupted. Check signal and power connections between the drive, system board, and power supply. Check the master/slave jumper settings. Check the IDE cable. Replace as necessary. Check the power supply. Replace as necessary. Check the system board. Replace as necessary.
	No sound from CDs.	Check that speaker power is on and volume is adjusted. Check audio software settings. Check the CD disc. Check the drive audio cable. Replace as necessary. Replace the CD-ROM/DVD drive. Replace the system board.
Zip drive malfunction	System power not on.	Turn system power on.
	Cannot access Zip drive.	Check that the Zip drive driver software is loaded and not corrupted. Check signal and power connections between the Zip drive, system board, and power supply. Check the master/slave jumper settings. Check the IDE cable. Replace as necessary. Check the power supply. Replace as necessary. Check the system board. Replace as necessary.

Problems and Solutions

Problem	Symptom	Solution
Communication error	No or bad data when communicating.	Check cable connections between the system board and device. Check that the interface port is selected. Test or replace the device and interface cable (see the device documentation for troubleshooting). Replace the system board.

Beep Codes

During boot up, the computer performs a series of POST (Power On Self Test) routines. A beep code may appear when an error is detected. There are fatal and nonfatal errors. The fatal errors include BIOS, CMOS, DMA, RAM, video, and keyboard controller errors. The nonfatal errors include timer tick interrupt, shutdown test, unexpected interrupt in protected mode, gate A20, RAM test, interval timer channel 2 test, clock, serial and parallel port test, numeric processor, system board select, and extended CMOS RAM.

The following table describes the beep codes.

Beep Code Descriptions

Beeps	Description
1-2	Search for option ROMs
1-2-2-3	BIOS ROM checksum
1-3-1-1	Test DRAM refresh
1-3-1-3	Test keyboard controller
1-3-3-1	Autosize DRAM
1-3-3-2	Initialize POST memory manager
1-3-3-3	Clear 512 KB base RAM
1-3-4-1	RAM failure on address line xxxx
1-3-4-3	RAM failure on data bits xxxx of low byte of memory bus
1-4-1-1	RAM failure on data bits xxxx of high byte of memory bus
2-1-2-2	POST device initialization
2-1-2-3	Check ROM copyright notice
2-2-3-1	Test for unexpected interrupts
2-2-4-1	Test RAM between 512 KB and 640 KB

CMOS Battery Replacement

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

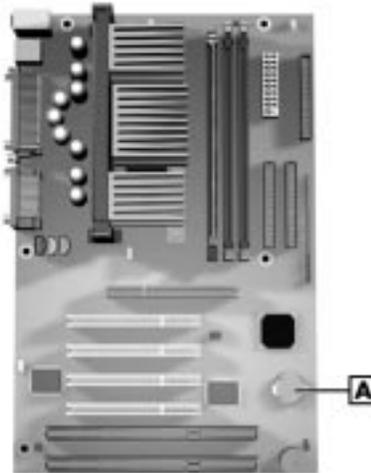
1. Turn off and unplug the system unit and any external options connected to the system.

CAUTION

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

2. Remove the system access cover.
3. Locate the battery and its socket on the system board (see the following figure).

Locating the Battery



A – Battery

4. Use fingers to carefully pull the battery up until it is clear to slide the battery out of the socket.

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.

-
5. With the positive (+) side facing up, press the new battery into the socket.
 6. Replace the system access cover.
 7. Connect external peripherals and power cables.
 8. Run Setup to reconfigure system parameters (see Section 2, “Setup Utility”).

5

Disassembly and Reassembly

- Disassembly
- Illustrated Parts Breakdown

This section contains step-by-step disassembly procedures for the system unit. Reassembly is the reverse of disassembly. The procedures are supported by simplified disassembly illustrations to facilitate removal.

A Phillips-head screwdriver is the only required tool. For complete disassembly of the system unit, follow the disassembly order listed in the following table. To reassemble, follow the table and procedures in reverse order.

Individual disassembly procedures do not require the total disassembly of the computer. Each of the following subsections lists the parts that must be removed before beginning the disassembly procedure.

Disassembly Sequence

Sequence	Part	See Page
1	System access cover	5-3
2	Expansion board(s)	5-3
3	Front panel	5-4
4	Side panel	5-5
5	Device cage	5-5
6	Diskette drive	5-6
7	5 1/4-inch device	5-6
8	Optional 3 1/2-inch hard drive	5-7
9	Standard 3 1/2-inch hard drive	5-8
10	Fan assembly	5-9
11	DIMM module	5-9
12	Power supply	5-9
13	System board	5-10

When disassembling the system unit, follow these general rules.

- Disconnect all peripherals.
- When handling boards or chips, touch the system unit frame to discharge static.
- Do not disassemble parts other than those specified in the procedure.
- Use a Phillips-head screw driver, unless otherwise specified.
- Label all removed connectors. Note where the connector goes and in what position it was installed.

On completion of any reassembly, perform a power-on self-test (see Section 4, “Maintenance and Troubleshooting”). If a fault occurs, verify that the reassembly was performed correctly.

 **CAUTION**

When handling boards or chips, ground yourself to release static.

Disassembly

Use the following procedures to disassemble the system unit.

 **Note:** Unplug the power cord before disassembling the system unit. Voltage is present inside the system unit even after the power is off. All voltage is removed only when the power cord is unplugged.

System Access Cover

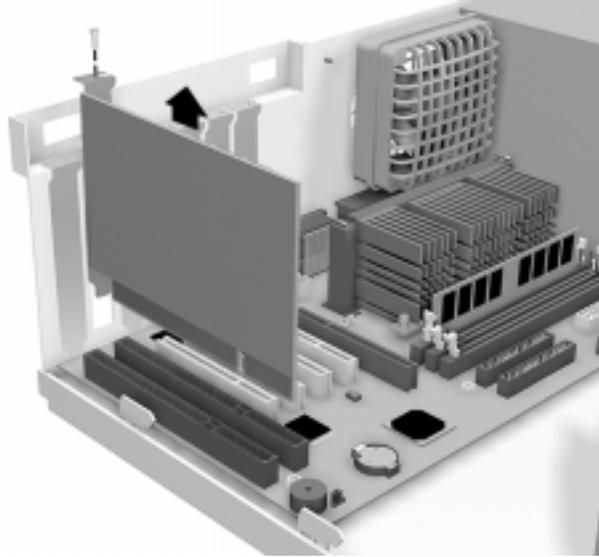
To remove and replace the system access cover, see Section 3, “Option Installation.”

Expansion Board Removal

Remove any installed expansion board(s) per the following steps.

1. Remove the system access cover as described in Section 3, “Option Installation.”
2. Disconnect any cables leading from the expansion board(s).
3. Remove the screw that secures the board to the support bracket.
4. Pull the board out of the connector (see the following figure). You might need to gently rock the board from side-to-side to release it from its connector.

Removing a Board

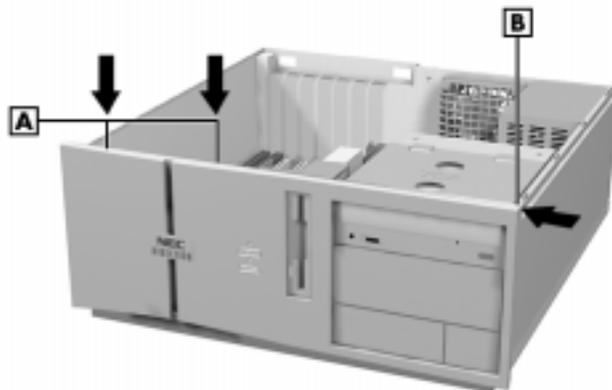


Front Panel Removal

Remove the front panel from the system unit as follows.

1. Locate the two plastic tabs at the front of the chassis. They are indicated by two arrows engraved on the chassis.
2. Press down on the two tabs and press in a third tab at the end of the panel to release the panel (see the following figure).

Releasing the Front Panel



A – Release Tab

B – Thumb Screw

3. Pull the panel away from the chassis.

Side Panel Removal

Remove the side panel from the system unit as follows.

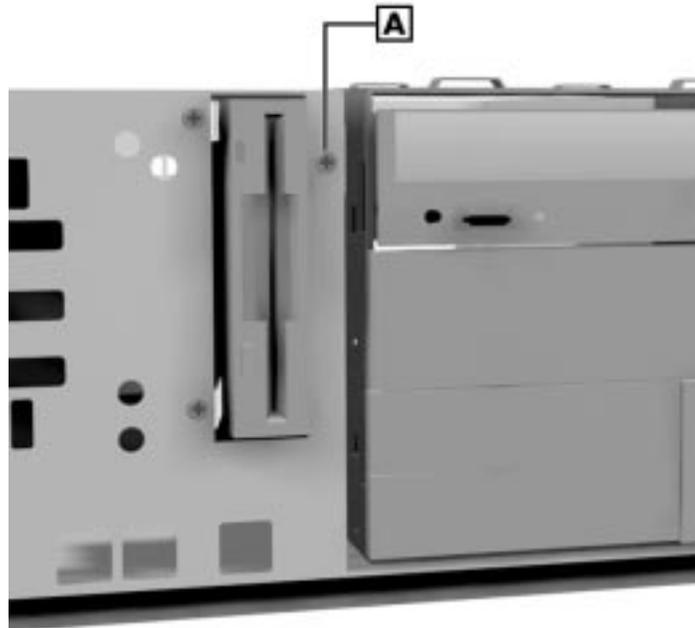
1. Remove the system access cover and front panel as previously described.
2. Locate the two side panel securing tabs at the front of the system.
3. Pull the tabs out and away from the system.
4. Slide the side panel towards the rear of the unit and away from the unit.

Device Cage Removal

Remove the device cage from the system unit as follows.

1. Label and disconnect any cables connected to devices in the device cage.
2. Locate the screw on the front of the system between the 3 1/2-inch blank panel and diskette drive (see the following figure). Remove the screw.

Locating the Device Cage Screw



A – Device Cable Screw

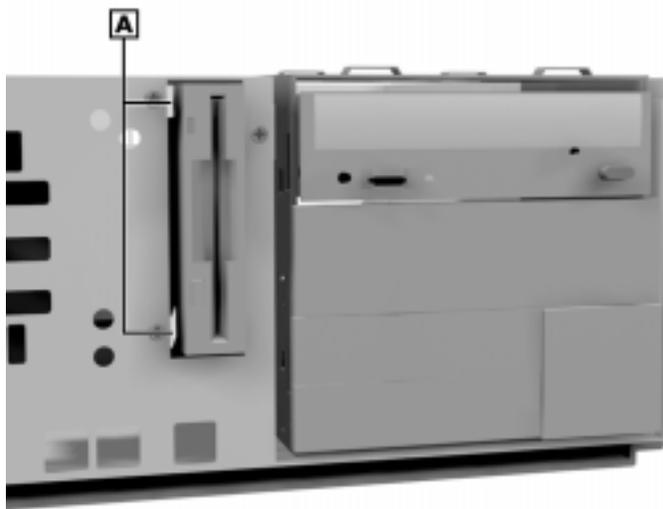
3. Slide the cage towards the front of the system and lift it out of the unit.

Diskette Drive Removal

Remove the standard diskette drive from the system unit as follows.

1. Remove the system access cover and front panel as previously described.
2. Label and unplug the signal and power cables for the diskette drive.
3. Locate the two clips at the front of the system that secure the diskette drive.

Locating the Two Diskette Drive Clips



A – Diskette Drive Clips

4. Squeeze the two clips and pull the diskette drive out of the front of the system.

5 1/4-Inch Device Removal

Remove an optional 5 1/4-inch device from the system unit as follows.

1. Remove the system access cover, front panel, and the device cage as previously described.
2. Label and unplug the signal and power cables from the optional device in the 5 1/4-inch device cage. Unplug the audio cable from an optional CD-ROM drive.
3. Remove the screws holding the device in the cage (see the following figure).

Removing the 5 1/4-Inch Device Screws



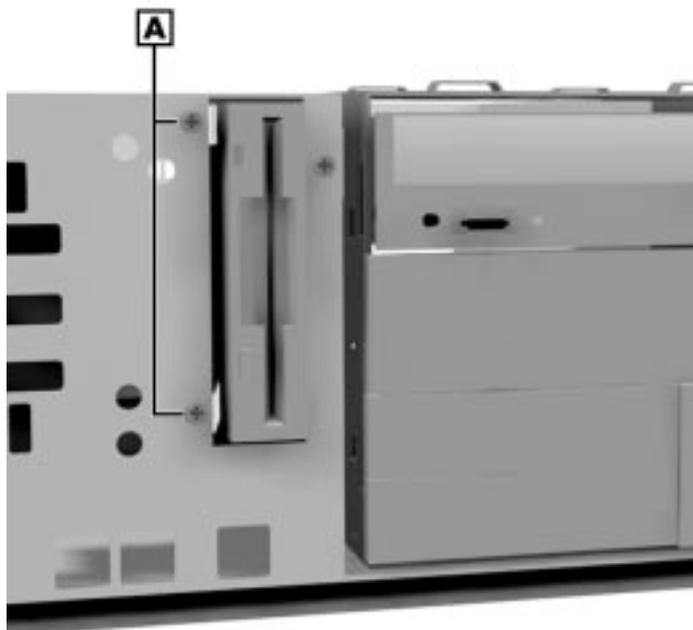
4. Slide the device out from the front of the system unit.

Optional 3 1/2-Inch Hard Drive Removal

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

1. Remove the system access cover and front panel as previously described.
2. Label and unplug the hard drive power and signal cables from the hard drive.
3. Remove the two screws securing the 3 1/2-inch hard drive bracket to the front of the system unit (see the following figure).

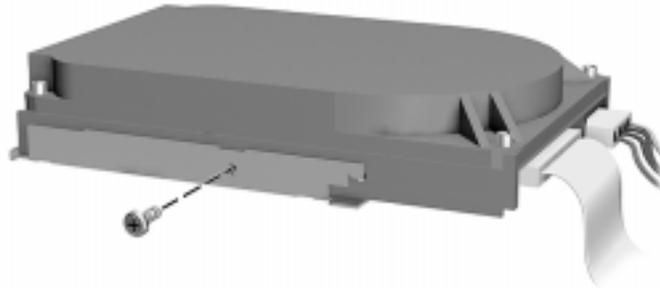
Removing the Bracket Screws



A – Two Drive Bracket Screws

-
4. Slide the 3 1/2-inch hard drive bracket towards the back of the system unit until it is free of the molded plastic.
 5. Remove the screw on the side of the hard drive securing it to the bracket.

Removing the Securing Screw



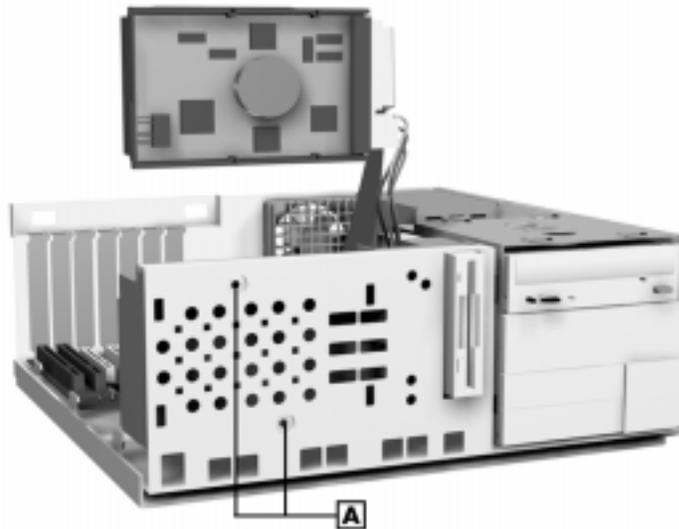
6. Slowly pull the hard drive away from the bracket and lift the drive out of the two securing tabs on the opposite side of the bracket.

Standard 3 1/2-Inch Hard Drive Removal

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

1. Remove the system access cover and front panel as previously described.
2. Unplug the hard drive power and signal cables from the optional hard drive.
3. Locate the two screws securing the 3 1/2-inch hard drive in the molded plastic cage at the front of the system. Remove the screws.
4. Release the two plastic clips inside the plastic cage holding the drive in place and slide the drive up and out of the cage.

Removing the Drive



A – Two Drive Screws

Fan Assembly Removal

Remove the fan assembly per the following steps.

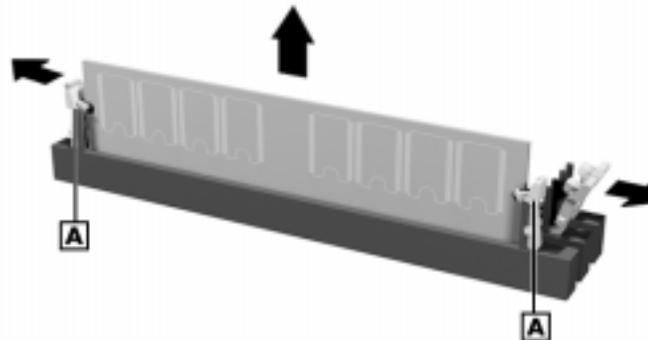
1. Remove the system access cover (see Section 3, “Option Installation”).
2. At the rear of the system unit, press in on the two locking tabs securing the assembly to the chassis.
3. Remove the fan by pulling it outward away from the system board.

DIMM Module Removal

Remove any optional DIMM modules from the system board as follows.

1. Remove the system access cover and any expansion boards as previously described.
2. Press the locking clips at the ends of the socket away from the DIMM memory module (see the following figure).
3. Gently rock the module while pulling it up from the socket.

Removing a DIMM



A – Plastic Clip

When installing a DIMM module, align the notches on the module with the keys in the memory socket, insert the module, and press in the plastic locking clips.

Power Supply Removal

Remove the power supply as follows.

1. Remove the system access cover as previously described.
2. Label and unplug the power cable attached to the system board.
3. Label and unplug the power cables from all installed devices.

-
4. At the back of the system unit, remove the two screws securing the power supply to the system unit (see the following figure).

Removing the Power Supply Screws



A – Power supply screws

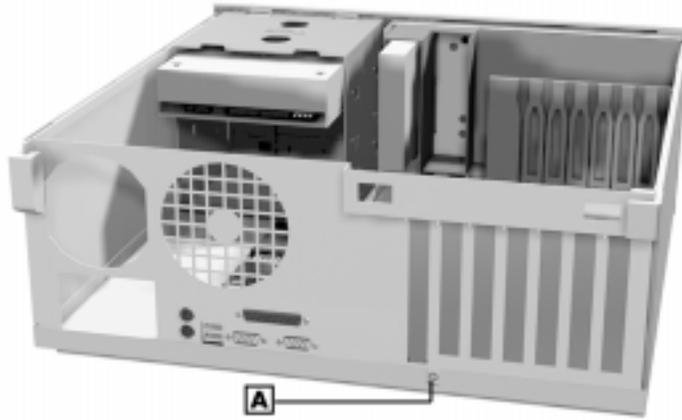
5. Pull the power supply out of the system unit.

System Board Removal

Remove the system board per the following steps.

1. Remove the system access cover, expansion boards, fan assembly, and power supply as previously described.
2. Remove and label all cables connected to the system board. Appendix B, “Connector Pin Assignments,” provides the connector identifiers and pin assignments for each connector.
3. Locate and remove the one screw at the rear of the unit that secures the system board to the system unit (see the following figure).

Removing the System Board Screw



A – System Board Screw

4. Slide the system board towards the front of the unit until it is clear of the metal shielding and the alignment clips.
5. Lift the board out of the system at an angle.
6. If replacing the system board, remove any installed DIMMs from the board. Reinstall the DIMMs on the new board.
7. Replace the access cover and reconnect all the cables. Turn the system and monitor on and note the initial boot up screen.

If the displayed board's processor speed does not match the actual processor, use the following procedure to set the system's processor speed.

Use the following steps to adjust the system's processor speed.

1. Turn off the system and remove the access cover.
2. Locate jumper J8A1 on the system board.
3. Move the jumper block from pins 1 and 2 (normal mode) to pins 2 and 3 (configure mode).
4. Turn on the system. The Maintenance menu appears showing the processor speed.
5. With the cursor on "Processor Speed," press **Enter**. Highlight the proper speed and press **Enter**.
6. Exit saving changes. A dialog box appears. Choose to save configuration changes and exit.
7. A screen with information about the jumper appears. Turn the system off.
8. Move the jumper block from pins 2 and 3 to pins 1 and 2.

Illustrated Parts Breakdown

This section contains the NEC CSD part descriptions and the illustrated parts breakdown (IPB) figure for the Direction SP B-Series desktop and minitower computers.

The following table and IPB lists and illustrates the field-replaceable parts for the desktop computer. The minitower table and IPB follow the desktop IPB.

Direction SP B-Series Desktop Field-Replaceable Parts List*

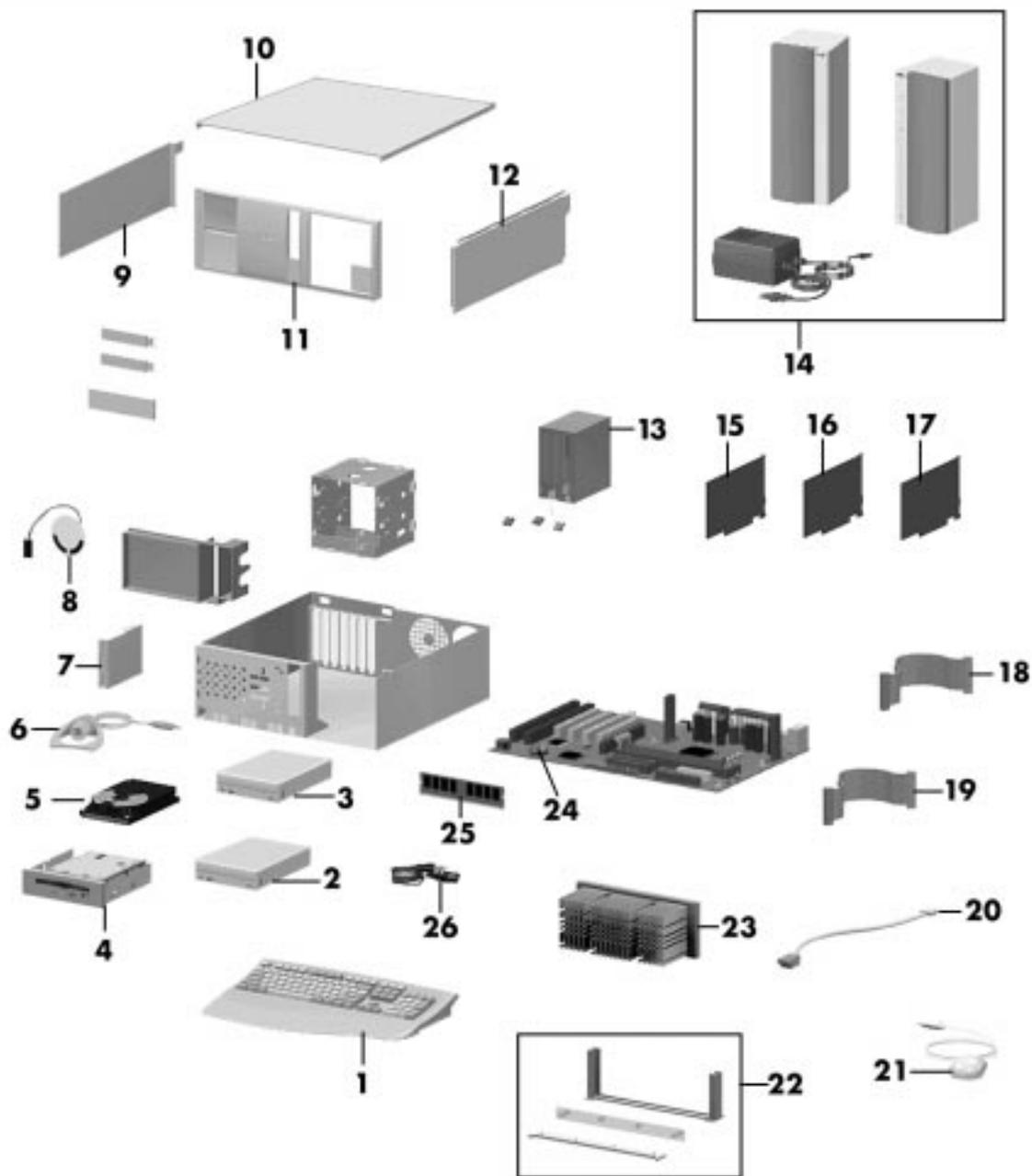
Item	Description
1	Keyboard, Ergo
2a	32X CD-ROM drive
2b	40X CD-ROM drive
3	Seagate Travan tape drive, backup
4	Iomega ATAPI Zip drive
5a	6.4-GB hard drive, IDE UDMA
5b	10.2-GB hard drive, IDE UDMA
5c	14.4-GB hard drive, IDE UDMA
6	Microphone
7	3.5-inch diskette drive
8	Speaker, internal
9	Left side cover
10	Top cover (access cover)
11	Front panel
12	Right side cover
13	Power supply - Sparkle
14a	Altec Lansing speakers, ACS90
14b	Altec Lansing speakers, ACS45
15a	8-MB Video board, Diamond Stealth II G460, AGP
15b	8-MB Video board, ATI XPERT98, AGP
15c	16-MB Video board, Diamond Viper V550, AGP
16a	56-Kbps modem board
16b	56 Kbps PCI Winmodem
16c	56 Kbps Diamond Supra V.90 PCI modem

* This data was prepared April 1999. For an up-to-date listing of spare parts, please call FaxFlashSM at 1-888-329-0088 (or 1-916-379-4780 outside the U.S.) and order document 42102343.

Direction SP B-Series Desktop Field-Replaceable Parts List*

Item	Description
17	3C509C-TX network board
18	Diskette drive signal cable
19	IDE signal cable
20	Cable, audio internal, dual MPC
21	Microsoft IntelliPoint mouse
22	Retention mechanism kit
23a	350-MHz Pentium II
23b	400-MHz Pentium II
23c	450-MHz Pentium II
23d	500-MHz Pentium III
24	System board
25a	32-MB DIMM - non-parity
25b	64-MB DIMM - non-parity
25c	128-MB DIMM - non-parity
26	AC power cable
Not shown	Battery, CMOS
Not shown	Active heatsink, CPU
Not shown	Direction SP B-Series User's Guide
Not shown	Cable keeper cord
Not shown	Heatsink bar top
Not shown	5 1/4-inch drive panel
Not shown	3 1/2-inch drive panel
Not shown	Power LED cable
Not shown	Floppy diskette drive clip-L assembly
Not shown	Floppy diskette drive clip-R assembly
Not shown	Phone cord cable, extension
Not shown	Modem user's guide
Not shown	Tape cartridge, Seagate Travan
Not shown	100 MB Zip Cartridge

* This data was prepared April 1999. For an up-to-date listing of spare parts, please call FaxFlashSM at 1-888-329-0088 (or 1-916-379-4780 outside the U.S.) and order document 42102343.



Direction SP B-Series Desktop Illustrated Parts Breakdown*

* This data was prepared April 1999. For an up-to-date listing of spare parts, please call FaxFlashSM at 1-888-329-0088 (or 1-916-379-4780 outside the U.S.) and order document 42102343.

The following table and IPB list and illustrate the field-replaceable parts for the minitower computer.

Direction SP B-Series Minitower Field-Replaceable Parts List*

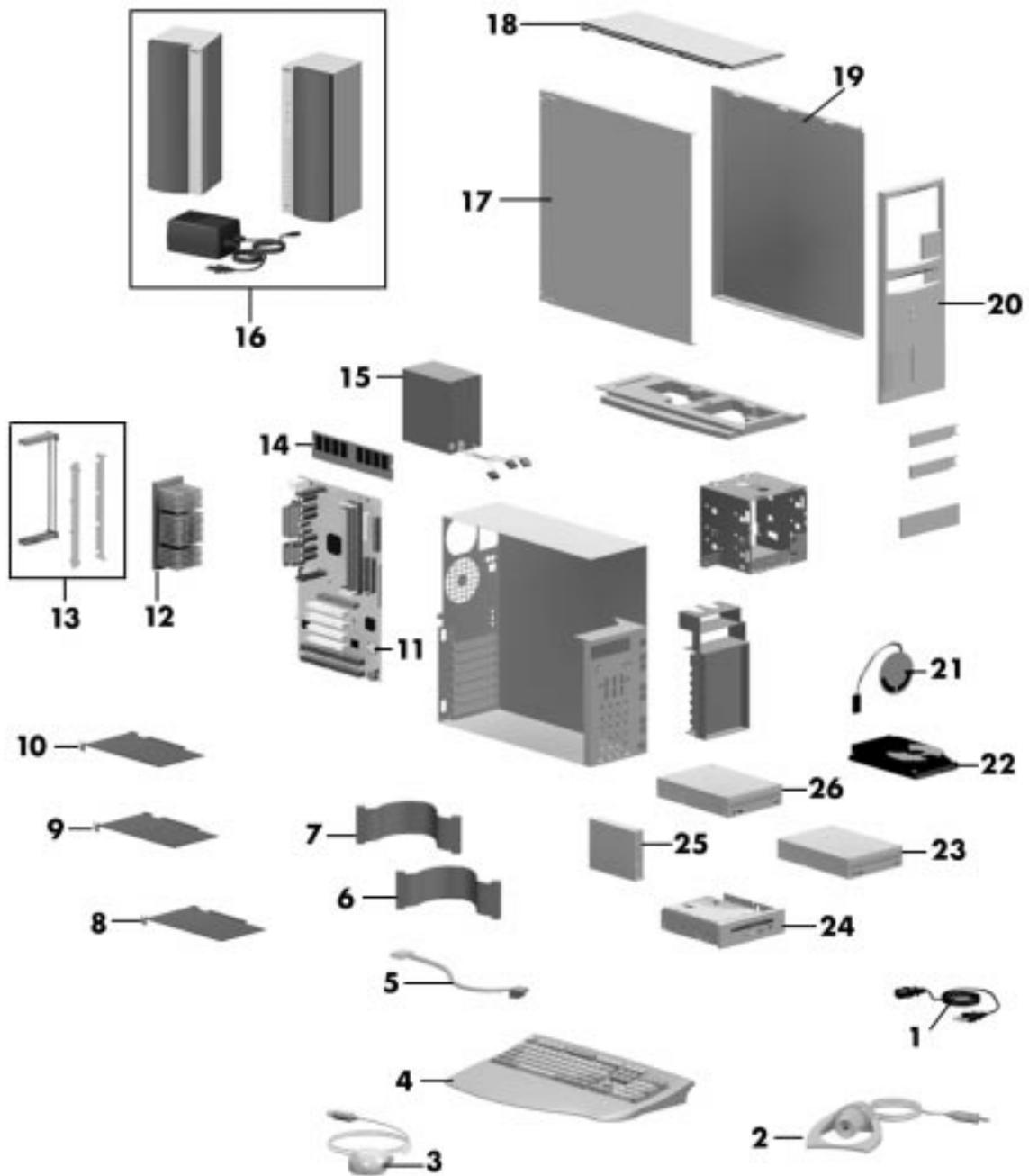
Item	Description
1	AC power cable
2	Microphone
3	Microsoft IntelliPoint Mouse
4	Keyboard, Ergo
5	Cable, audio internal, dual MPC
6	Diskette drive signal cable
7	IDE signal cable
8a	8-MB video board, Diamond Stealth II G460, AGP
8b	8-MB video board, ATI XPERT98, AGP
8c	16-MB video board, Diamond Viper V550, AGP
9a	56-Kbps modem board
9b	56-Kbps PCI Winmodem board
9c	56-Kbps Diamond Supra 56I V.90 PCI modem board
10	3C509C-TX network board
11	System board
12a	350-MHz Pentium II
12b	400-MHz Pentium II
12c	450-MHz Pentium II
12d	500-MHz Pentium III
13	Retention mechanism kit
14a	32-MB DIMM - non-parity
14b	64-MB DIMM - non-parity
14c	128-MB DIMM - non-parity
15	Power supply - Sparkle
16a	Altec Lansing speakers, ACS90
16b	Altec Lansing speakers, ACS45
17	Left side cover
18	Top cover
19	Right side cover
20	Front panel

* This data was prepared April 1999. For an up-to-date listing of spare parts, please call FaxFlashSM at 1-888-329-0088 (or 1-916-379-4780 outside the U.S.) and order document 42102343.

Direction SP B-Series Minitower Field-Replaceable Parts List*

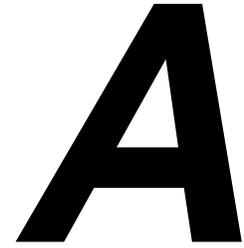
Item	Description
21	Speaker, internal
22a	6.4-GB hard drive, IDE UDMA
22b	10.2-GB hard drive, IDE UDMA
22c	14.5-GB hard drive, IDE UDMA
23a	32X CD-ROM drive
23b	40X CD-ROM drive
24	lomega ATAPI Zip drive
25	3.5-inch diskette drive
26	Seagate Travan tape drive, backup
Not shown	Battery, CMOS
Not shown	Heat sink, CPU
Not shown	Direction SP B-Series User's Guide
Not shown	Cable keeper
Not shown	Heatsink bar top
Not shown	5 1/4-inch drive panel
Not shown	3 1/2-inch drive panel
Not shown	Power LED cable
Not shown	Floppy diskette drive clip-L assembly
Not shown	Floppy diskette drive clip-R assembly
Not shown	Phone cord cable, extension
Not shown	Modem user's guide
Not shown	Tape cartridge, Seagate Travan
Not shown	100 MB Zip Cartridge

* This data was prepared April 1999. For an up-to-date listing of spare parts, please call FaxFlashSM at 1-888-329-0088 (or 1-916-379-4780 outside the U.S.) and order document 42102343.



Direction SP B-Series Minitower Illustrated Parts Breakdown*

* This data was prepared April 1999. For an up-to-date listing of spare parts, please call FaxFlashSM at 1-888-329-0088 (or 1-916-379-4780 outside the U.S.) and order document 42102343.



System Specifications

- Processor
- Random Access Memory
- Read-Only Memory
- Video Memory
- Calendar Clock
- Input/Output Facilities
- Expansion Slots
- Keyboard and Mouse
- Storage Devices
- Device Slots
- Graphics
- Sound System
- Dimensions
- Weight
- Power
- Recommended Operating Environment

This section describes system specifications.

Processor

Microprocessor — 350-MHz, 400-MHz, or 450-MHz Pentium II processor or 500-MHz Pentium III processor

Clock Rate

- 350 MHz internally, 100 MHz FSB
- 400 MHz internally, 100 MHz FSB
- 450 MHz internally, 100 MHz FSB
- 500 MHz internally, 100 MHz FSB

Processor Support

- 32-bit addressing
- 64-bit data

Primary Cache — 32 KB of internal write-back cache on processor

Secondary Cache — 512 KB of pipeline burst cache

Processor Mounting

- Processor subsystem is inserted into slot 1 on the system board.
- A 242-pin edge connector is implemented on the processor board for system board installation.
- Retention Mechanism (RM) is inserted over slot 1 to act as an insertion guide and prevent movement of processor after subsystem mounting.
- For thermal protection, a heatsink is supported by a Heat Sink Support (HSS) which is attached to the system board.

Random Access Memory

Standard Random Access Memory (RAM) — 32 MB to 384 MB of 100-MHz SDRAM installed in industry-standard DIMM sockets on system board

Total Memory — support for up to 384 MB of high-speed PC100 SDRAM

DIMM type — gold-plated, dual in-line modules (DIMMs)

Expansion — expandable using the following modules:

- 4-Mbit by 64 (32-MB DIMM)
- 8-Mbit by 64 (64-MB DIMM)
- 16-Mbit by 64 (128-MB DIMM)

Read-Only Memory

Flash ROM — 2 Mbit

Video Memory

Standard video memory — 8 MB or 16 MB video memory on video board

Calendar Clock

Year/Month/Day/Hour/Minute/Second/.01 Second; maintained by battery backup

Battery Type — Real Time Clock (RTC) battery

Input/Output Facilities

Integrated Industry-Standard Interfaces

- Parallel — bidirectional, ECP/EPP support; one 25-pin connector
- Serial — two high-speed RS-232C ports using 16C550-compatible UARTs, support transfer rates up to 115.2 Kbits per second; 9-pin connectors
- Universal Serial Bus (USB) — two USB ports, support two USB peripherals directly to the system; with appropriate connector, each port supports up to 127 daisy-chained devices; supports 12 megabits (Mbs) per second
- Keyboard — PS/2-compatible, 6-pin connector (mini DIN)
- Mouse — PS/2 compatible, 6-pin connector (mini DIN)
- IDE — dual IDE channels
 - two fast IDE channels
 - CD-ROM drive and hard drive on separate channels
 - support for up to 33 MB/second 32-bit transfers on PCI bus
 - support for a total of four IDE devices; 40-pin connectors
 - support for fast PIO mode 3 and mode 4, multiword DMA2, Ultra DMA33
- Diskette Drive — supports two devices, 34-pin connector

Expansion Slots

I/O Bus — PCI/ISA

Six expansion slots

- One 8-/16-bit ISA slot
- Three 32-bit PCI slots
- One shared ISA/PCI slot
- One AGP slot

Keyboard and Mouse

Keyboard — Windows 95 enhanced, PS/2-compatible

- Function Keys — 12 keys, capable of up to 48 functions
- Status Lamps — numeric lock, capital lock, and scroll lock keys
- Numeric Keypad — standard
- Separate Cursor Control Keys — standard

Mouse — PS/2[®]-compatible; six-pin connector

Storage Devices

Accessible Devices

- 3 1/2-inch, 1.44-MB diskette drive
- CD-ROM/DVD drive
- Zip Drive — Iomega Zip 100 ATAPI drive on some systems; removable 100-MB data disks; data transfer rate up to 1.4 MB per second

Device Slots

Seven device slots

- One 3 1/2-inch accessible device slot contains the standard 1.44-MB diskette drive
- One internal 3 1/2-inch hard drive slot for the hard drive, a second internal 3 1/2-inch hard drive slot is available for expansion
- Four accessible device slots
 - One accessible 5 1/4-inch device slot contains the standard CD-ROM/DVD drive

-
- One accessible 5 1/4-inch device slot
 - Two 3 1/2-inch device slots; the lower 3 1/2-inch slot is not accessible on the desktop model

Graphics

Video Memory – 8 MB or 16 MB

- **Diamond Stealth II G460 Graphics Support (with 8 MB of video memory)**
 - 1600 by 1200 pixels, 256 colors
 - 1280 by 1024 pixels, 256/65,000/16.7 million colors
 - 1152 by 864 pixels, 256/65,000/16.7 million colors
 - 1024 by 768 pixels, 256/65,000/16.7 million colors
 - 800 by 600 pixels, 256/65,000/16.7 million colors
 - 640 by 480 pixels, 256/65,000/16.7 million colors
- **Diamond Viper V550 Graphics Support (with 16 MB of video memory)**
 - 1920 by 1200 pixels, 256/65,000/16.7 million colors
 - 1920 by 1080 pixels, 256/65,000/16.7 million colors
 - 1600 by 1200 pixels, 256/65,000/16.7 million colors
 - 1280 by 1024 pixels, 256/65,000/16.7 million colors
 - 1152 by 864 pixels, 256/65,000/16.7 million colors
 - 1024 by 768 pixels, 256/65,000/16.7 million colors
 - 800 by 600 pixels, 256/65,000/16.7 million colors
 - 640 by 480 pixels, 256/65,000/16.7 million colors
- **ATI Xpert 98 Graphics Support (with 8 MB of video memory)**
 - 1600 by 1200 pixels, 256 colors
 - 1280 by 1024 pixels, 256/65,000/16.7 million colors

Sound System

The system board features the Yamaha DS1-L PCI accelerator and Analog Devices AD1819A SoundPort codec. The chips provide the following features:

- 32-voice XG wavetable
- 3D stereo
- support for DirectX
- full-duplex audio
- PC/PCI support for legacy DMAC emulation.

The optional AWE64D PCI sound board replaces the integrated audio system. It provides FM synthesis and 64 simultaneous voices.

Dimensions

System Unit

- Height — 17.1 in. (43.43 cm)
- Desktop Width — 6.5 in. (16.51 cm)
- Minitower Width — 7.8 in. (19.81)
- Depth — 17.3 in. (43.94 cm)

Keyboard

- Height — 1.6 in. (4.1 cm)
- Width — 19.0 in. (48.3 cm)
- Depth — 8.4 in. (21.3 cm)

Weight

The following weights are averages. Weights depend upon the system configuration.

System Unit — 27.5 lb (12.46 kg)

Keyboard — 3.5 to 4 lb (1.6 to 1.8 kg)

Power

Universal Power Supply — 235 W

Power Management — Partial- and full-power reductions, Sleep button

Recommended Operating Environment

Temperature — 50°F to 95°F (10°C to 35°C)

Relative Humidity — 20% to 80%

B

Connector Pin Assignments

- Serial Interface Connectors
- Parallel Interface Connector
- Power Supply (Primary)
- Keyboard and Mouse Connectors
- Front Panel
- Diskette Drive Interface Connector
- IDE Interface Connectors
- DIMM Sockets
- AGP Connector
- ISA Expansion Bus Connectors
- PCI Expansion Bus Connectors
- Universal Serial Bus Connectors

This appendix describes the system board connector pin assignments.

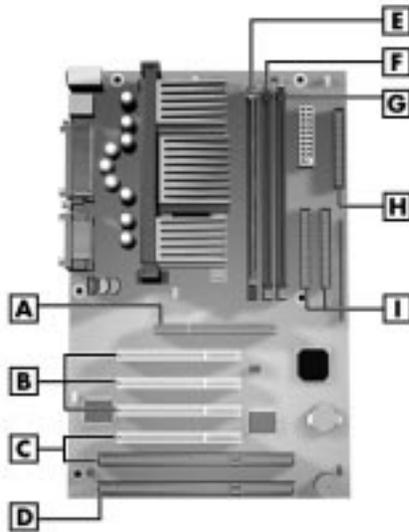
The following “System Board Connectors” table lists the connectors and sockets on the system board. The table also cross-references the page numbers where the connectors and their pinouts are described. The figures show the locations of the connectors and sockets on the system board.

The tables following the figures list each connector by its function, number, and type.

System Board Connectors

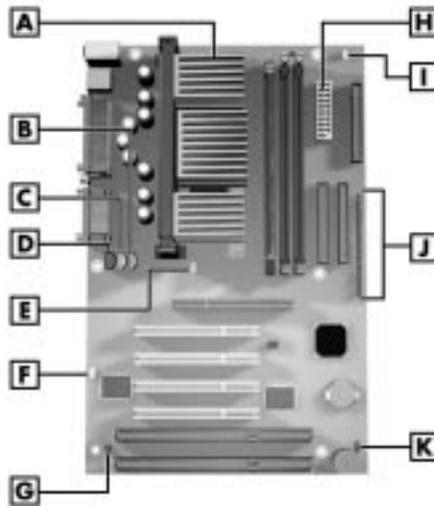
Connector(s)	Page Number
Parallel Interface	B-5
Serial Interface	B-5
Power Supply	B-6
Front Panel	B-7
Mouse/Keyboard	B-7
Diskette Drive	B-8
IDE	B-9
DIMM Sockets	B-10
AGP Connector	B-11
ISA Bus	B-13
PCI Bus	B-15
USB Connectors	B-16

System Board Expansion Slot, Memory, and I/O Connectors



- | | |
|-------------------------------------------|-------------------------------------|
| A – AGP Slot Connector | B – PCI Slot Connectors |
| C – Shared ISA/PCI Slot Connectors | D – ISA Slot Connector |
| E – DIMM Socket (Bank 2) | F – DIMM Socket (Bank 1) |
| G – DIMM Socket (Bank 0) | H – Diskette Drive Connector |
| I – Primary IDE Connector | J – Secondary IDE Connector |

System Board Connectors and Jumper



- | | |
|---------------------------------|----------------------------------------|
| A – Fan 2 Connector | B – Auxiliary Line In Connector |
| C – Telephony Connector | D – CD Audio Connector |
| E – Fan 3 Connector | F – Wake-On LAN Connector |
| G – Fan 1 Connector | H – Power Supply Connector |
| I – Configuration Jumper | J – Front Panel Connector |

System Board Internal Connectors

Description	Connector Number
CD-ROM Audio	J2F1
Auxiliary Line-in Audio	J2F2
Telephony	J2F1
Fan 3	J3F2
Diskette Drive	J8K1
PCI IDE	J8G1, J7G1
Fan 1	J8M1
Fan 2	J4M1
Power Supply	J7L1

System Board Connector Numbers and Types

Function	Number	Type
Parallel Interface		25-pin female sub D-shell
Serial Interface (serial ports 1 and 2)		9-pin D-shell
Mouse		6-pin PS/2 style connector
Keyboard		6-pin PS/2 style connector
Diskette Drive	J8K1	2 x 17-pin male
Power Supply (Primary)	J7L1	2 x 10-pin locking header
DIMM Sockets	J6J1 (Bank 0) J6J2 (Bank 1) J7J1 (Bank 2)	72 pin single inline connector
IDE Interface (Primary)	J8G1	2 x 20-pin header
IDE Interface (Secondary)	J7G1	2 x 20-pin header
Front Panel	J8G3	1 x 25-pin header
USB	J1L1	Female USB stacked connector

Serial Interface Connectors

Pin assignments for the serial interface port connectors are listed in the following table.

RS-232C Serial Port Connector Pin Assignments

Pin	Signal	Description
1	DCD	Carrier detect
2	Serial In#	Receive data
3	Serial Out#	Transmit data
4	DTR#	Data terminal ready
5	Ground	Signal ground
6	DSR	Data set ready
7	RTS	Request to send
8	CTS	Clear to send
9	RI	Ring indicator

Parallel Interface Connector

Parallel interface specifications for this port conform to the IBM-PC interface. Pin assignments for the parallel interface connector are listed in the following table.

Parallel Port Connector Pin Assignments

Pin	Signal	Pin	Signal
1	Strobe#	14	Auto feed#
2	Data bit 0	15	Fault#
3	Data bit 1	16	INIT# (Initialize)
4	Data bit 2	17	SLCT IN# (Select in)
5	Data bit 3	18	Ground
6	Data bit 4	19	Ground
7	Data bit 5	20	Ground
8	Data bit 6	21	Ground
9	Data bit 7	22	Ground
10	ACK# (Acknowledge)	23	Ground
11	Busy	24	Ground
12	Error	25	Ground
13	Select		

Power Supply (Primary)

Voltages from the power supply are input to the system board through the primary power supply connector. The following table shows the connector pin locations and pin assignments.

Primary Power Supply Connector Pin Assignments

Pin	Signal	Pin	Signal
1	+3.3V	11	+3.3V
2	+3.3V	12	-12V
3	Ground	13	Ground
4	+5V	14	PS-ON# (Power supply remote on/off control)
5	Ground	15	Ground
6	+5V	16	Ground
7	Ground	17	Ground
8	PWRGD (Power Good)	18	-5V
9	+5VSB	19	+5V
10	+12V	20	+5V

Keyboard and Mouse Connectors

The keyboard and mouse use standard PS/2 connectors. Pin assignments are given in the following table.

Keyboard and Mouse Connector Pin Assignments

Pin	Keyboard Connector	Mouse Connector
1	Keyboard Data	Mouse Data
2	No connection	No connection
3	Ground	Ground
4	+5V (fused)	+5V (fused)
5	Keyboard Clock	Mouse Clock
6	No connection	No connection

Front Panel

The front panel connector provides cabling for the buttons and panel LEDs (power and hard disk). The connector pin assignments are given in the following table.

Front Panel Connector Pin Assignments

Pin	Signal	Pin	Signal
1	HD_PWR	10	FPSLP
2	HDR_BLNK_GRN	11	IRRX
3	HAD	12	GND
4	HDR_BLNK_YEL	13	GND
5	GND	14	N/C
6	FPBUT_IN	15	IRTX
7	FP_RESET	16	IR_PWR
8	GND	17	N/C
9	+5V	18	N/C

Diskette Drive Interface Connector

The following table provides the pin assignments for the diskette drive interface connector.

Diskette Drive Connector Pin Assignments

Pin	Description	Pin	Description
1	Ground	2	DENSEL
3	Ground	4	Reserved
5	Key	6	FDEDIN
7	Ground	8	FDINDX# (Index)
9	Ground	10	FDM00# (Motor enable A)
11	Ground	12	No connect
13	Ground	14	FDDS0# (Drive select A)
15	Ground	16	No connect
17	No connect	18	FDDIR# (Stepper motor direction)
19	Ground	20	FDSTEP# (Step pulse)
21	Ground	22	FDWD# (Write data)
23	Ground	24	FDWE# (Write enable)
25	Ground	26	FDTRK0# (Track 0)
27	No connect	28	FDWPD# (Write protect)
29	Ground	30	FDRDATA# (Read data)
31	Ground	32	FDHEAD# (Side 1 select)
33	Ground	34	DSKCHG# (Diskette change)

IDE Interface Connector

All signal levels in the IDE interface are TTL compatible. A logic 1 is a signal whose voltage level is between 2.0 and 5.0 V. A logic 0 is a signal measuring between 0.00 and 0.70 V.

The two system board IDE connectors are physically identical. The following table provides the IDE pin assignments. All signals on the Host interface have the prefix HOST. All negatively active signals are further prefixed with a “-” designation. All positively active signals are prefixed with a “+” designation.

IDE/PCI Connector Pin Assignments

Pin	Description	Pin	Description
1	Reset IDE	2	Ground
3	Data 7	4	Data 8
5	Data 6	6	Data 9
7	Data 5	8	Data 10
9	Data 4	10	Data 11
11	Data 3	12	Data 12
13	Data 2	14	Data 13
15	Data 1	16	Data 14
17	Data 0	18	Data 15
19	Ground	20	Key
21	DDRQ0 (DDRQ1)	22	Ground
23	I/O write#	24	Ground
25	I/O read#	26	Ground
27	IOCHRDY	28	P_ALE (Cable select pullup)
29	DDACK0# (DDACK1#)	30	Ground
31	IRQ 14 (IRQ 15)	32	Reserved
33	Address 1	34	Reserved
35	Address 0	36	Address 2
37	Chip select 1P# (Chip select 1S#)	38	Chip select 3P# (Chip select 3S#)
39	Activity#	40	Ground

Note: Signal names in parentheses () are for the secondary IDE connector.

DIMM Sockets

The following table provides the DIMM socket pin assignments.

DIMM Socket Pin Assignments

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	V _{SS}	43	V _{SS}	85	V _{SS}	127	V _{SS}
2	DQ0	44	NC	86	DQ32	128	CKE0
3	DQ1	45	$\overline{S2}$	87	DQ33	129	NC
4	DQ2	46	DQM2	88	DQ34	130	DQM6
5	DQ3	47	DQM3	89	DQ35	131	DQM7
6	V _{DD}	48	NC	90	V _{DD}	132	NC (A13)
7	DQ4	49	V _{DD}	91	DQ36	133	V _{DD}
8	DQ5	50	NC	92	DQ37	134	NC
9	DQ6	51	NC	93	DQ38	135	NC
10	DQ7	52	CB2	94	DQ39	136	CB6
11	DQ8	53	CB3	95	DQ40	137	CB7
12	V _{SS}	54	V _{SS}	96	V _{SS}	138	V _{SS}
13	DQ9	55	V _{SS}	97	DQ41	139	DQ48
14	DQ10	56	DQ17	98	DQ42	140	DQ49
15	DQ11	57	DQ18	99	DQ43	141	DQ50
16	DQ12	58	DQ19	100	DQ44	142	DQ51
17	V _{DD}	59	V _{DD}	101	DQ45	143	V _{DD}
18	V _{DD}	60	DQ20	102	V _{DD}	144	DQ52
19	DQ14	61	NC	103	DQ46	145	NC
20	DQ15	62	NC (V _{REF})	104	DQ47	146	NC (V _{REF})
21	CB0	63	CKE1	105	CB4	147	NC
22	CB1	64	V _{SS}	106	CB5	148	V _{SS}
23	V _{SS}	65	DQ21	107	V _{SS}	149	DQ53
24	NC	66	DQ22	108	NC	150	DQ54
25	NC	67	DQ23	109	NC	151	DQ55
26	V _{DD}	68	V _{SS}	110	V _{DD}	152	V _{SS}
27	\overline{WE}	69	DQ24	111	\overline{CAS}	153	DQ56
28	DQM0	70	DQ25	112	DQM4	154	DQ57
29	DQM1	71	DQ26	113	DQM5	155	DQ58
30	$\overline{S0}$	72	DQ27	114	NC	156	DQ59

DIMM Socket Pin Assignments

Pin	Description	Pin	Description	Pin	Description	Pin	Description
31	NC	73	V _{DD}	115	$\overline{\text{RAS}}$	157	V _{DD}
32	V _{SS}	74	DQ28	116	V _{SS}	158	DQ60
33	A0	75	DQ29	117	A1	159	DQ61
34	A2	76	DQ30	118	A3	160	DQ62
35	A4	77	DQ31	119	A5	161	DQ63
36	A6	78	V _{SS}	120	A7	162	V _{SS}
37	A8	79	CK2	121	A9	163	CK3
38	A10	80	NC	122	BA0	164	NC
39	NC (BA1)	81	NC	123	NC (A11)	165	SA0
40	V _{DD}	82	SDA	124	V _{DD}	166	SA1
41	V _{DD}	83	SCL	125	CK1	167	SA2
42	CK0	84	V _{DD}	126	NC (A12)	168	V _{DD}

AGP Connector

The following table provides the pin assignments for the AGP connector.

AGP Connector Pin Assignments

Pin	Description	Pin	Description	Pin	Description	Pin	Description
A1	+12V	B1	No connect	A34	Vcc3.3	B34	Vcc3.3
A2	No connect	B2	Vcc	A35	AD22	B35	AD21
A3	Reserved	B3	Vcc	A36	AD20	B36	AD19
A4	No connect	B4	No connect	A37	Ground	B37	Ground
A5	Ground	B5	Ground	A38	AD18	B38	AD17
A6	INTA#	B6	INTB#	A39	AD19	B39	C/BE2#
A7	RST#	B7	CLK	A40	Vcc3.3	B40	Vcc3.3
A8	GNT1#	B8	REQ#	A41	FRAME#	B41	IRDY#
A9	Vcc3.3	B9	Vcc3.3	A42	Reserved	B42	+3.3V aux
A10	ST1	B10	ST0	A43	Ground	B43	Ground
A11	Reserved	B11	ST2	A44	Reserved	B44	Reserved
A12	PIPE#	B12	RBF#	A45	Vcc3.3	B45	Vcc3.3
A13	Ground	B13	Ground	A46	TRDY#	B46	DEVSEL#
A14	No connect	B14	No connect	A47	STOP#	B47	Vcc3.3
A15	SBA1	B15	SBA0	A48	PME#	B48	PERR#

AGP Connector Pin Assignments

Pin	Description	Pin	Description	Pin	Description	Pin	Description
A16	Vcc3.3	B16	Vcc3.3	A49	Ground	B49	Ground
A17	SBA3	B17	SBA0	A50	PAR	B50	SERR#
A18	Reserved	B18	SB_STB	A51	AD15	B51	C/BE1#
A19	Ground	B19	Ground	A52	Vcc3.3	B52	Vcc3.3
A20	SBA5	B20	SBA4	A53	AD13	B53	AD14
A21	SBA7	B21	SBA6	A54	AD11	B54	AD12
A22	Key	B22	Key	A55	Ground	B55	Ground
A23	Key	B23	Key	A56	AD9	B56	AD10
A24	Key	B24	Key	A57	C/BE0#	B57	AD8
A25	Key	B25	Key	A58	Vcc3.3	B58	Vcc3.3
A26	AD30	B26	AD31	A59	Reserved	B59	AD_STB0
A27	AD28	B27	AD29	A60	AD6	B60	AD7
A28	Vcc3.3	B28	Vcc3.3	A61	Ground	B61	Ground
A29	AD26	B29	AD27	A62	AD4	B62	AD5
A30	AD24	B30	AD25	A63	AD2	B63	AD3
A31	Ground	B31	Ground	A64	Vcc3.3	B64	Vcc3.3
A32	Reserved	B32	AD_STB1	A65	AD0	B65	AD1
A33	C/BE3#	B33	AD23	A66	SMB0	B66	SMB1

ISA Expansion Bus Connectors

The expansion slot signals, voltages, and grounds are supplied through the bus connectors. The following table provides the pin assignments for the ISA expansion bus.

ISA Expansion Slot Pin Assignments

Pin	Direction	Signal	Pin	Direction	Signal
A1	Input	IOCHCK#	B1	Ground	Ground
A2	Input/Output	SD7	B2	Reset	RESET (RESDRV)
A3	Input/Output	SD6	B3	Power	+5V
A4	Input/Output	SD5	B4	Input	IRQ9
A5	Input/Output	SD4	B5	Power	-5V
A6	Input/Output	SD3	B6	Input	DRQ2
A7	Input/Output	SD2	B7	Power	-12V
A8	Input/Output	SD1	B8	Input	SRDY# (NOWS#)
A9	Input/Output	SD0	B9	Power	+12V
A10	Input	IOCHRDY	B10	Ground	Ground
A11	Output	AEN	B11	Output	SMEMW# (SMWTC#)
A12	Input/Output	SA19	B12	Output	SMEMR# (SMRDC#)
A13	Input/Output	SA18	B13	Input/Output	IOW# (IOWC#)
A14	Input/Output	SA17	B14	Input/Output	IOR# (IORC#)
A15	Input/Output	SA16	B15	Output	DACK3#
A16	Input/Output	SA15	B16	Input	DRQ3
A17	Input/Output	SA14	B17	Output	DACK1
A18	Input/Output	SA13	B18	Input	DRQ1
A19	Input/Output	SA12	B19	Input/Output	REFRESH#
A20	Input/Output	SA11	B20	Output	BCLK
A21	Input/Output	SA10	B21	Input	IRQ7
A22	Input/Output	SA9	B22	Input	IRQ6
A23	Input/Output	SA8	B23	Input	IRQ5
A24	Input/Output	SA7	B24	Input	IRQ4
A25	Input/Output	SA6	B25	Input	IRQ3
A26	Input/Output	SA5	B26	Output	DACK2#
A27	Input/Output	SA4	B27	Output	TC

ISA Expansion Slot Pin Assignments

Pin	Direction	Signal	Pin	Direction	Signal
A28	Input/Output	SA3	B28	Output	BALE
A29	Input/Output	SA2	B29	Power	+5V
A30	Input/Output	SA1	B30	Output	OSC
A31	Input/Output	SA0	B31	Ground	Ground
C1	Input/Output	SBHE#	D1	Input	MEMCS16# (M16#)
C2	Input/Output	LA23	D2	Input	IOCS16# (IO16#)
C3	Input/Output	LA22	D3	Input	IRQ10
C4	Input/Output	LA21	D4	Input	IRQ11
C5	Input/Output	LA20	D5	Input	IRQ12
C6	Input/Output	LA19	D6	Input	IRQ15
C7	Input/Output	LA18	D7	Input	IRQ14
C8	Input/Output	LA17	D8	Output	DACK0#
C9	Input/Output	MEMR# (MRDC#)	D9	Input	DRQ0
C10	Input/Output	MEMW# (MWTC#)	D10	Output	DACK5#
C11	Input/Output	SD8	D11	Input	DRQ5
C12	Input/Output	SD9	D12	Output	DACK6#
C13	Input/Output	SD10	D13	Input	DRQ6
C14	Input/Output	SD11	D14	Output	DACK7#
C15	Input/Output	SD12	D15	Input	DRQ7
C16	Input/Output	SD13	D16	Power	+5V
C17	Input/Output	SD14	D17	Input	Master16# (MASTER#)
C18	Input/Output	SD15	D18	Ground	GND

PCI Expansion Bus Connectors

The expansion slot signals, voltages, and grounds are supplied through the bus connectors. The following table provides the pin assignments for the PCI expansion slots.

PCI Expansion Slot Pin Assignments

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	Ground (TRST#)	B1	-12V	A32	AD16	B32	AD17
A2	+12V	B2	Ground (TCK)	A33	+3.3V	B33	C/BE2#
A3	+5V (TMS)	B3	Ground	A34	FRAME#	B34	Ground
A4	+5V (TDI)	B4	no con (TDO)	A35	Ground	B35	IRDY#
A5	+5V	B5	+5V	A36	TRDY#	B36	+3.3V
A6	INTA#	B6	+5V	A37	Ground	B37	DEVSEL#
A7	INTC#	B7	INTB#	A38	STOP#	B38	Ground
A8	+5V	B8	INTD#	A39	+3.3V	B39	LOCK#
A9	Reserved	B9	PRSNT1#	A40	SDONE	B40	PERR#
A10	+5V (I/O)	B10	Reserved	A41	SBO#	B41	+3.3V
A11	Reserved	B11	PRSNT2#	A42	Ground	B42	SERR#
A12	Ground	B12	Ground	A43	PAR	B43	+3.3V
A13	Ground	B13	Ground	A44	AD15	B44	C/BE1#
A14	+3.3V aux	B14	Reserved	A45	+3.3V	B45	AD14
A15	RST#	B15	Ground	A46	AD13	B46	Ground
A16	+5V (I/O)	B16	CLK	A47	AD11	B47	AD12
A17	GNT#	B17	Ground	A48	Ground	B48	AD10
A18	Ground	B18	REQ#	A49	AD09	B49	Ground
A19	PME#	B19	+5V (I/O)	A50	Key	B50	Key
A20	AD30	B20	AD31	A51	Key	B51	Key
A21	+3.3V	B21	AD29	A52	C/BE0#	B52	AD08
A22	AD28	B22	Ground	A53	+3.3V	B53	AD07
A23	AD26	B23	AD27	A54	AD06	B54	+3.3V
A24	Ground	B24	AD25	A55	AD04	B55	AD05
A25	AD24	B25	+3.3V	A56	Ground	B56	AD03
A26	IDSEL	B26	C/BE3#	A57	AD02	B57	Ground
A27	+3.3V	B27	AD23	A58	AD00	B58	AD01
A28	AD22	B28	Ground	A59	+5V (I/O)	B59	+5V (I/O)

PCI Expansion Slot Pin Assignments

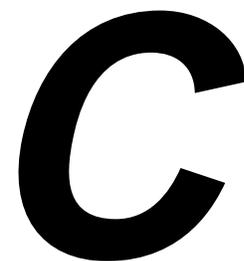
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A29	AD20	B29	AD21	A60	REQ64C#	B60	ACK64C#
A30	Ground	B30	AD19	A61	+5V	B61	+5V
A31	AD18	B31	+3.3V	A62	+5V	B62	+5V

Universal Serial Bus (USB) Connectors

The following table lists the pin assignments and signal names for the USB connectors.

USB Connectors

Pin	Signal Name
1	Power
2	USBP0# (USBP1#)
3	USBP0 (USBP1)
4	Ground



System Resources

- IRQ Settings
- System Resource Information
- Jumper Settings

This section includes information on:

- system interrupt request (IRQ) default settings
- viewing system resources
- jumper settings for the system board.

IRQ Settings

The following settings are the default IRQ settings:

- IRQ0 (timer)
- IRQ1 (keyboard)
- IRQ2 (cascade interrupt)
- IRQ3 (COM2)
- IRQ4 (COM1)
- IRQ5 (LPT2/sound/user available)
- IRQ6 (diskette drive)
- IRQ7 (LPT1)
- IRQ8 (real time clock)
- IRQ9 (reserved)
- IRQ10 (USB/user available)
- IRQ11 (Windows Sound System/user available)
- IRQ12 (mouse)
- IRQ13 (numeric processor)
- IRQ14 (primary IDE)
- IRQ15 (secondary IDE).

System Resource Information

Some hardware option installations might require system resources such as IRQ lines, direct memory access (DMA) channels, and input/output (I/O) addresses.

Follow these steps to view system resources:

1. From the Windows desktop, click the “My Computer” icon with the *right* mouse button.
2. Click **Properties**. The “System Properties” dialog box appears.
3. Click the “Device Manager” tab.

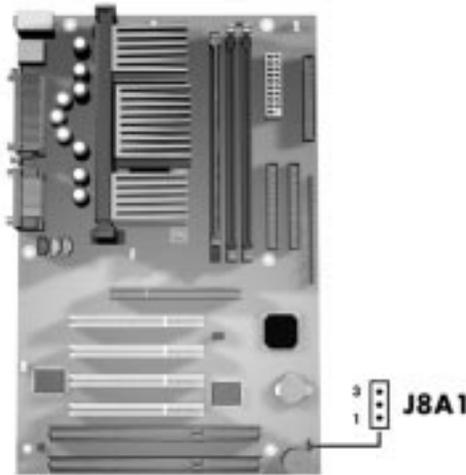
-
4. Double click **Computer**. The “Computer Properties” dialog box appears and displays the “View Resources” folder.

The “View Resources” folder shows the system resources used by your computer. For example, it shows a list of interrupts and how they are allocated. If an interrupt is not in the list, it’s available.

Jumper Settings

The following figure shows the jumper location on the system board.

Locating the Jumper



A – Jumper J8A1

The following table summarizes the system board jumper settings.

System Board Jumper Settings

Function	Jumper J8A1	Configuration
Normal Mode	1-2	Factory setting. Sets the system for normal operation. The BIOS uses current configuration information and passwords for booting.
Configure Mode	2-3	Allows system configuration. After POST, Setup runs automatically. The Maintenance Menu appears for setting configuration parameters (including speed and password settings).
Recovery Mode	None	Enables BIOS recovery procedures. BIOS attempts to recover the BIOS configuration. A recovery diskette is required (downloadable from the NEC CSD website).

Clearing Your Password

The following describes how to clear your system password(s).

1. Turn off the power and unplug the system and any peripherals.



Turn off the system before you change any jumper settings.

2. Remove the access cover (see “Access Cover Removal” in Section 3).
3. Locate the Configuration jumper (J8A1) on the system board (see the figure “Locating the Jumper” in the previous subsection).
4. You may have to remove any installed expansion boards to access the jumper (see “Expansion Board Removal” in Section 3).
5. Remove the jumper block from pins 1-2 and set it on pins 2-3. We recommend that you use needle nose pliers to move a jumper.
6. Replace the access cover (see “Access Cover Replacement” in Section 3).
7. Connect system power cables and monitor.
8. Power on the system.

The system enters Setup and the Maintenance menu appears. You can disable the user and administrator passwords.

If you removed the jumper, the system attempts to recover the BIOS. A recovery diskette is needed.

9. Power off, unplug the system and monitor, and remove the access cover.
10. Remove the jumper block from pins 2-3 and replace it on pins 1-2.
11. If you removed any expansion boards, replace them (see “Expansion Board Installation” in Section 3).
12. Replace the access cover. Reconnect the system power cables and peripheral devices.
13. Power on the system.
14. Run Setup (see Section 2, “Setup Utility”).

Recovering the BIOS

The following describes how to recover the system BIOS.

1. Turn off the power and unplug the system and any peripherals.



Turn off the system before you change any jumper settings.

2. Remove the access cover (see “Access Cover Removal” in Section 3).
3. Locate the Configuration jumper (J8A1) on the system board (see the figure “Locating the Jumper” in the previous subsection).
4. You may have to remove any installed expansion boards to access the jumper (see “Expansion Board Removal” in Section 3).
5. Remove the jumper block from pins 1-2. We recommend that you use needle nose pliers to move a jumper.
6. Replace the access cover (see “Access Cover Replacement” in Section 3).
7. Connect system power cables and monitor.
8. Power on the system.
The system attempts to recover the BIOS. A recovery diskette is needed.
9. Power off, unplug the system and monitor, and remove the access cover.
10. Place the jumper block on pins 1-2.
11. If you removed any expansion boards, replace them (see “Expansion Board Installation” in Section 3).
12. Replace the access cover. Reconnect the system power cables and peripheral devices.
13. Power on the system.
14. Run Setup (see Section 2, “Setup Utility”).

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™ or other Pentium II 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 and Pentium II 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 using 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 II machine, where it resides on the CPU module.

LAN

Local Area Network.

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.

printer port

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.

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 II 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 II processors, use either DIMMs or pairs of SIMMs. See DIMMs.

Slot 1

The form factor for Intel Pentium II 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 microprocessor 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. This is twice as fast as the previous disk drive standard for PCs, and is necessary to take advantage of new, faster Ultra ATA disk drives. The official name for the protocol is Ultra DMA/33.

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.

X

X2 technology

A technology developed by U.S. Robotics (now 3Com) for delivering data rates up to 56 Kbps over plain old telephone service (POTS). It was long believed that the maximum data transmission rate over copper telephone wires was 33.6 Kbps, but X2 achieves higher rates by taking advantage of the fact that most phone switching stations are connected by high-speed digital lines. X2 bypasses the normal digital-to-analog conversion and sends the digital data over the telephone wires directly to a modem where it is decoded.

Index

A

- Addresses
 - I/O, 2-7
- AGP
 - aperture size, 2-11
 - chipset, 1-6
 - connector pin assignments, B-11
- AWE64D PCI sound board, 1-10

B

- Battery
 - CMOS, 1-7, 2-2, 4-10
 - removal, 4-10
- Beep codes
 - descriptions, 4-9
- BIOS, 1-6, 1-7
 - recovery, C-5
- Boot device, 2-14
- Boot Menu, 2-13

C

- Cables
 - diskette drive, 3-14
 - IDE signal, 3-14
 - printer, 3-25
 - serial, 3-26
 - storage device, 3-13
 - system power, 3-15
- CD-ROM drive, 1-9, 2-8
- CD-ROM/DVD drive, 1-10
 - removing, 3-18
- Checking hard drive parameters, 2-8
- Chip set, 1-6
- CMOS
 - battery, 1-7
 - battery replacement, 4-10
 - memory, 1-7, 2-2
- Codes
 - beep, 4-9
- Configuration
 - audio, 2-8
 - hard drive, 2-8
 - peripherals, 2-7
 - video, 2-11
- Configure mode, 2-4
- Connector pin assignments
 - DIMM sockets, B-10
 - diskette drive, B-8

- front panel, B-7
- IDE/PCI boards, B-9
- keyboard and mouse, B-7
- parallel port, B-5
- PCI expansion slot, B-15
- primary power supply, B-6
- serial port, B-5
- system board connectors, B-2
- USB connectors, B-16

Connectors

- system board, B-2
- ## Cover removal, 3-3, 3-4

D

- Device
 - 5 1/4-inch removal, 5-6
 - cage removal, 5-5
 - slot specifications, A-4
 - slots, 3-12
- DIMM
 - connector pin assignments, B-10
 - installation, 3-11
 - module removal, 5-9
 - specifications, A-2
 - support, 3-8
- Disassembly
 - 3 1/2-inch hard drive, 5-7
 - 5 1/4-inch device, 5-6
 - device cage, 5-5
 - DIMM module, 5-9
 - diskette drive, 5-6
 - expansion board, 5-3
 - fan assembly, 5-9
 - front panel, 5-4
 - general rules, 5-2
 - keyboard, 4-3
 - power supply, 5-9
 - sequence, 5-2
 - side panel, 5-5
 - standard 3 1/2-inch drive, 5-8
 - system, 5-2
 - system board, 5-10
 - system unit, 5-3
- Diskette drive, 1-10, 2-10
 - connector pin assignments, B-8
 - removal, 5-6
- DMA settings, 1-7, 1-8
- Drives
 - assignment, 2-14

-
- cabling, 3-14, 3-16
 - connection, 1-9, 1-10
 - installing, 3-17, 3-19, 3-23
 - jumper settings, 3-12
 - removing CD-ROM/DVD drive, 3-18
 - sequence, 2-14
 - support, 1-9, 1-10, 3-11
- E**
- Expansion boards
 - bus, 1-6
 - installing, 3-5, 3-6, 3-8
 - removing, 3-8, 5-3
 - slot locations, 3-6
 - slot specifications, A-4
 - External options
 - parallel printer, 3-25
 - serial devices, 3-26
- F**
- Fan assembly
 - removal, 5-9
 - Features
 - desktop models, 1-2, 1-3
 - front, 1-2, 1-3, 1-4
 - memory, 1-5, 1-6
 - minitower models, 1-4
 - rear, 1-4
 - system board, 1-5
 - Flash EPROM, 1-6, 1-7
 - Front panel
 - connector pin assignments, B-7
 - removal, 5-4
 - removing, 3-17, 3-24
- G**
- Graphics
 - specifications, A-5
- H**
- Hard drive
 - configuration, 2-8
 - optional 3 1/2 inch hard drive removal, 5-7
 - parameters, 2-8
 - standard 3 1/2-inch hard drive removal, 5-8
 - support, 1-10
- I**
- I/O
 - addresses, 2-7
 - ports, 1-9
 - IDE boards
 - connector pin assignments, B-9
 - IDE devices, 1-9, 1-10, 2-8, 3-12
 - IDE ports, 1-9
 - Illustrated parts breakdown
 - desktop parts list, 5-12
 - minitower parts list, 5-15
 - Inactivity timer, 2-13
 - Installing options
 - 3 1/2-inch devices, 3-19
 - 5 1/4-inch devices, 3-23
 - cover removal, 3-3
 - cover replacement, 3-4
 - data storage devices, 3-11, 3-17
 - expansion boards, 3-5
 - external options, 3-25
 - guidelines, 3-2
 - interrupts, C-2
 - memory upgrade, 3-8
 - precautions, 3-2
 - system resources, C-2
 - Intel processor
 - serial number control utility, 2-15
 - Interrupts, 1-7, 2-7, C-2
 - settings, C-2
 - IPB
 - desktop parts list, 5-12
 - minitower parts list, 5-15
 - IRQs
 - settings, C-2
 - ISA expansion board
 - slot pin assignments, B-13
- J**
- Jumper settings
 - IDE devices, 3-12
 - system board, C-3
- K**
- Keyboard
 - cleaning, 4-3
 - connector pin assignments, B-7
 - dimensions, A-6
 - disassembly, 4-3
 - specifications, A-4
 - weight, A-6
- M**
- Maintenance, 4-2
 - keyboard cleaning, 4-3
 - mouse cleaning, 4-3
 - system cleaning, 4-3
 - Memory
 - CMOS, 1-7, 2-2
 - features, 1-5, 1-6
-

- installing DIMMs, 3-11
- map, 1-6
- removing DIMMs, 3-10
- sample configurations, 3-9
- sockets, 3-9
- support, 3-8
- upgrade, 3-8

Menu

- Advanced, 2-7
- Boot, 2-13
- DMI Event Logging submenu, 2-11
- Exit, 2-15
- Floppy options submenu, 2-10
- Hard drive submenu, 2-14
- IDE Configuration submenu, 2-8
- Main, 2-6
- Main setup, 2-3
- Peripheral configuration submenu, 2-7
- Power, 2-13
- Removable devices submenu, 2-14
- Resource Configuration submenu, 2-12
- Security, 2-12
- Video configuration submenu, 2-11

Modem, 1-10

Mouse

- cleaning, 4-3
- connector pin assignments, B-7
- specifications, A-4

Multimedia components

- CD-ROM/DVD drive, 1-10

N

NEC CSD

- service, 4-2
- support, 4-2
- telephone numbers, 4-2

O

Operating environment

- specifications, A-7

Option installation

- 3 1/2-inch devices, 3-19
- 5 1/4-inch devices, 3-23
- cover removal, 3-3
- cover replacement, 3-4
- data storage devices, 3-11, 3-17
- expansion boards, 3-5
- external options, 3-25
- guidelines, 3-2
- memory upgrade, 3-8
- precautions, 3-2

P

Parallel ports

- configuring, 2-7
- connecting printer, 3-25
- connecting to, 3-25
- connector pin assignments, B-5
- mode, 2-8
- protocols, 1-9

Parallel printer

- connecting, 3-25

Passwords

- administrator, 2-12
- clearing, C-4
- setting, 2-12
- Unattended Start, 2-12
- user, 2-12

PCI boards

- connector pin assignments, B-9
- slot pin assignments, B-15

PCI bus, 1-6

Peripheral configuration, 2-7

Plug and Play support, 1-7, 3-5

Ports

- parallel, 1-9, 2-7, 2-8, 3-25
- serial, 1-9, 2-7, 3-26
- USB, 1-9

POST

- beep codes, 4-9

Power

- management, 1-11, 2-13
- menu, 2-13

Power supply

- connector pin assignments, B-6
- description, 1-10
- removal, 5-9
- specifications, A-6

Primary IDE connector, 3-14

Printer

- connecting, 3-25

Processor, 1-5

- adjusting speed, 5-11
- specifications, A-2

Processor serial number control, 2-15

R

Random access memory

- specifications, A-2

Read-only memory

- specifications, A-3

Real-time clock, 1-7

- specifications, A-3

Recovery

- BIOS, C-5

-
- Repair
 - disassembly, 5-2
 - S**
 - Secondary IDE connector, 3-14
 - Security
 - Menu, 2-12
 - password clearing, C-4
 - Serial ports, 1-9, 2-7
 - connecting to, 3-26
 - connector pin assignments, B-5
 - Settings
 - IRQs, C-2
 - Setup utility
 - Advanced Menu, 2-7
 - audio, 2-8
 - Boot Menu, 2-13
 - boot sequence, 2-14
 - configuring peripherals, 2-7
 - diskette drive, 2-10
 - Exit Menu, 2-15
 - IDE configuration, 2-8
 - legacy USB, 2-8
 - legend bar, 2-5
 - Main Menu, 2-3, 2-6
 - Maintenance Menu, 2-4
 - parallel port, 2-7
 - Power Menu, 2-13
 - resource configuration, 2-12
 - saving changes, 2-15
 - Security Menu, 2-12
 - serial ports, 2-7
 - startup, 2-3
 - using, 2-2, 2-3, 2-4
 - video features, 2-11
 - Side panel
 - removal, 5-5
 - Slot pin assignments
 - ISA expansion board, B-13
 - Sound system, 1-9
 - specifications, A-6
 - Specifications
 - calendar clock, A-3
 - device slots, A-4
 - DIMM, A-2
 - expansion slots, A-4
 - graphics, A-5
 - input/output facilities, A-3
 - keyboard and mouse, A-4
 - keyboard dimensions, A-6
 - keyboard weight, A-6
 - operating environment, A-7
 - power, A-6
 - primary cache, A-2
 - processor, A-2
 - random access memory, A-2
 - read-only memory, A-3
 - secondary cache, A-2
 - sound system, A-6
 - storage devices, A-4
 - system unit dimensions, A-6
 - system unit weight, A-6
 - system weights, A-6
 - video memory, A-3
 - Storage devices
 - cabling, 3-16
 - device preparation, 3-12
 - device slots, 3-12
 - installation, 3-11, 3-12, 3-17
 - removing the front panel, 3-17, 3-24
 - specifications, A-4
 - support, 3-11
 - System
 - BIOS recovery, C-5
 - board, 1-5
 - cache, 1-5, 1-6
 - cleaning, 4-3
 - disassembly, 5-2
 - maintenance, 4-3
 - resources, 1-7, 1-8, 2-12
 - specifications, A-2
 - troubleshooting, 4-4
 - System board
 - jumper settings, C-3
 - password clearing, C-4
 - processor speed adjustment, 5-11
 - removal, 5-10
 - System board connectors
 - locations, B-2
 - pin assignments, B-2
 - System memory
 - support, 3-8
 - System processor
 - adjusting speed, 5-11
 - System resources, C-2
 - System unit
 - dimensions, A-6
 - disassembly, 5-3
 - weight, A-6
 - System unit disassembly, 5-3
 - 3 1/2-inch hard drive, 5-7
 - 5 1/4-inch device, 5-6
 - device cage, 5-5
 - DIMM module, 5-9
 - diskette drive, 5-6
 - expansion board, 5-3
-

- fan assembly, 5-9
- front panel, 5-4
- power supply, 5-9
- side panel, 5-5
- standard 3 1/2-inch hard drive, 5-8
- system board, 5-10

T

- Technical support, 4-4
- Telephone numbers
 - technical support and spare parts, 4-2
- Troubleshooting, 4-4
 - beep codes, 4-9
 - CMOS battery replacement, 4-10
 - diagnostics, 4-4
 - problems and solutions, 4-4

U

- USB
 - connector pin assignments, B-16
 - ports, 1-9
- Utilities
 - BIOS setup, 2-2
 - Intel processor serial number control, 2-15

V

- Video
 - configuration, 2-11
 - memory specifications, A-3, A-5

W

- Weights
 - system and keyboard, A-6

Z

- Zip drive, 1-9, 1-10

(For United States Use Only)

**Federal Communications Commission
Radio Frequency Interference Statement**

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.

Use shielded and properly grounded I/O cables and power cable to ensure compliance of this unit to the specified limits of the rules.

(For Canadian Use Only)

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

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Battery Replacement

A lithium battery in some computers maintains system configuration information. In the event that the battery fails to maintain system configuration information, NEC recommends that you replace the battery. For battery replacement information, see Section 4 of this manual or call your NEC CSD dealer or the NEC CSD Technical Support Center.

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.

ATTENTION: 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

Do not place used batteries in your regular trash.

The nickel-cadmium or nickel metal-hydrate batteries must be collected, recycled, or disposed of in an environmentally-approved manner.

The incineration, landfilling, or mixing of batteries with the municipal solid waste stream is **prohibited by law** in most areas.

Return batteries to a federal or state approved battery recycler. This may be where you purchased the battery or a local seller of automotive batteries.

Contact your local waste management officials for other information regarding the environmentally sound collection, recycling, and disposal of the batteries.

NEC

NEC Computer Systems Division
Packard Bell NEC, Inc.
1 Packard Bell Way
Sacramento, CA 95828-0903
www.nec-computers.com

102343SRV
4/99