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Preface

This service and reference manual contains the technical information necessary to set up, maintain, troubleshoot, and repair the NEC PowerMate® Ve series computer systems. It also provides hardware and interface information for users who need an overview of the computer system design. The manual is written for NEC-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, internal devices and system unit specifications.

Section 2, Setup and Operation, gives general setup and operation information. Included is a description of the system Setup utility and the factory default configuration settings. A procedure is provided for logging onto the NEC Bulletin Board and obtaining the latest the Flash ROM BIOS.

Section 3, Options, provides safety precautions and installation procedures for installing options.

Section 4, Maintenance and Troubleshooting, includes a list of NEC service information and telephone numbers that provide access to the NEC Bulletin Board System (BBS), FastFacts, and Technical Information Bulletins. Included are recommended maintenance information and a lists possible problem and solutions for computer.

Section 5, System Unit Repair, provides disassembly and reassembly procedures along with an illustrated parts breakdown. NEC service and spare parts ordering information is also provided.

Appendix A, Connector Pin Assignments, provides a list of the system boards' internal connector pin assignments and a list of external pin assignments for the keyboard/mouse, serial port, parallel port, and video port.

Appendix B, System Board Jumpers, provides jumper information for configuring the system for a particular requirement.

Appendix C, Hard Disk Drive Specifications and Jumper Settings, provides specifications and jumper settings for the hard disk drives that ship with the PowerMate Ve series systems.

Appendix D, CD-ROM Reader Specifications and Jumper Settings, provides specifications and jumper settings for the CD-ROM readers that ship with the PowerMate Ve series systems.

Abbreviations

A	ampere	ECP	enhanced capabilities port (ECP)
AC	alternating current	EGA	Enhanced Graphics Adapter
AT	advanced technology (IBM PC)	EPP	Enhanced Parallel Port
BBS	Bulletin Board System	EPROM	erasable and programmable ROM
BCD	binary-coded decimal	EVGA	Enhanced Video Graphics Array
BCU	BIOS Customized Utility	F	Fahrenheit
BIOS	basic input/output system	FAX	facsimile transmission
bit	binary digit	FCC	Federal Communications Commission
BUU	BIOS Upgrade Utility	FG	frame ground
bpi	bits per inch	FIFO	first-in/first-out
bps	bits per second	FM	frequency modulation
C	capacitance	FRU	field-replaceable unit
C	centigrade	GB	gigabyte
Cache	high-speed buffer storage	GND	ground
CAM	constantly addressable memory	HEX	hexadecimal
CAS	column address strobe	HGA	Hercules Graphics Adapter
CD-ROM	compact disk-ROM	Hz	hertz
CGA	Color Graphics Adapter	IC	integrated circuit
CGB	Color Graphics Board	ID	identification
CH	channel	IDE	intelligent device electronics
clk	clock	in.	inch
cm	centimeter	IPB	illustrated parts breakdown
CMOS	complementary metal oxide semiconductor	ISA	Industry Standard Architecture
COM	communication	I/O	input/output
CONT	contrast	IPC	integrated peripheral controller
CPGA	ceramic pin grid array	ips	inches per second
CPU	central processing unit	IR	infrared
DAC	digital-to-analog converter	IRQ	interrupt request
DACK	DMA acknowledge	K	kilo (1024)
db	decibels	k	kilo (1000)
DC	direct current	KB	kilobyte
DIP	dual in-line package	kg	kilogram
DMA	direct memory access	kHz	kilohertz
DMAC	DMA controller	lb	pound
DOS	disk operating system	LED	light-emitting diode
DRAM	dynamic RAM	M	mega
ECC	error checking and correction	mA	milliamps

max	maximum	tpi	tracks per inch
MB	megabyte	V	volt
MDA	Monochrome Display Adapter	Vac	volts, alternating current
MFM	modified frequency modulation	Vdc	volts, direct current
MHz	megahertz	VESA	video electronics standards association
MIC	microphone	VGA	Video Graphics Array
MIDI	musical instrument device interface	VRAM	video RAM
MPC	multimedia PC	W	watt
mm	millimeter	W	write
MPEG	Motion Picture Experts Group		
ms	millisecond		
NASC	National Authorized Service Center		
NC	not connected		
NMI	Non-maskable Interrupt		
ns	nanosecond		
PAL	programmable array logic		
PC	personal computer		
PCI	Peripheral Component Interconnect		
PDA	personal digital assistant		
PFP	plastic flat package		
PIO	parallel input/output		
pixel	picture element		
PROM	programmable ROM		
RAM	random-access memory		
RAMDAC	RAM digital-to-analog converter		
RGB	red green blue		
RGBI	red green blue intensity		
ROM	read-only memory		
rpm	revolutions per minute		
R	read		
RTC	real-time clock		
R/W	read/write		
S	slave		
SCSI	Small Computer System Interface		
SG	signal ground		
SIMM	single inline memory module		
SVGA	Super Video Graphics Array		
SW	switch		
TSC	Technical Support Center		
TTL	transistor/transistor logic		

Section 1

Technical Information

The PowerMate® Ve Series come standard with an Intel Pentium™ processor, a 3 1/2-inch 1.44 megabyte (MB) diskette drive, 8- or 16-MB random access memory (RAM), and 1 MB of video dynamic random access memory (DRAM).

The PowerMate Ve system configurations are listed in Table Section 1-1.

Table Section 1-1 PowerMate Ve System Configurations

Configurations	PowerMate V75e (75 MHz)	PowerMate V100e (100 MHz)
Diskless	3 1/2-Inch diskette drive only 8 MB of RAM	3 1/2-Inch diskette drive only 8 MB of RAM
Hard disk system	3 1/2-inch diskette drive 635 MB hard disk or 1.2 GB with 8 MB or 16 MB of RAM	3 1/2-inch diskette drive 635 MB hard disk or 1.2 GB with 8 MB or 16 MB of RAM
Network-ready system	3 1/2-inch diskette drive 635 MB hard disk Network board 8 MB of RAM	3 1/2-inch diskette drive 635 MB hard disk Network board 8 MB of RAM
Multimedia	3 1/2-inch diskette drive 1.2 GB hard disk quad-speed CD-ROM reader System board w/audio 16 MB of RAM 5 Watt Speakers Microphone	3 1/2-inch diskette drive 1.2 GB hard disk quad-speed CD-ROM reader System board w/audio 16 MB of RAM 5 Watt Speakers Microphone
Multimedia/Network ready	3 1/2-inch diskette drive 1.2 GB hard disk Quad-speed CD-ROM reader Network board System board w/audio 16 MB of RAM 5 Watt Speakers Microphone	3 1/2-inch diskette drive 1.2 GB hard disk Quad-speed CD-ROM reader Network board System board w/audio 16 MB of RAM 5 Watt Speakers Microphone

SYSTEM CHASSIS

The system chassis provides an enclosure for the system board, power supply, four expansion slots, a five-connector PCI/ISA backboard, and four storage device slots. The expansion slots include two 8-/16-bit ISA slots, one dedicated 32-bit PCI slot, and one shared PCI/ISA (32-bit PCI or 8-/16-bit ISA) slot. For network-ready configurations, one slot has a network board installed and the remaining slots are open. For multimedia configurations without a network board, all slots are open. For multimedia configurations with a network board, one slot has a network board and the remaining slots are open.

The four storage device slots accommodate up to three accessible devices and one internal hard disk drive device. The accessible devices include the standard one-inch high 3 1/2-inch 1.44-MB diskette drive and up to two 1.6-inch high 5 1/4-inch storage devices. The non-multimedia hard disk systems ship with an accessible 3 1/2-inch diskette drive and an internal 3 1/2-inch hard disk drive, leaving two accessible 5 1/4-inch storage device slots available for optional devices. The multimedia systems ship with an accessible 3 1/2-inch diskette drive, an internal 3 1/2-inch hard disk drive, and an accessible 5 1/4-inch CD-ROM reader, leaving one accessible 5 1/4-inch storage device slot available for an optional device.

Figure 1-1 shows front panel features and locations of the accessible storage devices in a desktop system. Multimedia systems come with a CD-ROM reader installed in the top accessible device slot.

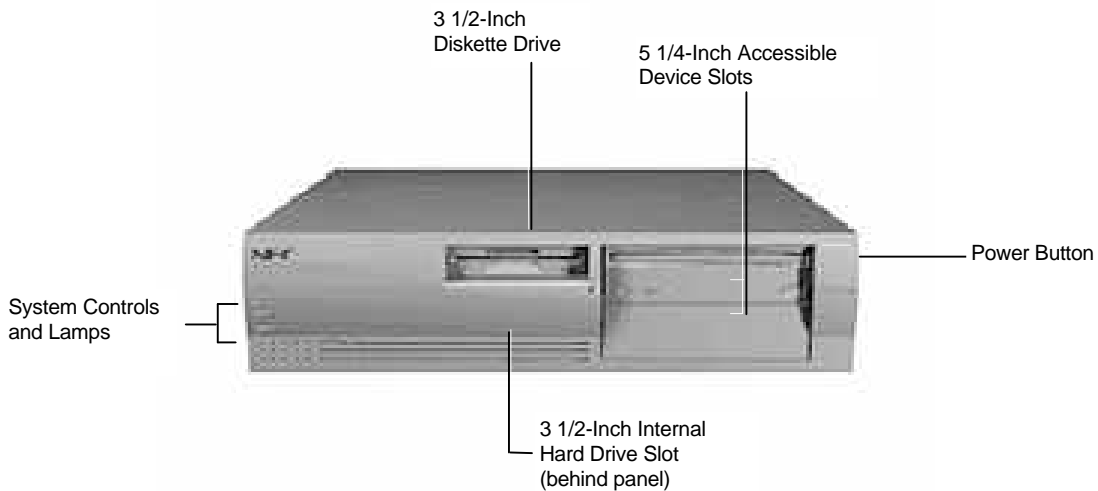


Figure 1-1 System Controls and Storage Device Slots

SYSTEM BOARD

Key features of the system board include the following:

- Intel Pentium 75- or 100-MHz Pentium processor, depending on system configuration
 - 16-KB internal dual write-back cache integrated on the processor
 - system Setup program built into the BIOS
 - flash ROM for fast economical BIOS upgrades
 - integrated input/output (I/O) controller with keyboard, diskette drive, and hard disk drive controllers. Supports two serial ports and a parallel port.
 - PCI local bus for fast data transfer
 - support for Intel OverDrive™ processors
 - 8-MB EDO RAM (16 MB in multimedia and multimedia/network configurations, 1.2 GB hard disk configurations)
 - ships with 32-bit, non-parity, 60-ns single-inline memory modules (SIMMs)
 - RAM expandable up to 128 MB
 - integrated graphics
 - Peripheral Component Interconnect (PCI) graphical user interface (GUI) accelerator and motion video playback controller using SiS 6205 Graphics and Video Accelerator
 - standard 1-MB (two 256K x 16) video DRAM, expandable to 2 MB
 - standard 1-MB video DRAM supports resolutions of 640 x 480 with up to 16.8 million colors, 800 x 600 with up to 64K colors, 1024 x 768 with up to 256 K colors, and 1280 x 1024 with up to 16 colors
 - integrated sound (multimedia configurations only)
 - ESS ES1788 Sound Blaster compatible chip on system board
 - Yamaha OPL3 FM synthesis chip on system board
 - built-in 16-bit stereo and FM synthesis
 - Wavetable sound upgradeable
 - 3D sound effects
-

- two intelligent drive electronics (IDE) interface channels
 - one fast IDE/PCI channel (primary connector) used by the hard disk drive to transfer data at the hard disk's optimum rate
 - one standard IDE channel (secondary connector) for the CD-ROM reader
 - supports up to four IDE devices, two to each channel
- power management for placing system in power save mode when idle for a specified amount of time
- 3 1/2-inch, 1.44-MB diskette drive standard all configurations
- four expansion slots: two ISA, one PCI, and one shared ISA/PCI connectors
- external connectors for connecting the following external devices:
 - VGA-compatible monitor (standard, super, high-resolution VGA)
 - personal system/2 (PS/2[®])-style mouse
 - PS/2-style keyboard
 - bidirectional Enhanced Parallel Port (EPP) and enhanced capabilities port (ECP) are supported for a parallel printer
 - serial devices through two buffered 16C550 UART serial ports, each supporting up to 19.2 KB per second
 - external speakers, microphone, and headphone connectors (multimedia and network/multimedia configurations only)
- MIDI/joystick connector on the system board for installation of an optional MIDI/joystick kit
- Audio Wave upgrade connector on the system board for installation of an optional Wave upgrade.

Table Section 1-2 lists the major chips on the system board. See Appendix A, Connector Pin Assignments, for a list of the system board connectors. See Appendix B, System Board Jumpers, for a description of board jumpers.

Table Section 1-2 System Board Chips

Chip	Description
P54C (CPGA)	75/50-MHz Intel Pentium processor 100/66-MHz Intel Pentium processor
SiS PCI/ISA Chip Set	System controller
5511	PCI/ISA cache memory controller
5512	PCI local data buffer
5513	PCI system I/O
SMC FDC37C665	Integrated Plug and Play Ultra I/O controller
SiS 6205	PCI GUI graphics controller
U24	128k x 8 Flash ROM
SiS 5513	Real-time clock
Toshiba CR2032 Coin Cell Battery	3 Volt Lithium CMOS battery (SMC 935)
ESS ES1788 Sound Chip (multimedia and multimedia/network systems only)	Onboard PC sound system
Yamaha OPL3-L Synthesizer Chip (multimedia and multimedia/network systems only)	Frequency modulated synthesizer

Processor

The PowerMate Ve series of computers use the following Pentium processors:

- PowerMate Ve75 — 75-MHz processor with internal speed of 75 MHz and external speed of 50 MHz.
- PowerMate Ve100 — 100-MHz processor with internal speed of 100 MHz and external speed of 66 MHz.

Each processor has 16 KB of write-back primary cache and a math coprocessor. The 16 KB primary cache provides 8 KB for instructions and 8 KB for data.

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

The processor is compatible with 8-, 16-, and 32-bit software written for the Intel386™, Intel486™, and Pentium processors.

To accommodate future technologies and work requirements, the Pentium processor comes in a 320-pin zero insertion force (ZIF) socket. The socket provides an upgrade path to the next generation processor.

Secondary Cache

The system board contains the connector for an optional 256 KB secondary cache, external to the processor. The optional cache can be 15-ns asynchronous or 20-ns synchronous pipeline burst.

Cache allows data to be sent or received from cache with one wait state burst. Cache memory improves read performance by holding copies of code and data that are frequently requested from the system memory by the processor. Cache memory is not considered part of the expansion memory.

System and Video BIOS

The system and video BIOS are stored in a 1 MB (128 KB by 8) flash memory device (Flash ROM). The system BIOS uses 64 KB, the video BIOS uses 32 KB, and 32 KB is reserved. The system BIOS is capable of being shadowed and cached through the system's Setup utility (see Section 2 for Setup information). System BIOS is write protected and automatically enabled.

The BIOS programs execute the Power-On Self-Test, initialize processor controllers, and interact with the display, diskette drives, hard disks, communication devices, and peripherals. The system BIOS also contains the Setup utility. The hardware setup default copies the ROM BIOS into RAM (shadowing) for maximum performance.

The Flash ROM allows the system and video BIOS to be upgraded with the BIOS Update utility, without removing the ROM (see Section 2 for further information on the BIOS Update utility). The Flash ROM supports the reprogramming of the system BIOS and the video BIOS.

The system memory map is shown in Table Section 1-3.

Table Section 1-3 System Memory Map

Memory Space	Size	Function
FFF80000-FFFFFFFF	512 KB	BIOS ROM
04000000-07FFFFFF	64 MB	L2 cache (Non-Cacheable with less than 512 KB SRAM) L1 cache (Cacheable)
01000000-03FFFFFF	48 MB	Always cacheable
00F00000-00FFFFFF	1 MB	Optional memory space gap
00100000-00EFFFFF	14 MB	Cachable
000F0000-000FFFFF	64 KB	System BIOS (Shadowed in DRAM)
000C8000-000EFFFF	160 KB	Expansion region (Shadowed in DRAM)

Table 1-3 System Memory Map

Memory Space	Size	Function
000C0000-000C7FFF	32 KB	Video BIOS (Shadowed in DRAM)
000A0000-000BFFFF	128 KB	Video Buffer (SMM space Non-Cacheable)
00080000-0009FFFF	128 KB	Optional memory space gap (DOS Apps)
00000000-0007FFFF	512 KB	DOS applications (No read/write protect) (Always cacheable)

Power Management

Each system incorporates power management features that lower power consumption when there is no activity detected from the keyboard, mouse, diskette drive, CD-ROM reader, or hard disk drive after a pre-defined period of time. As soon as activity is detected the system resumes where it left off.

With Power Management enabled (shipped enabled), the system automatically activates the power-saving features and enters a suspend mode whenever inactivity is sensed.

I/O Addressing

The processor communicates with I/O devices by I/O mapping. The hexadecimal (hex) addresses of I/O devices are listed in Table Section 1-4.

Table Section 1-4 I/O Address Map

Address (Hex)	I/O Device Name
0000-000F	DMA controller 1 (channel 0-3)
0020-0021	Interrupt controller 1
0040-0043	Timer 1
0048-004B	Timer 2
0060	Keyboard controller data byte
0061	NMI status and speaker control
0064	Keyboard controller cmd/status byte
0070-007F	Real-time clock, NMI mask
0080-008F	DMA page registers
00A0-00A1	Interrupt controller 2
00C0-00DE	DMA controller 2
00E0-00EF	Reserved

Table Section 1-4 I/O Address Map

Address (Hex)	I/O Device Name
00F0	Clear math coprocessor error
00F1	Reset math coprocessor
0F8-0FF	Math coprocessor
170-177	Secondary IDE channel
1F0-1F7	Primary IDE channel
200, 202, 207	Game I/O
220-22F	Sound port
238-23F	Serial port 4 (used for remapping)
278-27F	Parallel port 2
2B0-2DF	Alternate EGA adapter
2F8-2FF	Serial port 2
338-33F	Serial port 3 (used for remapping)
370-375	Floppy cont. (secondary address)
376	Secondary IDE channel CMD port
377	Secondary IDE channel stat port
378-37F	Parallel port 1
3B0-3BF	Mono display & printer adapter
3C0-3CF	EGA adapter
3D0-3DF	CGA adapter
3F0-3F5, 3F7	Floppy controller (primary)
3F8-3FF	Serial port 1
CF8-CFF	PCI configuration space

System Memory

Non-multimedia systems come standard with 8 MB of EDO memory: 640 KB of base memory and 7 MB of extended memory. All multimedia, 1.2 GB hard disk configurations, come standard with 16 MB of EDO memory: 640 KB of base memory and 15 MB of extended memory. System memory can be expanded up to 128 MB, using optional single in-line memory modules (SIMMs) installed in SIMM sockets on the system board.

Four SIMM sockets are integrated on the system board. Non-multimedia systems ship with two 4-MB SIMMs (8 MB total) installed in two sockets. The multimedia, 1.2 GB hard disk configurations, ship with two 8-MB SIMMs (16 MB total) installed in two sockets.

The SIMM memory sockets accept 32-bit (non-parity) 4-, 8-, 16-, or 32-MB 70 ns SIMMs. The SIMMs are 1 MB x 32 bit (4 MB), 2 MB x 32 bit (8 MB), 4 MB x 32 bit (16 MB), and 8 MB x 32 bit (32 MB). When the standard SIMMs are removed, four 32-MB SIMMs may be installed for a total of 128 MB.

CAUTION: SIMMs must match the tin metal plating used on the system board SIMM sockets. When adding SIMMs, use tin-plated SIMMs.

SIMMs install directly in the four sockets on the system board. The four sockets are assigned as SIMM 1 through SIMM 4. For non-multimedia configurations, the two standard 4 MB SIMMs are installed in SIMM 1 and SIMM 2. For multimedia configurations, the two standard 8 MB SIMMs are installed in SIMM 1 and SIMM 2. SIMMs must be installed in pairs of the same memory type and speed. Jumpers are not required to set memory size or type as the system BIOS automatically detects the SIMMs. SIMM banks 1 and 2 must always be filled for the system to operate. Table Section 1-5 shows the SIMM memory upgrade path.

Table Section 1-5 SIMM Memory Upgrade Path

Total Memory	SIMM 1	SIMM 2	SIMM 3	SIMM 4
8 MB	4 MB	4 MB	Empty	Empty
16 MB	4 MB	4 MB	4 MB	4 MB
16 MB	8 MB	8 MB	Empty	Empty
24 MB	4 MB	4 MB	8 MB	8 MB
24 MB	8 MB	8 MB	4 MB	4 MB
32 MB	8 MB	8 MB	8 MB	8 MB
32 MB	16 MB	16 MB	Empty	Empty
40 MB	4 MB	4 MB	16 MB	16 MB
40 MB	16 MB	16 MB	4 MB	4 MB
48 MB	8 MB	8 MB	16 MB	16 MB
48 MB	16 MB	16 MB	8 MB	8 MB
64 MB	16 MB	16 MB	16 MB	16 MB
64 MB	32 MB	32 MB	Empty	Empty
72 MB	4 MB	4 MB	32 MB	32 MB
72 MB	32 MB	32 MB	4 MB	4 MB

Table Section 1-5 SIMM Memory Upgrade Path

Total Memory	SIMM 1	SIMM 2	SIMM 3	SIMM 4
80 MB	8 MB	8 MB	32 MB	32 MB
80 MB	32 MB	32 MB	8 MB	8 MB
96 MB	16 MB	16 MB	32 MB	32 MB
96 MB	32 MB	32 MB	16 MB	16 MB
128 MB	32 MB	32 MB	32 MB	32 MB

Interrupt Controller

The interrupt controller operates as an interrupt manager for the entire AT system environment. The controller accepts requests from peripherals, issues interrupt requests to the processor, resolves interrupt priorities, and provides vectors for the processor to determine which interrupt routine to execute. The interrupt controller has priority assignment modes that can be reconfigured at any time during system operations.

The interrupt levels are described in Table Section 1-6. Interrupt-level assignments 0 through 15 are in order of decreasing priority. See Section 2, Setup and Operation, for information on changing the interrupts using Setup.

Table Section 1-6 Interrupt Level Assignments

Interrupt Priority	Interrupt Device
IRQ00	System Timer
IRQ01	Keyboard
IRQ02	Audio (multimedia configurations only)
IRQ03	COM2
IRQ04	COM1
IRQ05	Audio (multimedia configurations only)
IRQ06	Diskette Drive Controller
IRQ07	Parallel Port LPT1
IRQ08	Clock/Calendar
IRQ09	Audio (multimedia configurations only)
IRQ10	Available
IRQ11	3C509B network adapter (NIC configurations only)
IRQ12	PS/2 mouse

Table Section 1-6 Interrupt Level Assignments

Interrupt Priority	Interrupt Device
IRQ13	Coprocessor
IRQ14	Primary IDE
IRQ15	Secondary IDE

Integrated Graphics

The system has an SiS 6205 PCI local bus motion video playback controller and graphics accelerator integrated on the system board. State of the art techniques are used for optimizing performance in computer graphic intensive applications and graphical user interfaces (GUI).

The integrated graphics controller integrates a motion video controller, a high-performance GUI accelerator, 24-bit high frequency DAC and clock generator, VESA[®]-compliant feature connector, and 1 MB of fast 64-bit DRAM (upgradeable to 2 MB).

Motion Video Controller

The motion video controller integrates a powerful Windows[®] GUI engine and unique motion video playback hardware for superior performance. The graphics engine includes an on-chip color space converter to accelerate decompression and a hardware scaler to scale continuously from native size up to full screen at full speed. The graphics engine delivers a full screen, smooth display of motion video data up to 30 frames per second (fps). Support includes MPEG-1 (multimedia systems only) and Video for Windows.

MPEG is a compression/decompression standard developed by the Motion Picture Experts Group. MPEG produces full-screen 30 fps, broadcast-quality digital video. The video controller architecture maximizes the motion video performance and removes bandwidth bottlenecks to display multimedia data at its full speed.

Graphics Accelerator

The graphics accelerator is specifically designed for graphics-intensive operations, text and color pixel amplification, and scrolling. The graphics accelerator provides 64-bit, ultra-high performance for demanding True Color, High Color, and pseudocolor GUI and CAD applications.

The accelerator minimizes bus traffic by off-loading the tasks normally performed by the processor. The dedicated bit-block transfers (BitBLT) engine maximizes performance by speeding the movement of large blocks of image data in video memory.

Video Memory

The system comes with 1 MB of on-board video DRAM, upgradeable to 2 MB. The standard 1 MB DRAM consists of two 256K by 16 DRAM devices soldered to the system board. The optional 1 MB of DRAM consists of two 256 KB by 16 modules that install in two sockets on the system board.

With the standard 1 MB of video DRAM, the video hardware supports the following resolutions, colors, and refresh rates:

- 1280 by 1024 pixels, 16 colors, 60 Hz
- 1024 by 768 pixels, 16/256 colors, 60 Hz, 70 Hz, 75 Hz, and 85 Hz
- 800 by 600 pixels, 16/256/64K colors, 56 Hz, 60 Hz, 72 Hz, 75 Hz, and 85 Hz
- 640 by 480 pixels, 16/256/64K/16 million colors, 60 Hz, 72 Hz, 75 Hz and 85 Hz

With 2 MB of video DRAM, the system supports the following additional resolutions, colors, and refresh rates:

- 1280 by 1024 pixels, 256 colors, 60 Hz and 75 Hz
- 1024 by 768 pixels, 64K/16 million colors, 60 Hz, 70 Hz, 75 Hz and 85 Hz
- 800 by 600 pixels, 16 million colors, 56 Hz, 60 Hz, 72 Hz, 75 Hz, and 85 Hz
- 640 by 480 pixels, 16 million colors, 60 Hz, 72 Hz, 75 Hz, and 85 Hz.

ISA Bus

The system board uses the ISA bus for transferring data between the processor and I/O peripherals and expansion boards. The ISA bus supports 16-bit data transfers and typically operates at 8 MHz. ISA expansion slot connector pin assignments are provided in Appendix A.

PCI Local Bus

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

The PCI-bus operates at half the Pentium's processor speed, and supports memory transfer rates of up to 105 MB per second for reads and up to 120 MB per second for writes, depending on processor configuration.

The high-bandwidth PCI-bus eliminates the data bottleneck 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.

PCI expansion slot connector pin assignments are provided in Appendix A.

PCI Auto Configuration

The system comes with a PCI auto configuration utility that operates in conjunction with the system's Setup utility. The utilities automatically configure interrupts, DMA channels, I/O space, and other parameters to allow addition of PCI boards with minimal user intervention. (See Section 2 for Setup information.)

PCI/IDE Ports

The system board provides two high-performance PCI/IDE ports: a primary channel and a secondary channel. Each port supports up to two devices for a total of four IDE devices. The primary PCI/IDE port has an enhanced IDE interface which supports 11.1 MB per second 32-bit wide data transfers on the high-performance PCI local bus. The installed hard disk drive is connected to the primary PCI/IDE port. The installed CD-ROM reader (multimedia, multimedia/network and 1.2 GB hard disk systems only) is connected to the secondary PCI/IDE port.

Parallel Interface

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

The BIOS has automatic ISA printer port sensing. If the BIOS detects an ISA printer port mapped to the same address, the built-in printer port is disabled. The BIOS also sets the first parallel interface port it finds as LPT1 and the second port it finds as LPT2. The interrupt is selected to either IRQ5 or IRQ7 via Setup. Software selectable base addresses are 3BCh, 378h, and 278h.

I/O addresses and interrupts for the parallel port are given in Table Section 1-7.

NOTE: Any interrupts used for the built-in parallel port are not available for ISA parallel ports.

Table Section 1-7 Parallel Port Addressing and Interrupts

Starting I/O Address	Interrupt Level	Port
378	IRQ05	LPT1
278	IRQ05	LPT1 or LPT2
3BC	IRQ07	LPT1 or LPT2
378	IRQ07	LPT1
278	IRQ07	LPT1 or LPT2
3BC	IRQ07	LPT1 or LPT2

Parallel interface signals are output through the system board's 25-pin, D-subconnector. The connector is located at the rear of the system unit. Pin locations for the parallel interface connector are given in Appendix A.

Serial Interface

The system has two 16C550 UART compatible serial ports (COM1 and COM2) integrated on the I/O controller. The serial ports support the standard RS-232C interface (see Table Section 1-8). The buffered high-speed serial ports supports transfer rates up to 19.2 KB. These ports allow the installation of high-speed serial devices for faster data transfer rates.

I/O addresses and interrupt levels for the two channels are given Table Section 1-8. The interrupt level is selectable via Setup to either IRQ3 or IRQ4. Software selectable base addresses are 3F8h, 2F8h, 3E8h, and 2E8h.

NOTE: Any interrupts used for the built-in serial ports are not available for ISA parallel ports.

Table Section 1-8 Serial Port Addressing and Interrupts

Starting I/O Address	Interrupt Level	Port
3F8h	IRQ04	COM1*
2F8h	IRQ03	COM2
3E8h	IRQ04	COM3
2E8h	IRQ03	COM4

* Disabled if fax/modem installed

Serial interface specifications include:

- Baud rate up to 19.2 KB per second
- Word length - 5, 6, 7, or 8 bits
- Stop bit - 1, 1.5, or 2 bits
- Start bit - 1 bit
- Parity bit - 1 bit (odd parity or even parity).

Serial interface signals are output through the system board's 9-pin, D-subconnector. The connectors are located at the rear of the system unit. Pin locations for the serial interface connector are shown in Appendix A.

POWER SUPPLY

The power supply is mounted inside the system unit. It supplies power to the system board, option boards, diskette drives, hard disks, keyboard, and mouse. A fan inside the power supply provides system ventilation. The power supply supplies 145 watts of power. Connector locations are in Appendix A.

DISKETTE DRIVE

Up to two diskette drives are supported. The installed 3 1/2-inch diskette drive is connected by a single ribbon cable with two drive connectors. The diskette drive cable plugs directly into the system board. Typically both diskette drives are terminated. Connector locations are given in Appendix A.

HARD DISK DRIVE

Up to two IDE hard drives are supported. The system board has two IDE/PCI interface connectors (primary and secondary) for connecting various storage devices such as hard disk drives. Each connector supports up to two IDE devices.

The system ships with one internal 3 1/2-inch hard disk drive (1-inch high, thin-height) installed behind the front panel. The drive cable plugs into the primary (fast) connector on the system board.

KEYBOARD

The PS/2-style 104 key keyboard is standard equipment for the system. The keyboard provides a numeric keypad, separate cursor control keys, and 12 function keys, capable of up to 48 functions. Status lamps on the keyboard indicate: Num (Numeric) Lock, Caps (Capital) Lock, and Scroll Lock key status. The keyboard's six-pin connector plugs into the rear of the system. The keyboard connector pin assignments are given in Appendix A.

MOUSE

A PS/2-compatible mouse is standard equipment for the system. The mouse has a self-cleaning mechanism that prevents a buildup of dust or lint around the mouse ball and tracking mechanism. The mouse's six-pin connector plugs into the rear of the system. The mouse connector pin assignments are given in Appendix A.

MULTIMEDIA COMPONENTS

Systems configured for multimedia come with audio integrated on the system board, a CD-ROM reader, a speaker set, and a microphone. The following briefly describes each. Information on setting up and operating the speakers, microphone, and CD-ROM reader is in Section 2, Setup and Operation.

Integrated Audio

Multimedia systems come with audio components integrated on the system board. Non-multimedia systems do not have the audio components on the system board. The audio components include an ESS ES1788 Sound Blaster-compatible chip, a Yamaha OPL3 FM synthesizer chip, and an SRS Labs Sound Retrieval System[®]. The system's integrated audio features the following:

- built-in 16-bit 128x oversampling Sigma-Delta Stereo Codec with 85dB S/N ratio
- built-in five-channel 16/32 step MPC compatible stereo mixer with master volume and sample rates up to 48 Hz stereo
- dual DMA channel and built-in FIFOs for full duplex simultaneous playback and record in 16-bit stereo
- WaveBlaster upgradeable for Wavetable synthesis
- 3D sound effects
- 20 voice FM synthesis.

The integrated components are compatible with the Sound Blaster[™] board and the Microsoft[®] Windows Sound System[™] board. The components work with the pre-installed Voyetra AudioStation software.

CD-ROM Reader

The quad-speed IDE CD-ROM reader is pre-installed as drive E on multimedia and multimedia/network configurations. The reader can be used to load programs from a CD or it can be used to play audio CDs. The reader operates at different speeds depending on whether the CD contains music or data. The reader is fully compatible with Kodak Multisession Photo CDs™ and standard CDs. The reader is set as the master device on the secondary IDE/PCI connector port.

Speakers

The multimedia systems come with 5 W high-quality Goldtron stereo speakers, an AC adapter, and connecting wires. The speaker set features a volume control, power on/off switch, power lamp, and a headphone jack. Volume is controlled from the speaker or from the preinstalled sound system software. The speaker set connects to the speaker line out jack on the back of the system.

Microphone

The microphone that comes with the multimedia systems allows recording of voice and sound into computer data files. The microphone connects to the MIC jack located on the back of the system. The microphone works in conjunction with the audio software shipped with the system.

NETWORK BOARD

Network-ready systems are configured with an Ethernet 3C509B network interface board (NIC). The network board allows connection to an Ethernet network and communication with other computers. The network board has three connectors for coaxial and twisted-pair network cabling:

- BNC connector — supports thin coaxial cables
- AUI connector — supports thick coaxial cables
- RJ-45 connector — supports twisted-pair 10BASE-T cables.

PLUG AND PLAY

The system comes with a Plug and Play BIOS which supports Plug and Play technology. Plug and Play eliminates complicated setup procedures for installing Plug and Play expansion boards. With Plug and Play, adding a Plug and Play expansion board is done by turning off the system, installing the board, and turning on the system. There are no jumpers to set and no system resource conflicts to resolve. Plug and Play automatically configures the board.

POWER MANAGEMENT

Each system is Energy Star compliant and comes with the power-saving features enabled. If the keyboard, mouse, or drives are not used after 15 minutes, the screen goes blank and the system goes into a partial power shutdown. A blinking power lamp indicates that the system is in the power-saving mode. As soon as activity is detected, the system resumes where it left off.

The system can be manually put into a Suspend power-saving mode by pressing the suspend button. The Suspend mode provides the greatest power savings by putting the system in maximum power shutdown. When the system goes into Suspend mode, it saves data and system status and then shuts off power to all possible components. A blinking power lamp indicates that the system is in the power-saving mode. As soon as activity is detected, the system resumes where it left off.

The amount of inactive time is adjustable. Power management can also be disabled. Both can be set through Setup.

DESKTOP MANAGEMENT INTERFACE

The Desktop Management Interface (DMI) is the standard interface used to manage system components on the computer. DMI acts as a layer of abstraction between management applications and managed components such as systems, network cards, and printers.

With DMI, a management application (such as Hewlett Packards Openview), provides a simplified method to collect information from different vendors computers operating on the network.

DMI is not a protocol but an interface that complements network protocols like the Simple Network Management Protocol (SNMP).

DMI Components

The NEC DMI consists of two major functional components:

- the Component Interface (CI) module
- the NEC DMI Browser.

The CI module provides the instrumentation and interface between the BIOS and the DMI Service Layer (SL). The DMI Browser displays and manages existing attributes in the Management Information Format (MIF) database. The Desktop Management Task Force (DMTF) provides the DOS Service Layer, Windows Service Layer, and MIF database structure.

Manageable Components

Manageable components are hardware, software, and peripherals installed or attached to a desktop computer or network server. These include hard disks, word processors, CD-ROMs, printers, operating systems, graphics boards, modems, etc. Manageable components can come with the system or be added later. Each component supplies information to the MIF database that contains the product's pertinent management information.

Each product may or may not include an instrumentation module in order to provide real-time support.

CI Module

The Component Interface (CI) module is a Windows program that provides access to your system and its components. It runs minimized in Windows and should only be canceled if you are uninstalling DMI.

CI module is comprised of programs written by the component manufacturer to provide real-time attribute values to the network Service Layer as requested.

DMI Browser

The NEC DMI Browser is a Windows application provided by NEC Technologies, Inc. The Browser uses the Management Interface (MI) to provide access to MIF attributes and their respective values. The Browser has the ability to set attributes and manage DMI components.

The NEC Browser can only access the local MIF database. The Browser lets you access MIF attributes according to the structure defined by the DMTF. It is not intended to be a general PC management application. If a more comprehensive management application is desired, use a product such as Intel's LANDesk Manager™.

The NEC DMI Browser has two sections: an Overview and a Detailed View. The Overview displays pertinent information on the system. In addition, you can click on each of eight buttons provided to obtain more information on each subject. The organization of the data in the Overview presents a comprehensive view of the system.

To display the Detailed View, select either the Detail tab or the Detail option on the View menu. This initiates a hierarchical view of the MIF database and allows the user to make some changes. For example, if a system is transferred to another department or user, the primary user name, telephone number and system location can be updated.

In the Browser, components and groups are expanded or collapsed by selecting the desired object and double clicking. You can also use the toolbar to access information in the MIF file.

The Browser provides seven buttons (Windows for Workgroups, only) in the toolbar which are defined as follows:

- Expand — to expand a component.
 - Collapse — to collapse a component.
 - View Component Detail — to review the selected component's details.
 - View Group Detail — to review the selected groups details.
 - View Attribute Detail — to review the selected attribute's details.
-
- DMI Browser Information — to display program information, version number, and copyright.
 - Help — to display help information for clicked toolbar, buttons, and menus.

The Browser provides five buttons (Windows 95) in the toolbar which are defined as follows:

- Overview — to switch to Overview screen.
- Detailed View — to switch to Detailed View screen.
- Print — to print.
- DMI Browser Information — to display program information, version number, and copyright.
- Help — to display help information for clicked toolbar, buttons, and menus.

Upon exiting the Browser, the program saves the current viewing configuration. The next time you use the Browser, it restores all the viewing screens to the last known position.

Usage

To start the NEC DMI Viewer, simply double click on the NEC DMI icon in the NEC Utilities group in Windows.

The initial display contains the system serial number, model number, asset tag number, processor information, serial and parallel ports and their status, video information, HDD information, and memory information. Click on any of the buttons to display even more information on the eight topics.

The service topic option invokes the Windows utility SYSEDIT. This utility displays all of the important system files.

CAUTION: Using the SYSEDIT utility can put either the system or Windows into a state where it cannot operate. If you are not familiar with the use of these files and their maintenance, do not make any changes.

Troubleshooting

If trouble is experienced in using the NEC DMI Browser, here are a few suggestions to follow.

Reboot the system after installation, otherwise you may have problems running the NEC DMI Browser.

If the product name, serial number, system boot time, or other attribute returns a N/A, check the following:

- Look at the AUTOEXEC.BAT file to see if the line
DMIDIR%\WIN16\BIN\NECDMI.EXE is present.
- Make sure the file NECDMI.DAT is located in the DMIDIR%\WIN16\BIN
subdirectory.
- Check that NECCI.EXE is running.

SPECIFICATIONS

System specifications are included in Table Section 1-9.

Table Section 1-9 Specifications

Item	Specification
Dimensions and Weight	Width: 17 inches (43.18 cm) Depth: 16 inches (40.64 cm) Height: 4 inches (10.6 cm) Weight: 22 lb (11.1 kg) (dependent upon options)
Keyboard	Width: 19.0 inches (48.3 cm) Depth: 8.4 inches (21.3 cm) Height: 1.6 inches (4.1 cm) Weight: 3.5 to 4.0 lb. (1.6 to 1.8 kg)
Device Slots	Two 5 1/4-inch, front accessible slots One 3 1/2-inch front access slot One 3 1/2-inch internal slot
Expansion Slots	Four slots: two 16-bit ISA slots one ISA/PCI shared slot one PCI slot
Peripheral Interface	PS/2-style keyboard connector, rear panel PS/2-style mouse connector, rear panel Two RS-232C serial ports, rear panel Parallel printer port, rear panel VGA port, rear panel
Front Panel	Power button Power indicator lamp Hard disk drive busy indicator lamp Suspend button Reset button
Processor	Intel Pentium 75- or 100-MHz (dependent on system)
Cache Memory	16 KB of primary cache (8 KB data, 8 KB instruction) integrated in the processor, optional 256 KB secondary cache
Flash ROM	128 KB (28F001) Flash ROM
Chip Set	SiS5511+/5512/5513 PCI/ISA
System Memory	8-MB EDO standard, expandable to 128 MB using SIMM sockets
Multimedia, Multimedia/Network and 1.2 GB Hard Disk Systems	16-MB EDO standard, expandable to 128 MB using SIMM sockets
Optional SIMMs	4-, 8-, 16-, and 32-MB; 32-bit, non-parity, 70-ns SIMMs

Integrated Graphics

SiS 6205 PCI Graphics & Video Accelerator
1-MB video DRAM standard, expandable to 2 MB

Table Section 1-9 Specifications

Item	Specification
	Maximum resolution 1280 x 1024 pixels
Battery	coin-type battery
Power Supply	145 Watt, 115 V/230V switch selectable
CD-ROM Reader (Multimedia and Multimedia/Network systems only)	See Appendix D for more specifications Disc format: ISO 9660 Data transfer rate: 600 KB/sec, PIO Mode 3 support Access time (typical): 500 msec Built-in buffer: 128 KB Host interface: IDE (ATAPI)
Integrated Sound	Standard in multimedia systems ESS1688 Sound Blaster compatible Yamaha OPL3 FM Synthesis SRS Labs 3D sound solution 16-bit 128x oversampling sigma-delta stereo CODEC with 85 dB S/N ratio Stereo jacks for microphone: line in and line out Wave Blaster upgradeable for wavetable synthesis
5 Watt Speakers (Goldtron™ Speakers)	Standard in multimedia systems Magnetic shielded 5-watt stereo speakers Power on/off switch, power lamp, volume control Mini-stereo headphone jack Built in stereo amplifier 9-volt AC power adapter
Network Interface Board (Network-ready systems only)	3Com EtherLink III 3C509B-COMBO Network interface IEEE 802.31 10Base-T and Ethernet IEEE 802.3 industry standard for 10 Mbps CSMA/CD local area network Connectors RJ-45 AUI BNC
Operating Environment	Temperature — 50°F to 95°F (10°C to 35°C) Relative Humidity — 20% to 80%
Administrative Compliance	UL 1950 - safety CSA C22.2 No. 950-m89 TUV EN60950: 1988 FCC part 15, Subpart J, Class B - emissions FCC part 68 C.R.C., c.1374 IEC 950 - safety VDE 0871/6.78, Class B - emissions

Section 2

Setup and Operation

This section provides information on hardware setup and operation for the PowerMate Ve series systems. Setup includes unpacking, setting up, and powering on the system. It also includes information for configuring the system with the setup program, using the NEC bulletin board service, and running the BIOS update utility. Setting system board jumpers is described in Appendix B, System Board Jumpers.

UNPACKING AND REPACKING

Find an area away from devices that generate magnetic fields (electric motors, transformers, etc.). Place the carton on a sturdy surface, and carefully unpack the system. The carton contents for diskless systems include the system unit, keyboard, mouse, power cord, user documentation, and various software diskettes. The carton contents for non-multimedia configurations include the system unit, keyboard, mouse, power cord, and user documentation. The carton contents for multimedia and multimedia/network configurations include the system unit with a CD-ROM player, keyboard, mouse, speakers, power cord, and user documentation.

Repack the system using the original shipping carton and packing material. Part numbers for replacement shipping cartons and packing material are included in Section 5, "Illustrated Parts Breakdown."

SETUP

Set up the system by making the following connections.

1. Set the voltage selector switch to 115V (U.S. and Canada) or 230V and plug the power cord into the system power socket (see Figure Section 2-1).
-

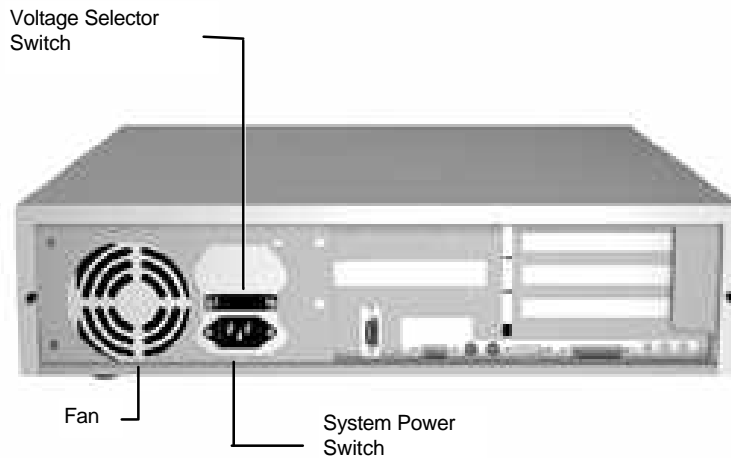


Figure Section 2-1 Voltage Selector Switch

NOTE: The correct AC input voltage must be properly set. Select the appropriate voltage with the voltage selector switch located at the rear of the system.

2. Connect the keyboard, mouse, monitor, and printer cables to the back of the system unit (see Figure Section 2-2).

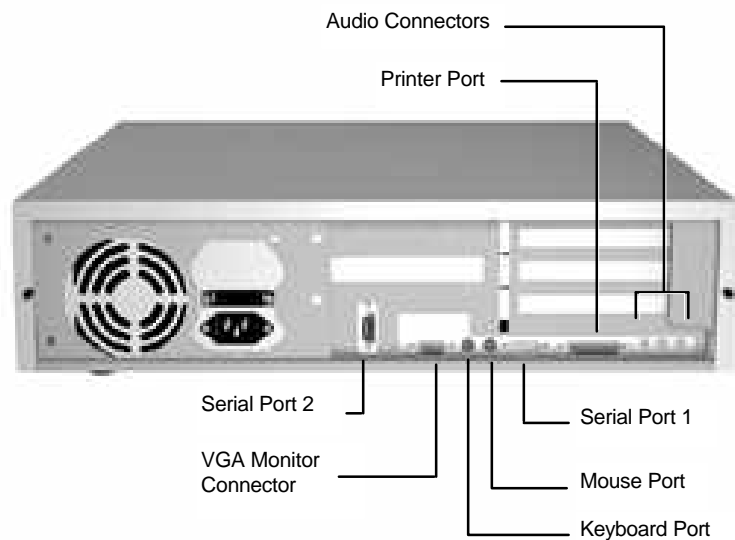


Figure Section 2-2 Peripheral Connections

3. If setting up a network-ready system, connect the appropriate network cable to the network board at the rear of the system (see Figure Section 2-3).

CAUTION: If adding a T-connector, be sure that other network users are logged off the system before connecting the cable.

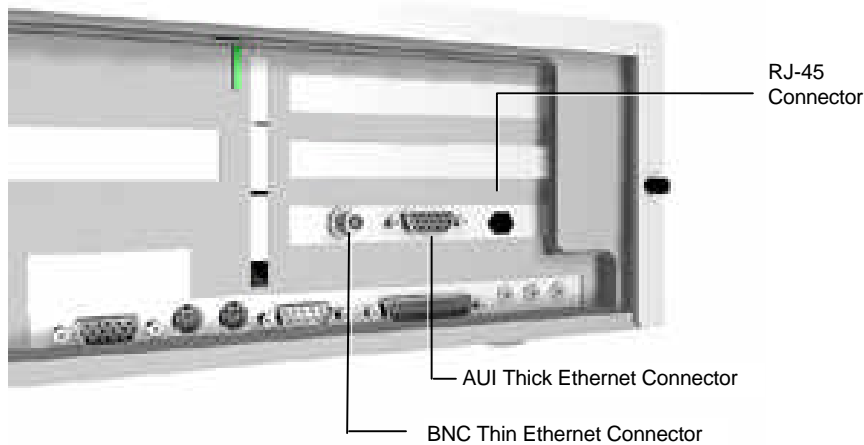


Figure Section 2-3 Network Board Connections

4. If installing a multimedia system, connect the speakers as follows.
 - Locate the right speaker (has the controls on the front) and the speaker cable attached to the back.
 - Connect the speaker input cable to the line out jack on the back of the system (see Figure Section 2-5).
 - Connect the AC adapter to the right speaker and to a surge protector or wall outlet.
 - Press the power switch. The power lamp lights.
 - Adjust the volume control as required.

5. Assemble and connect the microphone (multimedia systems only) as follows.
- Slide the microphone holder into the slot in the microphone stand as far as it will go (see Figure Section 2-4).
 - Slide the microphone cable and microphone into the holder. Adjust the microphone by pivoting it up and down and side to side.

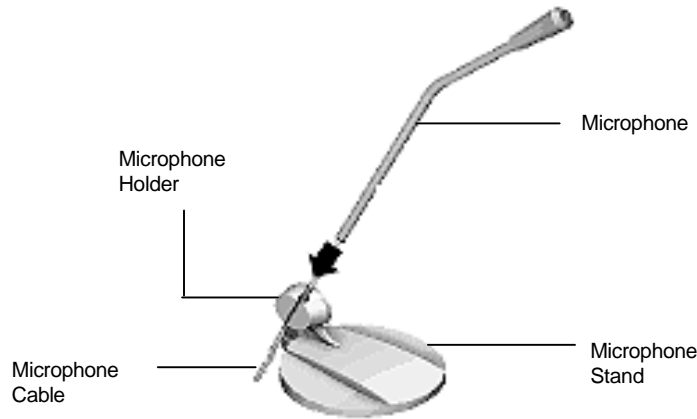


Figure Section 2-4 Assembling the Microphone Holder

- Plug the microphone into the microphone in jack at the rear of the system (see Figure Section 2-5).

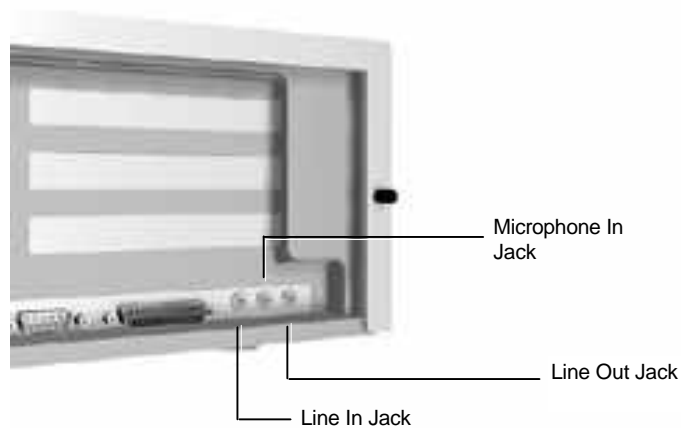


Figure Section 2-5 Connecting the Microphone

6. Press the power button (see Figure Section 2-6) to power-on the system. The power lamp lights green, indicating that the system is in Full-Power On mode.

The system automatically goes into its Power-On Self-Test (POST), and checks system components. One beep indicates that the system has successfully completed its power-on test.

If a problem occurs, a series of beeps may sound. If this happens repeatedly after powering on, power off and troubleshoot the system.

NOTE: If the system displays a message indicating that system settings have changed, run Setup (see System Configuration later in this section).

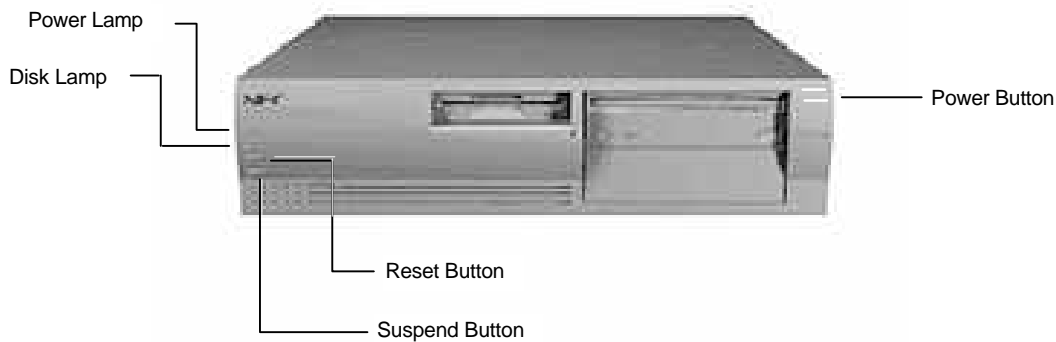


Figure Section 2-6 Power Button, Lamps, and Suspend Button

7. Press the suspend button (see Figure Section 2-6) to place the unit in the maximum power saving mode.

A blinking power lamp indicates that the system is in the power-saving mode.

Pressing a key or moving the mouse places the system back in the Full-Power mode.

If the system is left alone for a preset time (15 minutes), it goes into the automatic Standby mode. The screen goes blank and the system goes into the power-saving mode of operation. Moving the mouse or pressing a key places the system back in the Full-Power mode.

CD-ROM READER

An NEC 4X CD-ROM reader (see Figure Section 2-7) comes pre-installed as drive E in the multimedia configurations. The reader is set as a master device, and is connected to the secondary IDE/PCI port on the system board.

NOTE: The CD-ROM reader installed in the system might look different than one shown in the following figure. The locations of the other features may vary but the functions are the same.

Use the CD-ROM reader to load and start programs from a CD or to play audio CDs. The CD-ROM reader has the following controls and indicators:

- jack for connecting headphones with a stereo mini-jack plug
- volume control for adjusting the headphone volume
- busy lamp that lights during read operations
- open/close button for opening or closing the CD tray when the power is on. When playing a CD, press the open/close button to stop the CD.
- emergency eject hole in the front panel for manually opening the CD tray if power is lost. Insert a jewelers screwdriver into the hole. Turn the screw counterclockwise to open the tray and clockwise to close the tray.

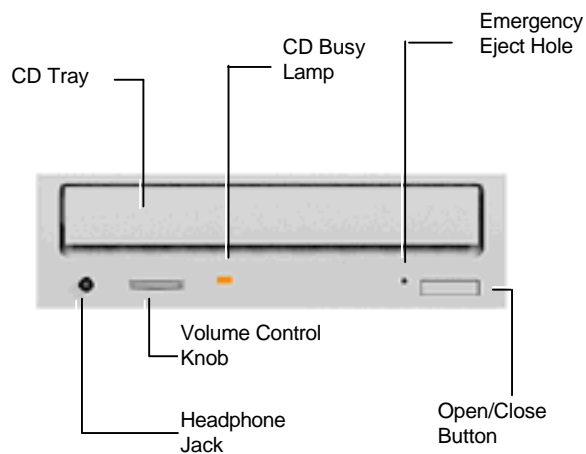


Figure Section 2-7 Typical CD-ROM Reader Controls and Indicators

To load a disc in the CD-ROM reader, follow these steps.

1. Press the open/close button. The CD tray opens.
2. Put the CD, printed side up, into the tray.
3. Press the open/close button again and the tray closes.
4. To remove the disc, press the open/close button. The tray opens, allowing removal of the disc.

SYSTEM CONFIGURATION

This section describes the Setup utility program that allows the system configuration information to be viewed and changed.

NOTE: The system ships from the factory with the correct system parameters for the configuration. Unless setting the time and date, setting security features, customizing the system, or adding optional hardware, Setup does not need to be run.

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

Setup Utility

The Setup utility is used to view and set system parameters. Use the Setup utility 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 appears 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 or keyboard parameters.
-

- configure system connections for peripherals such as the diskette drive, hard drives, and devices connected to the printer and serial ports.
- customize the system with security features such as passwords, diskette drive restriction, virus check reminder, and system backup reminder.
- set system parameters if the CMOS battery or real-time clock/battery module needs replacing.

How to Start Setup

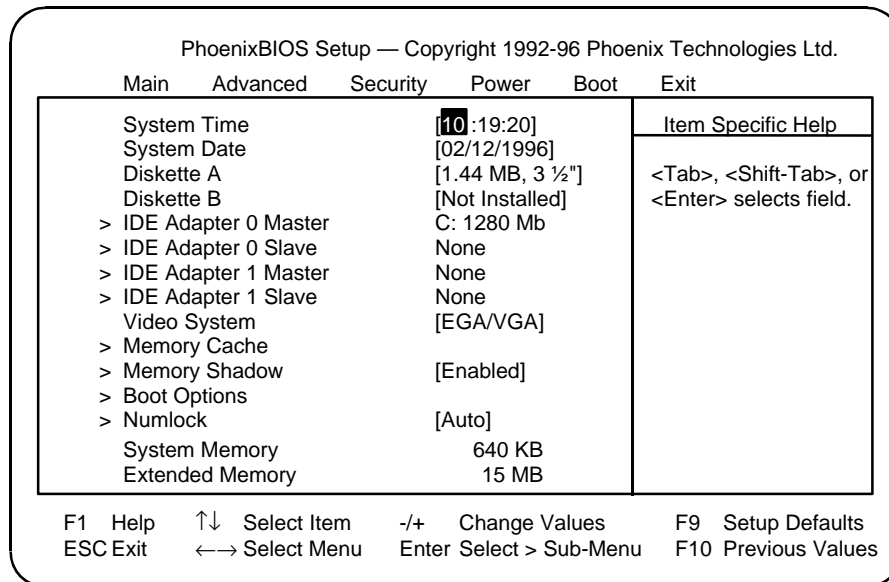
To start the Setup utility, follow these steps:

1. Turn on or reboot the system. Setup displays the following message:

Press <F2> to enter SETUP

2. Press **F2**. Setup's Main Menu window appears similar to the following screen.

NOTE: The screen shown is typical of the system. The actual items on the Main Menu depend upon the hardware installed in the system.



Main Menu

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 (Main, Advanced, Security, Power, Boot, Exit) for setting system parameters.
- A Main Menu summary window — the center area on the left side of the screen. This area provides a summary of Main Menu Setup parameters. Main Menu parameters can be set directly from this window or from the Main menu option in the legend bar.
- The Field Help window or Item Specific Help — the area on the right side of the screen. This help area provides help information for the Setup option currently selected.
- The legend bar — the area at the bottom of the screen. The legend bar provides a summary of command keys for using Setup.
- The General Help window — a window that appears any time during Setup after pressing **F1** or **Alt H**. This help window provides two pages of 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 this menu for basic system configuration. For example, select Main to set the system time, system date, diskette drives, and video parameters. Use this menu to check memory parameters, numlock, and boot options.
- **Advanced** — Use this menu to set serial port and printer port addresses and interrupts, to enable/disable the system's diskette drive controller and dual-IDE controllers, and to enable a Plug and Play operating system such as Windows 95.

The Advanced menu also provides, for example, menu items for setting parameters for large disks (using large disks with Windows NT™), enable/disable onboard sound and surround sound, and enable/disable the mouse port.

Some of the Advanced features are accessible only with a Supervisor password.

- Security — Use this menu to set User and Supervisor Passwords, diskette access, fixed disk boot sector, and the Backup and Virus-check reminders.
- Power — Use this menu to configure Power Management features.
- Boot — Use this menu to select the boot device (diskette drive, CD-ROM reader, or hard drive)
- Exit — Exits the Setup utility with options to save or discard changes, load defaults, or load previous values.

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. Table Section 2-1 describes the legend keys and their alternates.

Table Section 2-1 Setup Key Functions

Key	Function
F1 or Alt-H	Displays General Help window (described later in this section).
Esc	Exits the menu.
← or → arrow keys	Selects a different menu.
↑ or ↓ arrow keys	Moves cursor up and down.
Tab or Shift-Tab	Cycles cursor up and down.
Home or End	Moves cursor to top or bottom of window.
Page Up or Page Down	Moves cursor to next or previous page.
- (minus)	Selects the Previous Value for the field.
+ (plus)	Selects the Next Value for the field.
F9	Loads the Default Configuration values for this menu.
F10	Loads the Previous Configuration values for this menu.
Enter	Executes a command or selects submenu.
Alt-R	Refreshes screen.

- **Selecting a Menu Item**

To select a menu item, use the up or down arrow keys to move the cursor to the desired field.

Use the tab key to cycle the cursor through the options.

Then use the value keys (F5, -, F6, +, or space bar) to cycle through the value for that field. The Save Values command in the Exit Menu saves the values currently displayed in all the menus.

- **Displaying a Submenu**

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

Field Help Window

The 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 is moved to each new field.

General Help Window

Pressing **F1** or **Alt H** on any menu brings up the General Help window that describes the legend keys and their alternates.

The scroll bar on the right of any window indicates that there is more than one page of information in the window. Use **Page Up** and **Page Down** to display all the pages. Pressing **Home** and **End** displays the first and last page.

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

Main Menu Options

Table Section 2-2 lists and describes the available parameters when the Main Menu is selected in the menu bar. Other Main Menu parameters are available by selecting submenus.

Parameters available directly from the Main Menu summary window have a right-pointing triangle next to the parameter. Use the arrow keys to move the cursor to a parameter and press **Enter** to select a submenu.

See the sections following the table for a description of Main Menu parameters from the summary window.

Table Section 2-2 Main Menu Parameters

Parameter	Options	Description
System Time	HH:MM:SS	Sets the system time.
System Date	MM/DD/YYYY	Sets the system date.
Diskette A: Diskette B:	360KB, 5 1/4" 1.2MB, 5 1/4" 720KB, 3 1/2" 1.44MB, 3 1/2" 2.88MB, 3 1/2" Not Installed	Selects the type of diskette drive in the system.
Video System	EGA/VGA (default) CGA 80x25 Monochrome	Selects the default video device.
Memory Cache		Described in the following sections.
Memory Shadow	Enabled (default)	Described in the following sections.
Boot Options		Described in the following sections.
System Memory	Automatically detected by the system	Displays the amount of conventional memory detected at power-on.
Extended Memory	Automatically detected by the system	Displays the amount of extended memory detected at power-on.

IDE Adapters

IDE adapters control the IDE devices, such as IDE hard disk drives and IDE CD-ROM readers, in the system. The system uses two IDE controllers integrated on the system board.

Setup supports up to four IDE devices, with an IDE adapter for each of the following configurations:

- 1 Master
- 1 Master, 1 Slave
- 2 Masters
- 2 Masters, 1 Slave
- 2 Masters, 2 Slaves

The factory installed master/slave combination for configurations with an IDE hard disk connected to the primary IDE/PCI port is "1 Master." If a second hard disk is added to the primary IDE/PCI port, the combination becomes "1 Master, 1 Slave."

The factory installed master/slave combination for multimedia configurations with an IDE hard disk and a CD-ROM reader is "2 Masters." The hard disk is connected to the primary IDE/PCI port and the CD-ROM reader is connected to the secondary IDE/PCI port as a master. If an IDE hard disk is added to the primary IDE/PCI port, the combination becomes "2 Masters, 1 Slave."

Jumper settings on the IDE device set the device to master or slave (see the documentation that comes with the device).

Select the IDE Adapter option configuration directly from the Main Menu summary window. Available options include:

- IDE Adapter 0 Master
- IDE Adapter 0 Slave
- IDE Adapter 1 Master
- IDE Adapter 1 Slave.

IDE Adapter 0 configures the primary IDE/PCI port (primary channel), IDE Adapter 1 configures the secondary IDE port.

Each IDE Adapter parameter has a right-pointing arrow to the left of it. Selecting the option displays an IDE adapters advanced features menu with IDE hard disk parameters. Select an IDE Adapter option and set parameters for each hard disk separately.

Use Table Section 2-3 to configure the hard disk. If the IDE hard disk features auto IDE type detection, select the Autotype Fixed Disk parameter. The system then automatically detects the hard disk type and sets the remaining parameters.

CAUTION: Incorrect settings can cause the system to malfunction and to not read the drive.

Table Section 2-3 IDE Hard Disk Parameters

Parameter	Options	Description
Type	1 to 39 User Auto	Selecting 1 to 39 fills in all remaining fields with values for predefined disk type. "User" prompts user to fill in remaining fields. When "Auto" is selected, the BIOS automatically sets drive type.
Cylinders	1 to 16,384	Specifies number of cylinders.
Heads	1 to 16	Specifies number of read/write heads.
Sectors/Track	1 to 63	Specifies number of sectors per track.
Write Precomp	0 to 65534 None	Specifies the number of the cylinder at which to change the write timing.
Multi-Sector Transfers	2,4,8,16, Sectors Disabled	Specifies the number of sectors in multi-sector transfers.

Table Section 2-3 IDE Hard Disk Parameters

Parameter	Options	Description
LBA Mode Control	Enabled Disabled (default)	Sets LBA Mode Control on or off.
32-Bit I/O	Enabled (default) Disabled	Sets 32 bit I/O to on or off.
Transfer Mode	Standard (default) Fast PIO1 Fast PIO2 Fast PIO3	Specifies the transfer mode for moving data to and from the hard drive. Standard is the slowest mode but the most compatible. Fast PIO (programmed input/output) is the slowest of the three enhanced modes. Fast PIO3 is the fastest of the enhanced modes.

Memory Cache

For memory caching parameters, select "Memory Cache" directly from the Main Menu summary window. See Table Section 2-4 for a description of memory cache parameters.

CAUTION: Incorrect settings can cause the system to malfunction.

Table Section 2-4 Memory Cache Parameters

Parameter	Options	Description
External cache	Enabled Disabled (default)	Sets the state of external cache.
Cache Video BIOS Area	Enabled (default) Disabled	Controls caching of the video BIOS area.
Caching Memory Regions	Enabled Disabled (default)	Default is disabled. Cache shadows optional ROM located in specified segments of memory and can improve performance. CAUTION: Some add-in boards, particularly with on-board firmware, do not work properly when shadowed.

Memory Shadow

Memory Shadow is always enabled. This parameter is not user-selectable.

Boot Options

The system might require a Supervisor password to set Boot parameters. Select "Boot Options" directly from the Main Menu summary window to display the "Boot Options" menu.

Use the legend keys to make the selections and exit to the Main Menu. Use Table Section 2-5 to select the boot options.

Table Section 2-5 Boot Parameters

Parameters	Options	Description
Summary Screen	Enabled (default) Disabled	Displays system configuration at the end of boot-up.
Floppy Check	Enabled (default) Disabled	Verifies diskette type during boot-up. Disabling speeds up boot time.
Last Boot Fail	3 (default) User-selectable settings Disabled	Sets the number of times for user to boot system. If system fails to boot on number of tries, the "Previous Boot Incomplete" message appears and the system boots with default settings. The default setting, 3, give the user three tries to boot the system before the "Previous Boot Incomplete" message" appears.

Numlock

Select "Numlock" directly from the Main Menu summary window to display the Keyboard Features menu.

Use the legend keys to make the selections and exit to the Main Menu. Use Table Section 2-6 to configure the keyboard parameters.

Table Section 2-6 Numlock Parameters

Parameters	Options	Description
Numlock	Auto (default) On Off	On or Off turns NumLock on or off at bootup. Auto turns NumLock on if it finds a numeric key pad.
Keyboard Auto-Repeat rate	Fast (default) Medium Slow	Sets the delay time after the key is held down before it begins to repeat the keystroke.
Keyboard Auto-Repeat delay	1/4 sec 1/2 sec (default) 3/4 sec 1 sec	
Key Click	Enabled Disabled (default)	Turns audible key click on or off.

Advanced Menu

Accessing the Advanced menu might require a Supervisor password. See Table Section 2-7 for Advanced Menu parameters.

CAUTION: Setting items in the Advanced menu to incorrect values can cause the system to malfunction.

Table Section 2-7 Advanced Menu Parameters

Parameter	Options	Description
Integrated Peripherals	See Table Section 2-8 for options.	See Table Section 2-8 for descriptions of the options.
Plug and Play OS	No Yes (default)	Select "Yes" if using a Plug and Play capable operating system such as Windows 95. Otherwise, set to "No."
Reset Configuration Data	No (default) Yes	If Windows 95 or the ICU has difficulty configuring the system, try setting this parameter to "Yes" to clear all of the configuration data. This parameter resets automatically to "No" to reboot.
ISA Graphics Device Installed	No (default) Yes	Set to "Yes" if other system devices need to know if an ISA graphics device is installed.
Big Memory Mode	Normal (default) Alternate	Selects the method the BIOS uses to report memory sizes over 64 MB to the operating system. Select "Normal" for MS-DOS and Windows. Select "Alternate" for OS/2® and Windows NT™.
Large Disk Access Mode	DOS (default) Other	Select DOS if the system has DOS. Select "Other" if another operating system like Windows 95 or UNIX is installed. A large disk is one that has more than 1024 cylinders, more than 16 heads, or more than 63 tracks per sector.

Integrated Peripherals Menu

Select Integrated Peripherals menu on the Advanced Menu to configure the connections between the system processor and the I/O ports (serial ports 1 and 2, printer port), diskette drives, hard disk controllers, and integrated audio in multimedia systems.

NOTE: A Supervisor password might be required to select parameters from the Integrated Peripherals menu.

Use the legend keys to make the selections and exit to the Main Menu. Use Table Section 2-8 to configure the peripherals.

Table Section 2-8 Integrated Peripherals Parameters

Feature	Options	Description
COM A Port COM B Port	Disabled User-selectable settings Auto	Selects a unique address and interrupt request for the listed COM ports. Auto selects the next available combination. Factory settings: COM A port default: 3F8, IRQ 4 COM B port default: 2F8, IRQ 3
LPT Port	Disabled 378, IRQ 7 (default) User-selectable settings Auto	Selects a unique address and interrupt request for the LPT port. Auto selects the next available combination.
LPT Mode	Output only (default) Bi-directional ECP	Enables parallel port to function normally (Output only), bidirectional, or in an enhanced capabilities port (ECP) mode. Check the printer documentation to set the correct LPT mode for your printer.
ECP Channel	DMA 0 DMA 1 DMA 3	Available when ECP is selected for the LPT mode.
Diskette Controller	Enabled (default) Disabled	Enables the on-board diskette drive controller.
Local Bus IDE Controller	Both (default) Primary Disabled	Enables the on-board IDE controllers. "Both" enables the primary (fast) and secondary (standard) channels. The "Primary" option enables only the primary (fast) channel
PS/2 Mouse	Enabled (default) Disabled	Enables/disables the PS/2-style mouse.
On-board Sound	Stereo with SRS (default) Stereo	This parameter is only available when the BIOS detects integrated audio on the system board. When the audio is detected, stereo with surround sound is the default. If playing an audio file with SRS built-in, use the Stereo setting.

Security Menu

Selecting “Security” from the Main Menu displays a menu with system security options.

NOTE: The Setup program can be entered with either a User or Supervisor password. However, more Setup choices are available with the Supervisor password.

CAUTION: The features set in the Security menu affect the features that appear on the Security menu as well as on other Setup menus.

Enabling “Supervisor Password” requires a password for entering Setup. Passwords are not case sensitive.

Pressing **Enter** at either Set Supervisor Password or Set User Password on the menu displays a Set Password dialog box with the following prompts:

Enter new password: []
Re-enter new password: []

To set a password, type the password and press **Enter**. Reenter the password and press **Enter**.

See Table Section 2-9 for a description of the security features. Use the legend keys to make the selections and exit to the Main Menu.

Table Section 2-9 System Security Options

Feature	Options	Description
Supervisor Password	Disabled (default) Enabled	Must set to "Enabled" to set a Supervisor password.
User Password	Disabled (default) Enabled	Must set to "Enabled" to set a User password.
Set Supervisor Password	Up to seven alphanumeric characters	Pressing Enter displays dialog box for entering the supervisor password. This password gives FULL access to Setup menus.

Table Section 2-9 System Security Options

Feature	Options	Description
Set User Password	Up to seven alphanumeric characters	Pressing Enter displays the dialog box for entering the user password. This password gives RESTRICTED access to Setup menus. Requires prior setting of Supervisor password.
Password on boot	Disabled (default) Enabled	<p>Enabled requires a password on boot (cold boot only, no password required for warm boot). Requires the prior setting of the Supervisor and/or User password.</p> <p>If disabled, password(s) are required for entering Setup but are not required for booting.</p> <p>If Supervisor password is set and this option is disabled, the BIOS boots without asking for a password.</p>
Diskette Access	User (default) Supervisor	Supervisor setting restricts use of diskette drives to supervisor. Requires setting the Supervisor password.
Fixed Disk Boot Sector	Normal (default) Write Protected	Write protected helps prevent viruses. When write protected, operating systems (and viruses and application programs) which attempt to modify the boot sector will not be able to do so.
System Backup Reminder and Virus Check Reminder	Disabled (default) Daily Weekly Monthly	<p>When a schedule is specified, displays a message during bootup asking (Y/N) if the system has been backed up or scanned for viruses.</p> <p>Message returns on each boot until you respond with "Y".</p> <p>Daily displays the message on the first boot of the day, weekly on the first boot after Sunday, and monthly on the first boot of the month.</p>

Power Menu

Selecting "Power" from the menu bar displays a screen with the power management parameters. Use the Power menu to specify the settings for Power Management. The parameters are described in Table Section 2-10.

A power-management system reduces the amount of energy used after specified periods of inactivity. The Power menu supports a Full On state, a Standby state with partial power reduction, and a Suspend state with full power reduction.

Use the legend keys to make the selections and exit to the Main Menu.

Table Section 2-10 Power Management Parameters

Feature	Options	Description
APM	Enabled (default) Disable	Advanced power management (APM) allows APM-aware software to better manage power savings.
Power Savings Mode	Customize (default) Disabled Maximum Medium Minimum	Maximum, Medium, and Minimum set power-management options with predefined values. Select Customize to make customize selections. Disabled turns off all power management.
Sleep Timeout	15 min (default) Disabled User Selectable	Inactivity period required before partial power shutdown (Standby mode).
Deep Sleep Timeout	15 minute (default) Disabled User Selectable	Inactivity period required before Sleep timeout to maximum power shutdown (Suspend mode).
Video in Sleep Mode	Off (default) On	Off, turns monitor off in Sleep mode.
IRQ to Monitor	Enabled (default) Disabled	Allows you to select the following interrupts to wake up the system. The default is Enabled for each interrupt IRQ3, IRQ4, IRQ5, IRQ7, IRQ9, IRQ10, and IRQ11
Keyboard Wakeup	Enabled (default) Disabled	Allows keyboard activity to wake up system.
Mouse Wakeup	Enabled (default) Disabled	Allows mouse activity to wake up system.

Boot Menu

Selecting "Boot" from the Main menu displays the following list of boot devices.

1. Diskette drive
2. CD-ROM drive
3. Hard Drive

The BIOS loads the operating system from the devices in the sequence selected.

Exit Menu

Selecting “Exit” from the menu bar displays the following exit options.

- Save Changes & Exit
- Discard Changes & Exit
- Get Default Values
- Load Previous Values
- Save Changes.

The following subsections describe each of the options on the Exit Menu. Note that **Esc** does not exit this menu. Select one of the items from the menu or menu bar to exit.

Save Changes & Exit

After making the selections on the Setup menus, always select Save Changes to Non-Volatile RAM (NVRAM) to make them operative.

Unlike standard RAM memory, NVRAM is sustained by an onboard battery and stays on when the system is turned off.

After saving the selections, the program displays this message:

```
NOTICE
Changes have been saved
[continue]
```

If an attempt is made to exit without saving, Setup asks if the changes should be saved before exiting.

During bootup, Setup attempts to load the values saved in NVRAM. If the values saved in NVRAM cause the system boot to fail, reboot and press **F2** to enter Setup. In Setup, the ROM default values (as described below) can be loaded or the values can be changed that caused the boot to fail.

Discard Changes & Exit

Use this option to exit Setup without recording any changes.

Get Default Values

To load all the default Setup values in the Setup menus, select Load ROM Default Values from the Main Menu. The program displays this message:

```
NOTICE
Default values have been loaded!
[continue]
```

If, during bootup, the BIOS program detects a problem in the integrity of values stored in NVRAM, it displays these messages:

```
System CMOS checksum bad - run SETUP
Press <F1> to resume, <F2> to Setup
```

The CMOS values have been corrupted or modified incorrectly, perhaps by an application program that changes data stored in CMOS.

Press **F1** to resume the boot or **F2** to run Setup with the ROM default values already loaded into the menus. Other changes can be made before saving the values to NVRAM.

Load Previous Values

During a Setup session, if a mistake has been made and has not yet been saved to NVRAM, the previously saved NVRAM values can be restored.

Selecting Load Previous Values on the Exit menu updates all the selections and displays this message:

```
NOTICE
Previous values have been loaded!
[continue]
```

Save Changes

Save Changes saves all the selections without exiting Setup. Other menu selections can be reviewed or changed.

BIOS UPDATE UTILITY

The system BIOS resides on a flash ROM in the system. The flash ROM can be updated, should it ever become necessary. This feature allows the ROM BIOS chip to be flashed with a new BIOS code through software, rather than replacing the chip.

Performing an update is done with a BIOS flash diskette. The diskette, which contains the latest version of the BIOS code, can be obtained from NEC Technologies or, if a modem is available, the latest BIOS can be downloaded from NEC's Bulletin Board Service (BBS).

If a modem is available, use the following procedure to access the BBS for the latest version of the BIOS Update utility. How to flash the BIOS with a flash diskette is described following the BBS access procedure.

NEC Bulletin Board Service

Log onto the BBS as follows.

NOTE: First time users must answer a new user questionnaire.

1. From the Windows for Workgroups Program Manager, select Accessories and double click on Terminal.
 2. From the Settings menu, click on Communications, check that the settings match the following BBS parameters, and click OK when done.
 - Baud rate: select a baud rate that matches the modem
 - Parity: none
 - Data bits: 8
 - Stop bits: 1
 - Flow control: Xon/Xoff (select Hardware if using 14.4 bps or higher)
 3. From the Phone menu, click on Dial, enter the BBS phone number (508 635-4706), and click OK. Your business phone or location might require a **9 1** or **1** prefix.
 4. Press **Enter** twice.
 5. Enter your first name, last name, and password. Press **Enter** after each.
 6. Follow the screen prompts until the NECTECH Main Menu is displayed.
 7. At the Main Menu, press **J** to join a conference. Select **Conference 1** for the desktop conference.
 8. From the Main Menu, select **F** and **Enter** for the File menu.
 9. At the File menu, select **F** for a list of downloadable files. Follow the prompts to select a file for downloading.
-

After completing downloading of the file, log off the BBS as follows.

1. Press **Enter** (to continue).
2. Press **G** (command for Goodbye/Hangup).
3. Press **Enter**.

Using the BIOS Update Utility

Update the BIOS from the BIOS flash diskette as follows.

1. Write down the Setup parameters currently set on the system.
 2. Turn off the system.
 3. Insert the flash diskette in drive A, and turn on the system.
 4. The update proceeds automatically and shows a BIOS Update successfully completed message when done.
 5. Press any key to reboot the system.
 6. Remove the flash diskette.
-

Section 3

Option Installation

This section provides instructions for installing the following options:

- expansion boards
- SIMM memory upgrade
- video memory upgrade
- processor upgrade
- L2 SRAM cache module
- data storage devices
- external options.

All options require that the system cover be removed. Procedures for removing the cover is included in this section.

GENERAL RULES FOR INSTALLING OPTIONS

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 system unit frame to discharge static.
 - Do not disassemble parts other than those specified in the procedure.
 - All screws are Phillips-head, 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 system unit 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 these safety instructions.

CAUTION: Electrostatic discharge can damage computer components. Discharge static electricity by touching a metal object before removing the system unit 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 (boards, chips, and so on) 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.
-

Removing the System Unit Cover

The following procedure describes how to remove the system unit cover.

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

1. Turn off and unplug the system unit.
2. Disconnect the keyboard, mouse, monitor, and any other external options (such as a printer) from the rear of the system unit.

CAUTION: Electrostatic discharge can damage computer components. Discharge static electricity by touching a metal object before removing the system unit cover.

3. Remove the two cover screws from the rear of the system unit (see Figure Section 3-1).

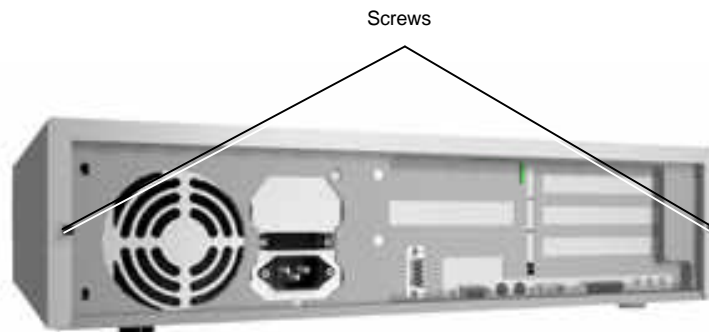


Figure Section 3-1 Removing Cover Screws

4. From the rear of the system, grasp the sides and slide the cover about an inch away from the front panel (see Figure Section 3-2).

NOTE: The cover fits tightly. Press the front edge of the cover to release it from the front panel. Also press against the rear panel to slide the cover one inch away from the front panel.



Figure Section 3-2 Releasing the Cover

5. Lift the cover up and away from the system unit.
6. Reinstall the cover by reversing steps 1 through 5, above.

Be sure that the cover tabs on the sides of the cover align inside the frame of the unit when positioning the cover over the chassis.

EXPANSION BOARDS

The computer supports ISA Plug and Play expansion boards. Plug and Play expansion boards allow installing 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- 16-bit, ISA and 32-bit PCI expansion boards are supported in the system unit. ISA expansion boards can either be Plug and Play or non-Plug and Play boards.

Expansion Slot Locations

The PowerMate system has four expansion slots (see Figure Section 3-4):

- two ISA slots
 - one PCI slot
 - one shared PCI/ISA slot.
-

ISA expansion slots support industry-standard 8-bit or 16-bit expansion boards. The PCI/ISA slot also supports PCI expansion boards.

PCI expansion boards run at the system's processor 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 which boosts system performance.

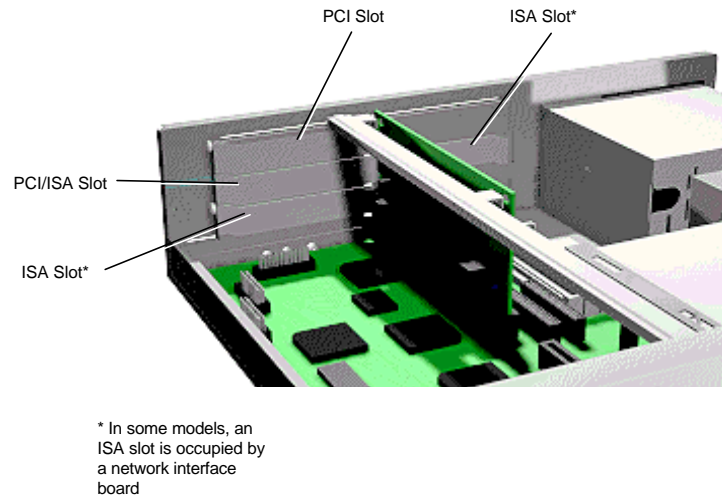


Figure Section 3-4 Locating Expansion Slots

Expansion Board Installation

Install expansion boards in the system as follows.

1. Remove the system unit cover as previously described.
2. Follow any preinstallation instructions that came with the expansion board (such as setting switches or jumpers on the board).
3. If installing a board in the inside expansion slot (next to the power supply), see “Inside Slot Expansion Board Installation.” Otherwise, continue to the next step.
4. Remove the screw securing an expansion slot cover and remove the cover (see Figure Section 3-6).

Save the screw for installing the expansion board. 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.

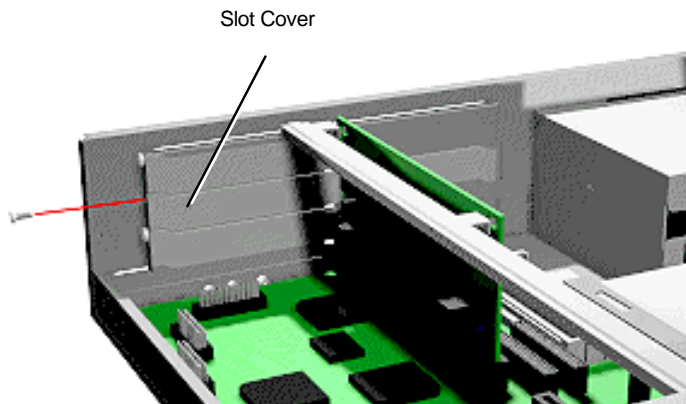


Figure Section 3-6 *Removing a Slot Cover*

5. Hold the board by its edges and insert it into the expansion slot (see Figure Section 3-8). Align full-size expansion boards with the guide rail at the front of the system unit.

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.

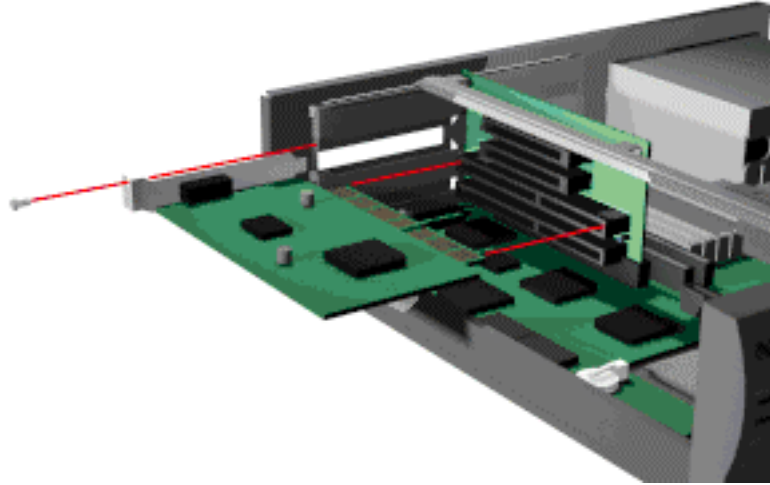


Figure Section 3-8 *Inserting the Board*

7. Attach any signal cables required by the expansion board.
8. Replace the system unit cover.

Inside Slot Expansion Board Installation

Use this procedure if installing an expansion board into the inside slot.

1. Remove the system unit cover as previously described.
2. Follow any preinstallation instructions that come with the expansion board (such as setting switches or jumpers on the board).
3. Remove the two screws that secure the slot cover support and expansion slot cover to the rear of the system (see Figure Section 3-10).

Remove the slot cover support and slot cover from inside the system unit.

CAUTION: Take care not to drop the slot cover and support into the system.

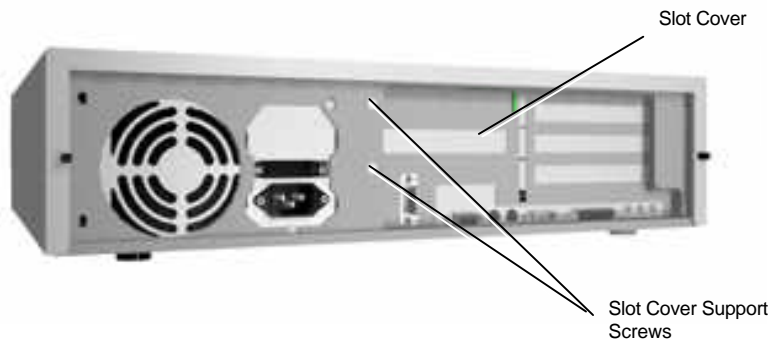


Figure Section 3-10 Removing the Slot Cover Support Screws

4. Hold the board by its edges, component side down and the bracket end facing the rear of the unit, and insert it into the expansion slot.

Press the board firmly into the expansion slot connector. Gently rock the board from side-to-side to seat it into the connector.

5. Hold the slot cover support over the expansion board bracket and replace the two screws removed earlier (see Figure Section 3-12). The slot cover support secures the expansion board in place.

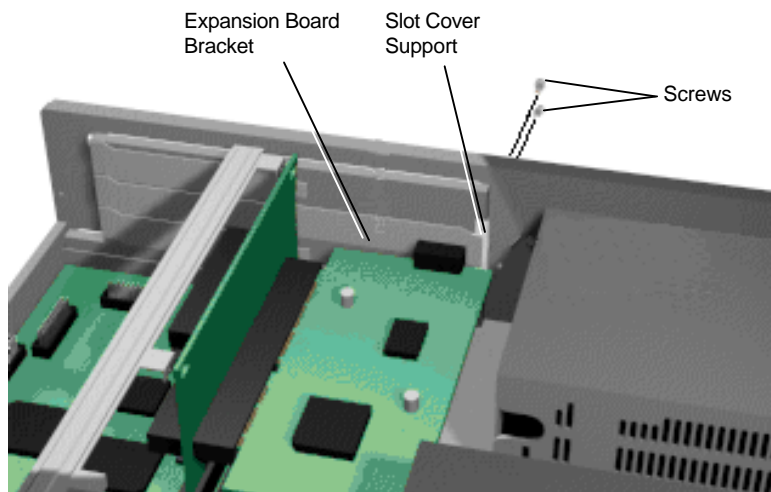


Figure Section 3-12 Attaching the Slot Cover Support

6. Attach any signal cables required by the expansion board.
 7. Replace the system unit cover.
-

SYSTEM BOARD OPTIONS

SIMM, video, and processor OverDrives require locating the connector on the system board. See the following figure for connector locations.

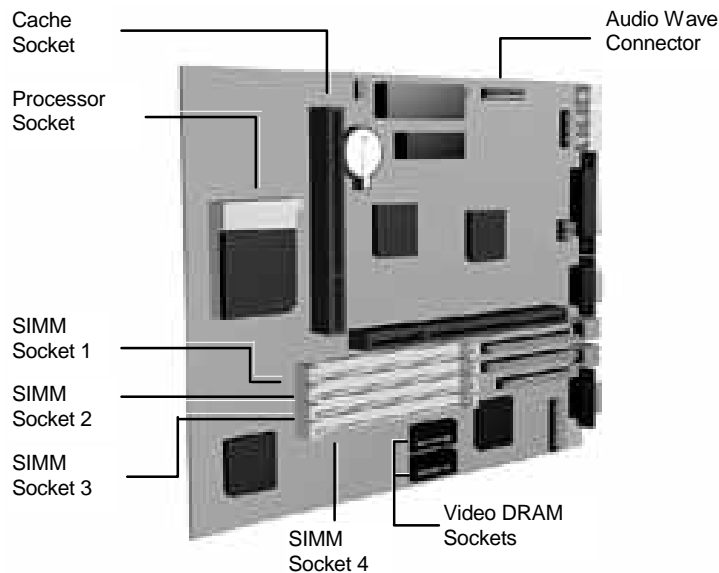


Figure Section 3-14 System Board Upgrade Sockets and Connectors

SIMM Upgrade

SIMM sticks are installed into SIMM sockets on the system board. The system board provides four SIMM sockets and supports up to 128 MB of high-speed EDO memory. The system supports the following 32-bit (non-parity) 70 ns SIMMs:

- 1-MB by 32-bit (4-MB stick)
- 2-MB by 32-bit (8-MB stick)
- 4-MB by 32-bit (16-MB stick)
- 8-MB by 32-bit (32-MB stick).

CAUTION: To avoid corrosion between different metals, only use tin-plated SIMM sticks.

Checking System Memory

Use the following procedure to:

- check the memory installed in the system

- determine the SIMM configuration needed to increase memory
- locate the sockets for SIMM installation.

1. Locate the four SIMM sockets on the system board (see Figure Section 3-14).

If any cables block access to the SIMM sockets, label and disconnect them. If any boards block access to the sockets, remove them.

2. Use Table Section 3-1 to determine the SIMM configuration needed to upgrade memory and to identify the sockets for SIMM installation.

Table Section 3-1 Recommended Memory Upgrade Path

Total Memory	SIMM Socket 1	SIMM Socket 2	SIMM Socket 3	SIMM Socket 4
8 MB*	4 MB	4 MB	Empty	Empty
16 MB	4 MB	4 MB	4 MB	4 MB
16 MB**	8 MB	8 MB	Empty	Empty
24 MB	4 MB	4 MB	8 MB	8 MB
24 MB	8 MB	8 MB	4 MB	4 MB
32 MB	8 MB	8 MB	8 MB	8 MB
32 MB	16 MB	16 MB	Empty	Empty
40 MB	4 MB	4 MB	16 MB	16 MB
40 MB	16 MB	16 MB	4 MB	4 MB
48 MB	8 MB	8 MB	16 MB	16 MB
48 MB	16 MB	16 MB	8 MB	8 MB
64 MB	16 MB	16 MB	16 MB	16 MB
64 MB	32 MB	32 MB	Empty	Empty
72 MB	4 MB	4 MB	32 MB	32 MB
72 MB	32 MB	32 MB	4 MB	4 MB
80 MB	8 MB	8 MB	32 MB	32 MB
80 MB	32 MB	32 MB	8 MB	8 MB
96 MB	16 MB	16 MB	32 MB	32 MB
96 MB	32 MB	32 MB	16 MB	16 MB
128 MB	32 MB	32 MB	32 MB	32 MB

*Standard configuration for 8-MB systems.

**Standard configuration for 16-MB systems.

SIMM Removal

Remove a SIMM as follows.

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

1. Remove the system unit cover as previously described.
2. Locate the SIMM sockets (see Figure Section 3-14).
3. Press the metal clips at the outer edges of the socket away from the SIMM.
4. Push the SIMM away from the locking tabs and remove it from the socket (see Figure Section 3-15).

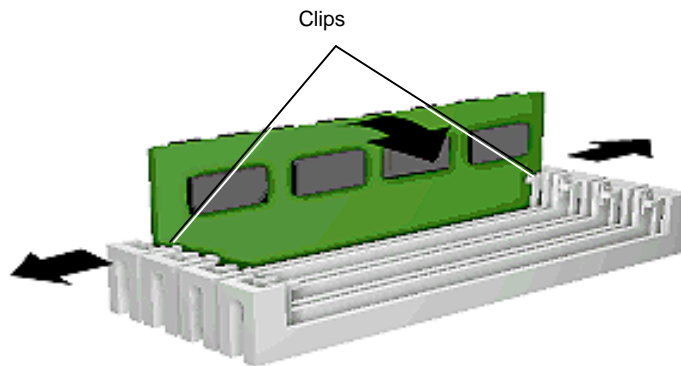


Figure Section 3-15 Removing a SIMM

5. Install a SIMM per the following procedure.

SIMM Installation

Install a SIMM as follows.

1. Remove the system unit cover as previously described.
2. Locate the SIMM sockets (see Figure Section 3-14).
Remove any currently installed SIMMs that are not needed.

CAUTION: Before installing a SIMM, reduce static discharge by touching the system's metal chassis.

3. Position the SIMM in the socket. The notched end of the SIMM allows only the correct positioning.
4. Insert the SIMM at an angle into the socket.
5. Tilt the SIMM towards the locking tabs using equal pressure at the ends of the SIMM until it locks into the socket (see Figure Section 3-17).

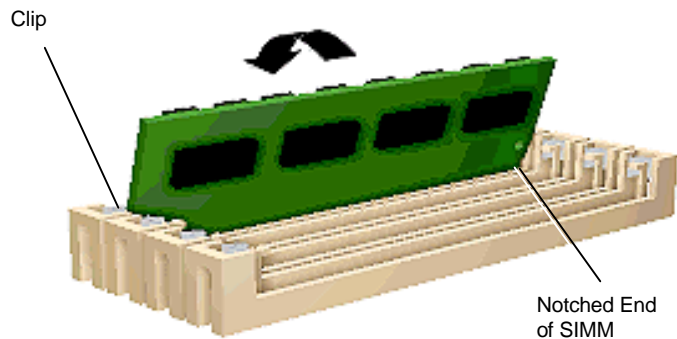


Figure Section 3-17 Inserting the SIMM

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

Video Upgrade

Upgrade the video memory by adding two 512-KB by 16-bit video DRAM modules as follows.

1. Remove the system unit cover as previously described.
2. Locate the video DRAM sockets (see Figure Section 3-14).

If any expansion boards are obstructing your view of the sockets, remove the boards (see “Expansion Board Removal”).

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

3. Align the notched ends of the module and socket (see Figure Section 3-19). Using equal pressure, gently press the module into the socket. Repeat for the second module.

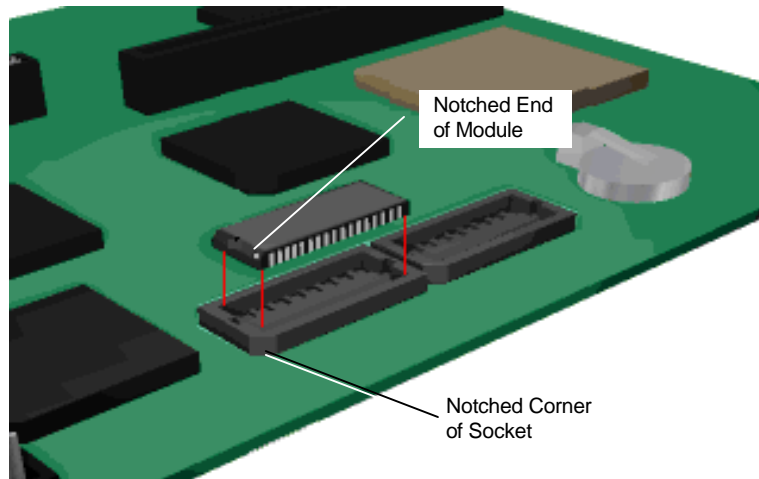


Figure Section 3-19 *Aligning the Video DRAM Module with the Socket*

4. Replace any boards that were removed.
5. Replace the system unit cover.

Processor Upgrade

The zero-insertion force (ZIF) socket accepts pin-grid-array (PGA) processors, such as the primary processor or an OverDrive™ processor.

CAUTION: Incorrect installation of the processor can damage the processor, system board, or both. Follow the installation instructions carefully.

The system requires a heatsink on the OverDrive processor. Verify that you have the correct heatsink for the processor.

When upgrading the processor, first remove the processor currently installed in the system, then install the OverDrive processor.

Processor Removal

Remove the installed processor on the system board as follows.

1. Remove the system unit cover as previously described.
2. Locate the processor socket (see Figure Section 3-14).
If any expansion boards are obstructing the socket, remove the boards.
3. Release the heatsink clip from the tabs on the socket.
4. Release the processor by pulling the lever on the socket away from the socket and as far back as it goes without forcing.

CAUTION: Before picking up the processor, reduce static discharge by touching the metal frame of the system unit.

5. Lift the processor out of the socket.

Processor Installation

1. Remove the processor currently in the system (described in the previous procedure).

CAUTION: Before picking up the processor, reduce static discharge by touching the metal frame of the system unit.

2. Align the notched corner of the processor with the alignment corner in the socket and insert the processor.
3. Swing the lever down to lock the processor into the socket.

CAUTION: Remember to either reattach the heatsink used with the old processor or install the new heatsink supplied with the OverDrive processor.

4. Install the heatsink on the processor and reattach the clip.
 5. Check to see if the newly installed processor requires a system board jumper change (see Appendix B, System Board Jumpers).
-

6. Replace any boards removed during this procedure.
7. Replace the system unit cover.

SECONDARY CACHE UPGRADE

The system comes with 16 KB of primary cache built into the processor. Your system supports an optional 256 KB of asynchronous or synchronous pipeline burst secondary SRAM cache module. The secondary cache installs into a cache socket on the system board. Secondary cache increases system performance.

NOTE: NEC recommends that you purchase the NEC Cache Upgrade Kit when adding secondary cache. The NEC option kit has been tested and approved to work correctly with your system.

Use the following procedure to install the cache module.

1. Remove the system unit cover.
2. Locate the cache socket on the system board (see Figure Section 3-14).

If you have expansion boards obstructing the connector, remove the boards.

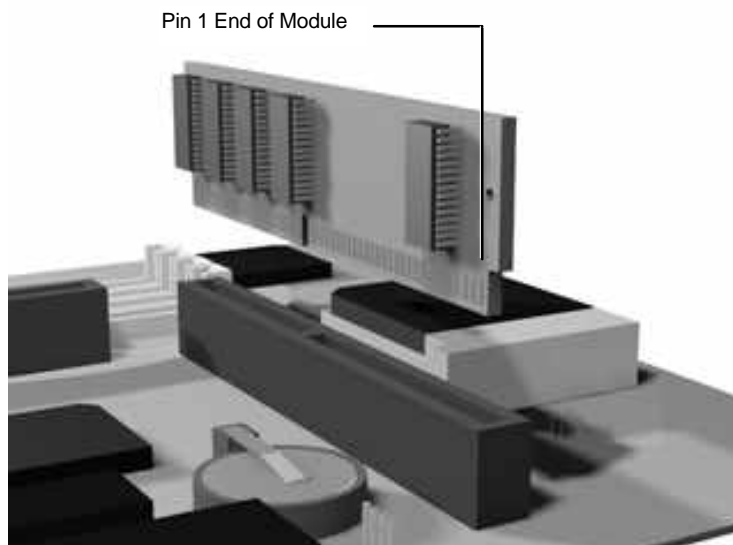


Figure Section 3-21 *Aligning the Cache Module with the Socket*

CAUTION: Before you install a cache module, reduce static discharge by touching the system's metal chassis.

3. Align the pin 1 end of the cache module with the pin 1 end of the secondary cache socket. Using equal pressure, gently press the module into the socket.
4. Check to see if the newly installed cache module requires a system board jumper change. See Appendix B, System Board Jumpers.
5. Replace any boards that you may have removed during this procedure (see "Expansion Board Installation" earlier in this chapter).
6. Replace the system unit cover.

DATA STORAGE DEVICES

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

- up to two diskette drives, including the standard 1.44-MB diskette drive
- up to four IDE devices such as IDE hard disks and an IDE CD-ROM reader.

Other storage devices might require the installation of a compatible controller board.

Device Slots

The PowerMate system has four storage device slots:

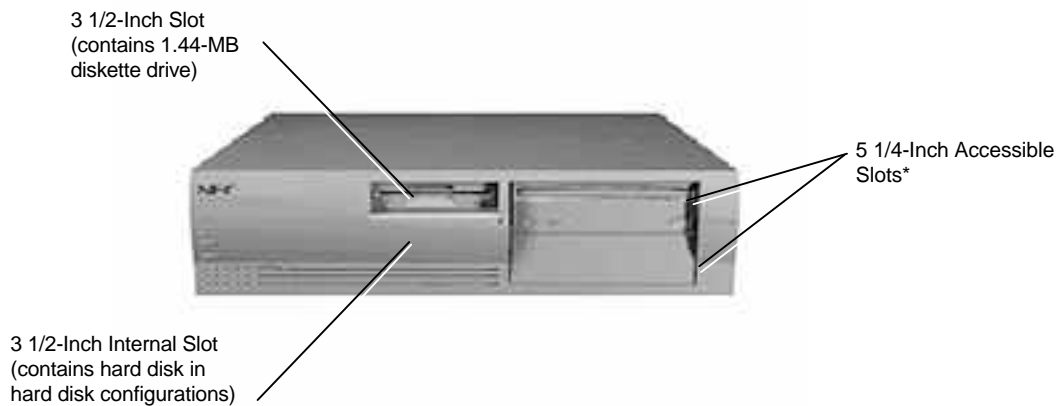
- a 3 1/2-inch accessible device slot which contains the standard 1.44-MB diskette drive
- one 3 1/2-inch internal hard disk drive slots (1-inch high, thin-height)
Hard disk configurations come with an IDE hard disk installed.
- two 5 1/4-inch accessible device slots (1.6-inch high, half-height)

In multimedia models, one accessible device slot contains the standard CD-ROM reader.

Other accessible devices (diskette drive, tape drive, CD-ROM reader) can be installed in the 5 1/4-inch slots.

A hard disk with a 5 1/4-inch form factor can be installed in the 5 1/4-inch slots.

Figure Section 3-13 shows the device slot locations in the system.



* Top 5 1/4-inch slot is available in some configurations.

Figure Section 3-13 Locating 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:

- Diskette drive — remove any termination on the optional diskette drive. See the documentation that comes with the drive.
- 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 disk or IDE CD-ROM reader, must be set correctly as the first (master) or second (slave) device on the IDE channel.

The standard IDE hard disk (in hard disk models) is set as the master device on the primary IDE connector. The CD-ROM reader in multimedia models is the master device on the secondary IDE connector.

Device Cables

The cables used for installation of optional storage devices include:

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

The diskette drive and IDE cables shipped with the system each support two devices. Cable connector locations on the system board are shown in Figure Section 3-15.

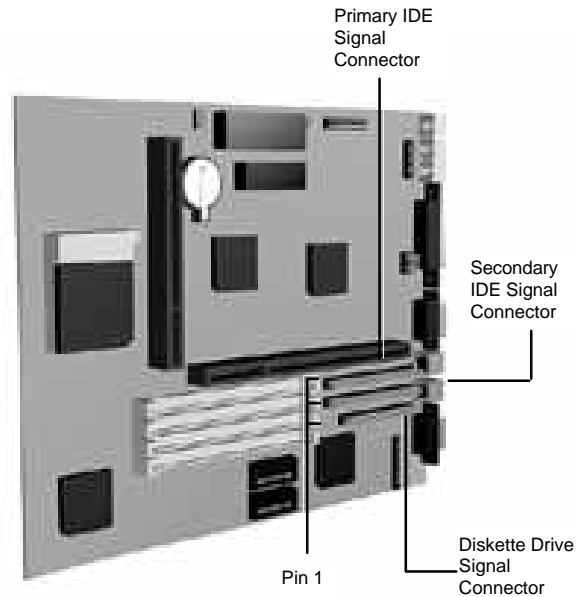


Figure Section 3-15 System Board Cable Connectors

Diskette Drive Signal Cable

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

The installation of a second diskette drive in your system does not require the replacement of the existing diskette drive signal cable. Connect an optional diskette drive to the middle connector on the standard 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.

Figure Section 3-17 shows a three-connector diskette drive signal cable.

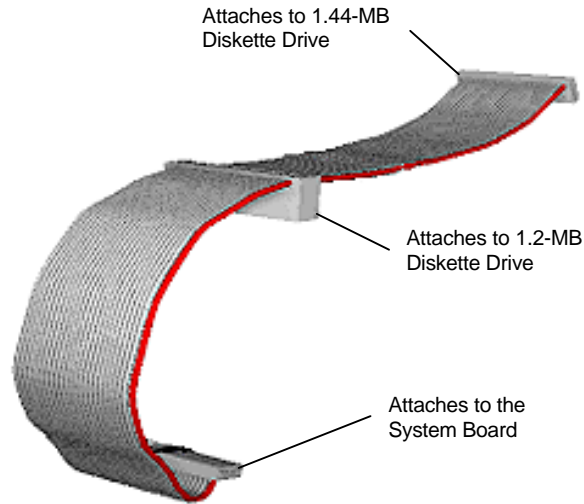


Figure Section 3-17 *Optional Diskette Drive Signal Cable*

IDE Signal Cables

Hard disk systems come with a three-connector IDE interface cable attached to the primary IDE connector. Multimedia systems come with a second IDE cable connected to the CD-ROM reader and to the secondary IDE connector.

Each IDE connector on the system board supports two IDE devices. The addition of an IDE device to an IDE connector does not require the replacement of the existing IDE signal cable.

If installing an optional IDE CD-ROM reader, connect it to the secondary IDE connector. The primary (fast) IDE port should be reserved for hard disks.

Figure Section 3-19 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.

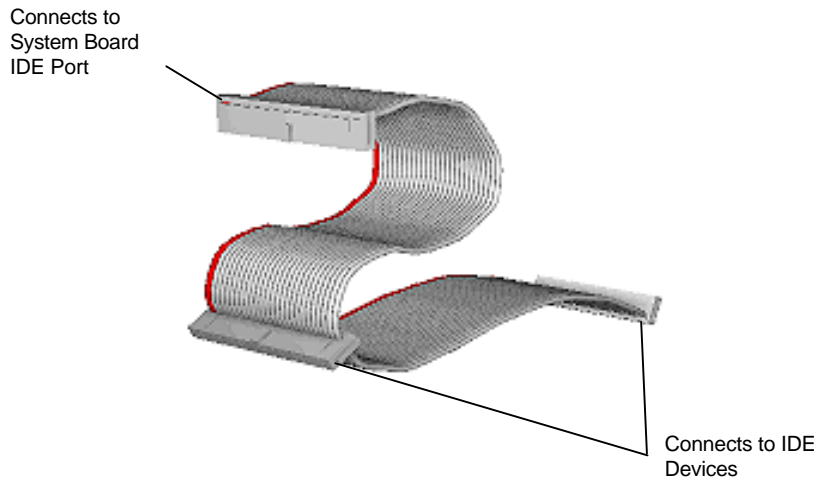


Figure Section 3-19 Optional IDE Cable Connectors

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. Figure Section 3-21 shows the power cable connectors.

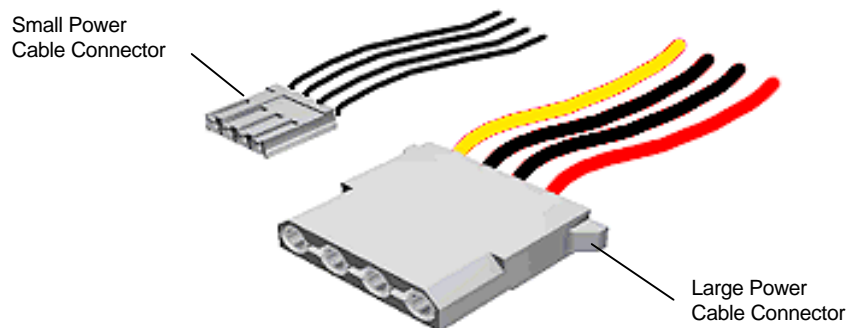


Figure Section 3-21 Power Cable Connectors

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 Figure Section 3-23.
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.

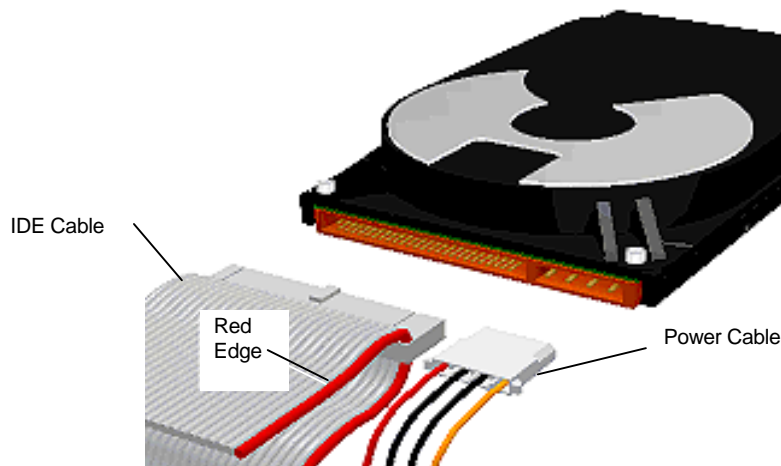


Figure Section 3-23 *Connecting IDE Device Cables*

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

Cabling a Diskette Drive

1. Connect the diskette drive signal cable connector to the signal connector on the diskette drive (see Figure Section 3-25).
 2. Locate an available power connector.
 3. Connect the power cable to the power connector on the device.
-

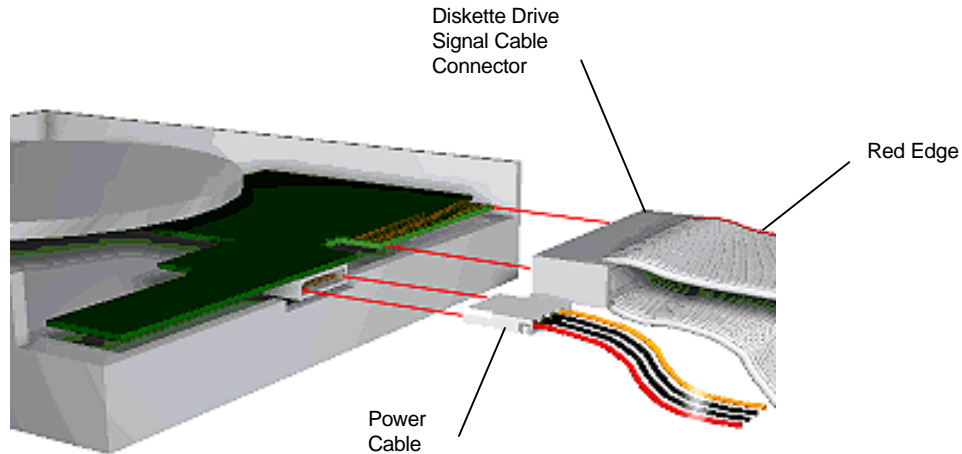


Figure Section 3-25 Connecting 1.2-MB Diskette Drive Cables

Storage Device Installation

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

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

Removing the 3 1/2-Inch Drive Bracket

The 3 1/2-inch drive bracket containing the diskette drive must be removed before installing any 3 1/2-inch and 5 1/4-inch devices. Remove the bracket as follows.

1. Remove the desktop system cover as previously described.
2. Remove the screw securing the drive bracket to the chassis (see Figure Section 3-27).
3. Slide the bracket to the rear of the chassis to release it from the three bracket tabs.
4. Carefully lift the drive bracket up and place it on top of the power supply.

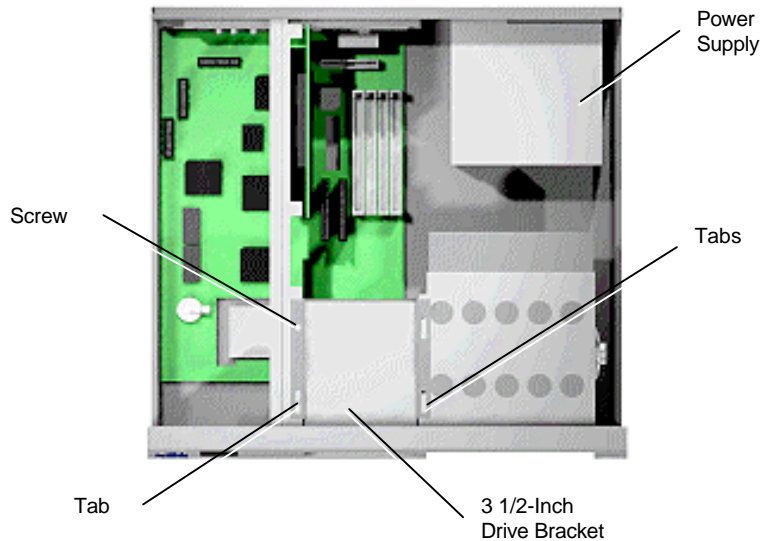


Figure Section 3-27 Removing the 3 1/2-Inch Drive Bracket

Installing the 3 1/2-Inch Drive

Install a hard disk drive into the drive bracket as follows.

- 1.** Remove the system unit cover as previously described.
- 2.** Remove the 3 1/2-inch drive bracket from the system unit (see “Removing the 3 1/2-Inch Drive Bracket”).
- 3.** Follow the preinstallation instructions that come with the device, such as setting jumpers and switches.
- 4.** Insert the hard disk drive so that the connectors extend out of the bracket on the same end as the standard diskette drive connectors.
- 5.** Align the holes in the hard disk drive with the holes in the bracket.
- 6.** Secure the device to the bracket with the four screws, two to a side, that come with the device (see Figure Section 3-29).



Figure Section 3-29 Securing a 3 1/2-Inch Drive

7. Connect the drive cables.
8. Replace the 3 1/2-inch drive bracket (see “Replacing the 3 1/2-Inch Drive Bracket”).

Removing the Front Panel

Remove the front panel only if installing a 5 1/4-inch device. The front panel does not need to be removed if installing a 3 1/2-inch hard disk drive.

If installing a 3 1/2-inch hard disk drive, see “Installing the 3 1/2-Inch Drive.”

1. Remove the system unit cover as previously described.
 2. Remove the front panel by releasing the four tabs from the back of the front panel (see Figure Section 3-31).
-

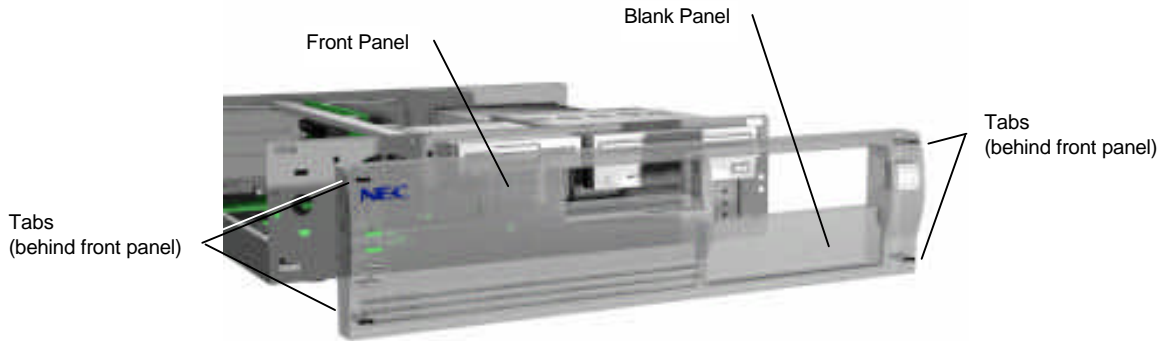


Figure Section 3-31 Removing the Front Panel

3. Identify the slot for the device being installed.
4. Remove the blank panel from the selected slot by pressing the panel tabs from inside the front panel and pushing the blank panel out (see Figure Section 3-33).

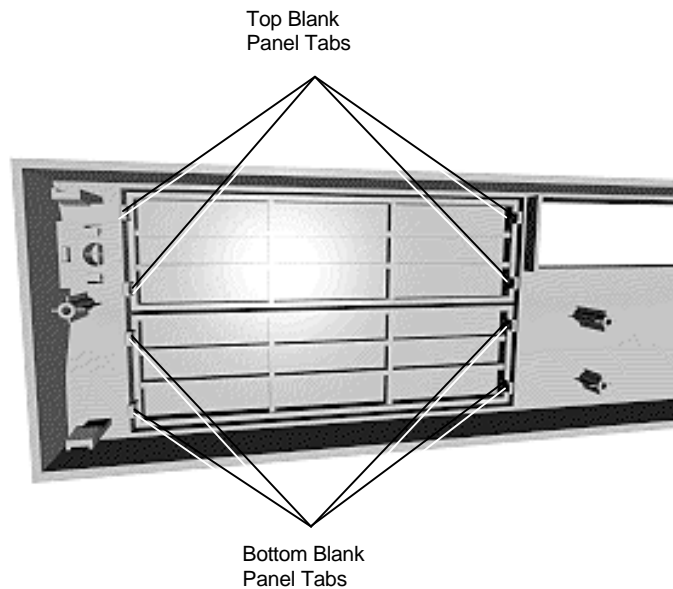


Figure Section 3-33 Locating the Blank Panel Tabs

5. Remove the perforated metal plate from the selected slot on the chassis by pulling the metal plate back and forth until it releases.
-

6. Install the device (see “Installing the 5 1/4-Inch Device”).

Installing the 5 1/4-Inch Device

Install an accessible device into the device cage as follows.

1. Remove the 3 1/2-inch drive bracket from the system unit (see “Removing the 3 1/2-Inch Drive Bracket”).
2. Remove the front panel (see “Removing the Front Panel”).
3. Follow the preinstallation instructions that come with the device, such as setting jumpers and switches.

NOTE: If the device comes with rails, do not attach them. Remove any rails already attached.

4. From the front of the system, insert 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.

5. Connect the device cables.
 6. Align the holes in the device with the holes in the cage.
 7. Secure the device to the cage with the four screws, two to a side, that come with the device (see Figure Section 3-35).
-

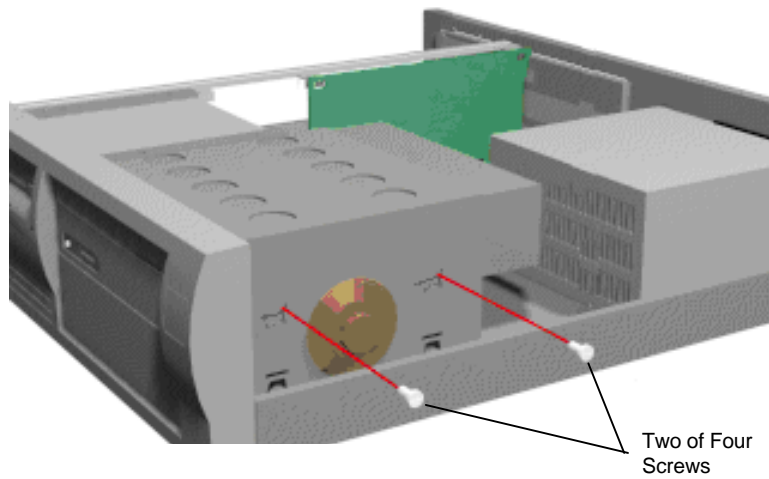


Figure Section 3-35 Securing the Device

8. Replace the drive bracket (see “Replacing the 3 1/2-Inch Drive Bracket”).

Replacing the Front Panel

Replace the front panel as follows.

1. Align the four front panel tabs with the holes in the front of the system unit.
2. Evenly press the front panel into position until the tabs lock the panel in place (see Figure Section 3-37).

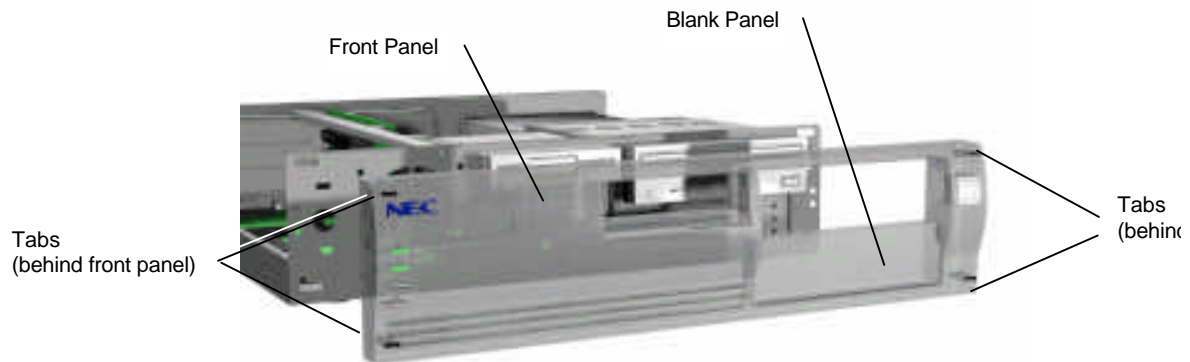


Figure Section 3-37 Aligning the Front Panel

3. Continue to Step 5 in “Replacing the 3 1/2-Inch Drive Bracket.”
-

Replacing the 3 1/2-Inch Drive Bracket

When replacing the 3 1/2-inch drive bracket, take care to prevent pulling and loosening the cable connections.

1. Place the 3 1/2-inch drive bracket in the 3 1/2-inch device slot.
2. Slide the 3 1/2-inch drive bracket toward the front of the chassis so that the tabs secure the bracket.
3. Use the previously removed bracket screw to secure the bracket in place (see Figure Section 3-39).

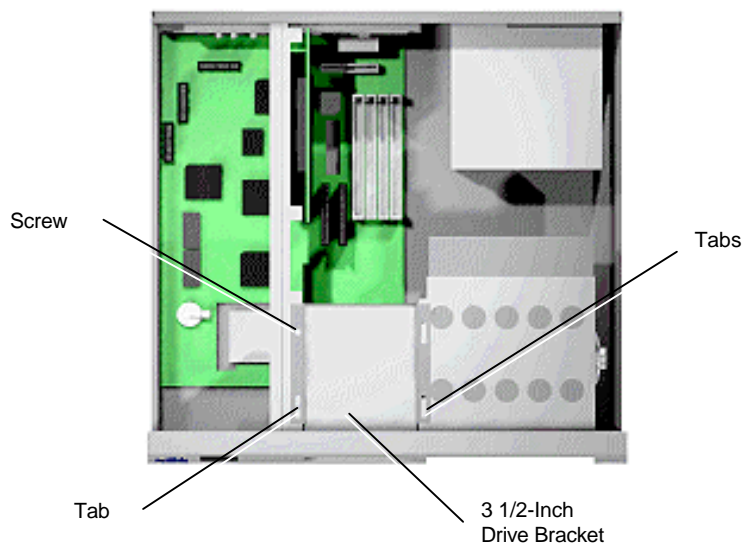


Figure Section 3-39 Securing the 3 1/2-Inch Drive Bracket

4. Replace the front panel (see “Replacing the Front Panel”).
5. Replace the system unit cover.

NOTE: If a 1.2-MB diskette drive was installed, remove the protective cardboard insert from the drive.

6. Run the Setup program to set the new configuration.

ADDING EXTERNAL OPTIONS

This subsection includes installation procedures for a parallel printer and serial devices. Procedures for connecting the microphone and speakers are included in Section 2, Setup and Operation.

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 Figure Section 3-41).
3. Secure the cable with the screws provided.
4. Connect the other end to the printer.



Figure Section 3-41 Connecting a Printer Cable

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 two serial ports on the rear of the computer (see Figure Section 3-43).
3. Secure the cable with the screws provided.
4. Connect the other end to the serial device.



Figure Section 3-43 *Connecting an RS-232C Cable to the Desktop*

Section 4

Maintenance and Troubleshooting

This section provides information on maintaining and troubleshooting the PowerMate Ve Series computers. Also included in this section are NEC service telephone numbers (Table Section 4-1) and procedures for replacing the CMOS battery.

Table Section 4-1 NEC Service and Information Telephone Numbers

Service	Call
To order NEC spare parts, cross-shipments, status on orders, part numbers, contracts, extended warranties and customer service issues (dealers only)	In the U.S., call 1(800) 632-4525
To order NEC spare parts (for customers)	In the U.S., call 1(800) 233-6321 In Canada, call 1(800) 727-2787
To obtain option information, literature, dealer locations, and sales leads	Call 1(800) NEC-INFO
To open a service call or speak to a technician	In the U.S., call 1(800) 632-4565
To log onto the NEC Electronic Bulletin Board System (BBS) for downloading software drivers and the latest BIOS for ROM flashing	Call 1(508) 635-4706 (see BIOS Update Utility in Section 2)
To acquire FastFacts™ about NEC products to your fax machine 24 hours a day. Use this automated service to receive the latest Technical Information Bulletins and more.	In the U.S., call 1(800) 366-0476 Outside the U.S., call 1(708) 238-7800
To inquire about Canadian repairs	Call 1(800) 268-4191

MAINTENANCE

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

The system, keyboard, and monitor require cleaning and checking at least once a year, and more often if operating in a dusty environment. No other scheduled maintenance 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 boot-up. Allow the diskette drive heads to clean for about 30 seconds.

Keyboard Cleaning

When necessary, inspect and clean the inside of the keyboard as follows:

1. Turn the keyboard upside-down.
2. Remove the 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.

3. 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 Figure Section 4-1).
3. Turn the ball cover counterclockwise and remove the cover.

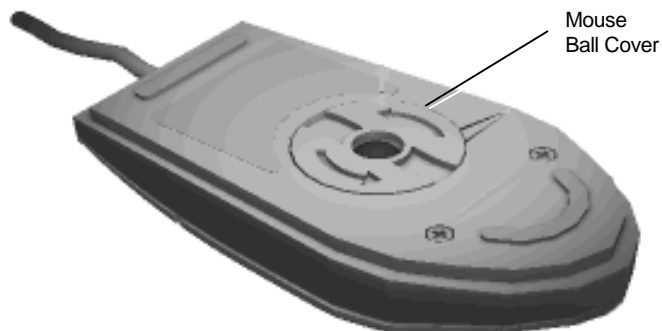


Figure Section 4-1 Removing the Mouse Ball Cover

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 clockwise 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.

If disassembly is required, see Section 5. Connector pin assignments are given in Appendix A. Jumper settings are given in Appendix B.

Diagnosing and Solving Problems

One beep indicates that the system has completed its POST test. If intermittent beeping occurs, power off the system and try again. If the beeping persists, see Table Section 4-2. The table summarizes problems that may develop during system operation and lists (in sequential order) suggested corrective actions.

Table Section 4-2 Problems and Solutions

Problem	Symptom	Solution
No power	Power lamp on computer status panel will not light.	<ol style="list-style-type: none"> 1. Check that the power cord is plugged into the AC connector on the computer. Check that the other end of the cord is plugged into a live properly grounded AC power outlet. 2. Check cable connections between power supply and system board. 3. Systematically eliminate possible shorted PCBs by removing cables and expansion boards. 4. Check the +5 and +12 power supply voltages (see Appendix A, Connector Pin Assignments). Measure voltages with the system board installed. 5. Replace power supply. 6. Replace system board.
Power supply malfunction	<p>Any one or more of the following conditions could 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 keyboard.</p>	<ol style="list-style-type: none"> 1. Perform steps 1 through 4 listed in this table under No Power. 2. Check power supply voltages. Voltages should be measured with a load on them (system board plugged in). See Appendix A for connector pin assignments and Section 1 for the power supply specifications. 3. Replace power supply.

Table Section 4-2 Problems and Solutions

Problem	Symptom	Solution
Operating system does not boot	Intermittent beeping at power-on. Computer beeps more than once and is unable to complete boot-up.	<ol style="list-style-type: none"> 1. Check system configuration and jumper settings (refer to Appendix B). 2. Verify that drives are enabled. 3. Reseat SIMMs and option boards in their connectors. Inspect system board for dropped objects. 4. Remove option boards and reboot. 5. Replace system board.
	“Invalid Configuration” message displayed.	<ol style="list-style-type: none"> 1. Press F1 to run Setup and correct the parameters. 2. Replace the CMOS battery if the date and time must be set each time the computer is powered on.
	Computer halts during loading sequence.	<ol style="list-style-type: none"> 1. Power the computer off. Check for proper jumper settings (see Section 2), then power-on the computer. 2. Check condition of selected bootload device (diskette or hard disk) for bad boot track or incorrect OS files. 3. Try booting OS from diskette or recopy OS files onto hard disk. 4. Verify correct hard disk is selected.
Diskette drive does not work	Lamp on drive panel does not light when diskette is loaded.	<ol style="list-style-type: none"> 1. Check power and signal cable connections between diskette drive, system board, and power supply. 2. Check diskette drive jumpers. 3. Check power supply and replace diskette cable. 4. Replace diskette drive. 5. Replace system board.
Hard disk malfunction	Hard disk drive lamp does not light but hard disk drive can be accessed.	<ol style="list-style-type: none"> 1. Check cable connections between lamp and system board.
	Hard disk controller failure message displayed.	<ol style="list-style-type: none"> 1. Check that the IDE port and hard disk drives are enabled in Setup.

Table Section 4-2 Problems and Solutions

Problem	Symptom	Solution
Hard disk malfunction (cont'd)	Cannot access hard disk.	<ol style="list-style-type: none"> 1. Check signal/power connections between hard disk, PCB, power supply. 2. Check drive jumper settings. 3. Check power supply. 4. Check hard disk cable and hard disk. Replace as necessary. 5. Replace system board (or hard disk controller PCB if the system board controller is not used).
Memory malfunction	Total memory is not recognized.	<ol style="list-style-type: none"> 1. Reseat SIMMs. 2. Systematically swap SIMMs. 3. Check to see if the SIMM configuration is valid (see Section 3). 4. Replace SIMMs. 5. Replace system board.
Sound malfunction	No output sounds.	<ol style="list-style-type: none"> 1. Check interrupts. Refer to Section 1 for interrupt settings. 2. Check DMA channels. Refer to Section 1 for DMA channel settings. 3. Replace system board.
Keyboard or mouse malfunction	Monitor has prompt, but cannot input data.	<ol style="list-style-type: none"> 1. Check that keyboard/mouse is plugged in. 2. Check password (see Section 2). 3. Disable password (see Appendix B). 4. Replace keyboard (or mouse). 5. Replace system board.
Monitor malfunction	Unable to synchronize display.	<ol style="list-style-type: none"> 1. Adjust the monitor's synchronization controls. 2. Check that the driver used matches the capabilities of the video DRAM installed. 3. Check that the monitor's resolution matches the video setting and supported video drivers used (see Section 1). 4. Check that the utility is not selecting a refresh rate/resolution that is not supported by the monitor.

Table Section 4-2 Problems and Solutions

Problem	Symptom	Solution
Monitor malfunction (cont'd)	Wavy display.	<ol style="list-style-type: none"> 1. Check that the computer and monitor are not near motors or electric fields.
	Blank display.	<ol style="list-style-type: none"> 1. Press any key or move mouse to ensure power management has not blanked the display. 2. Check that the monitor cable is attached to the video connector at the rear of the system. 3. Check that the monitor power ON/OFF switch is ON. 4. Check cable connections between the AC power supply and monitor. 5. Adjust brightness and contrast controls on the monitor. 6. Check cable connections between the monitor connector and the system board (or optional video board). 7. Replace monitor. 8. Replace system board.
CD-ROM Malfunction	Disc tray does not open.	<ol style="list-style-type: none"> 1. Check that the system power is on. 2. System power failed. Insert a small object such as a paper clip into the emergency eject hole to open the tray, clockwise to close the tray.
	Cannot access CD-ROM reader.	<ol style="list-style-type: none"> 1. Check signal/power connections between reader, PCB, power supply. 2. Check master/slave settings. 3. Check power supply. 4. Check IDE cable. Replace as necessary. 5. Replace system board.

Table Section 4-2 Problems and Solutions

Problem	Symptom	Solution
CD-ROM Malfunction (cont'd)	No sound from CDs.	<ol style="list-style-type: none">1. Check that speaker power is on and volume is adjusted.2. Check audio software settings.3. Check CD audio cable. Replace as necessary.4. Replace CD-ROM reader.5. Replace system board.
Communication Error	No or bad data when communicating.	<ol style="list-style-type: none">1. Check cable connections between system board and device.2. Check that the interface port is selected.3. Test or replace the device and interface cable (see the device documentation for troubleshooting).4. Replace system board.

CMOS Battery Replacement

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

1. Turn off and unplug the system unit and any external option connected to it.
2. Remove the system unit cover.

3. Locate the battery socket on the system board.

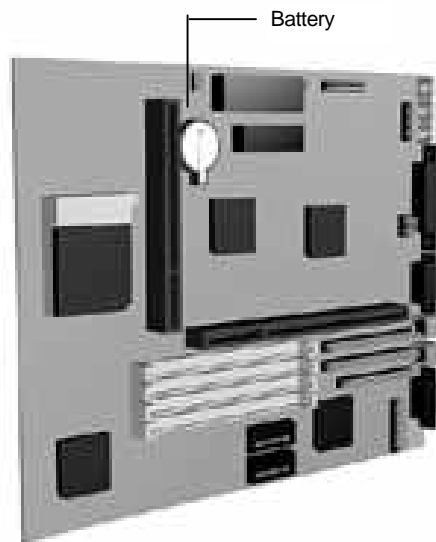


Figure Section 4-2 Battery Socket Location

4. Carefully lift the battery from the socket tabs and out of the socket.

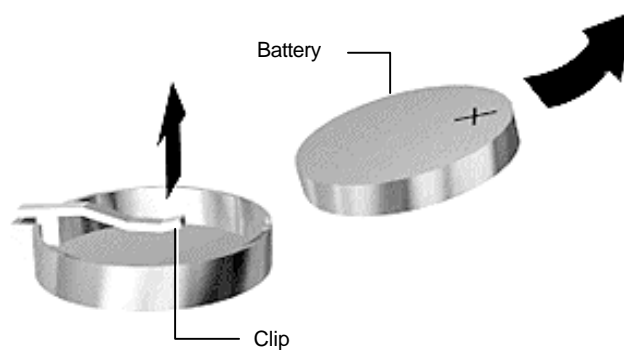


Figure Section 4-3 Battery Removal

5. With the positive (+) side facing up, press the new battery into the socket.
 6. Replace the system unit cover.
 7. Connect external peripherals and power cables.
 8. Run Setup to reconfigure your system parameters.
-

Section 5

System Unit Repair

DISASSEMBLY AND REASSEMBLY

This section contains step-by-step disassembly procedures. The hard disk drive, and 3 1/2-inch diskette drive are installed and included in these disassembly procedures. Reassembly is the reverse of disassembly. Each procedure is supported by a simplified disassembly illustration to facilitate removal. The detailed exploded-view diagram and parts lists are shown later in this section.

A Phillips-head screwdriver is the only required tool. For complete disassembly of the system unit, follow the disassembly order listed in Table Section 5-1. To reassemble, follow the table in reverse order.

Individual removal 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 removal procedure. To reassemble, follow the procedure in reverse order.

Table Section 5-1 PowerMate Ve Disassembly Sequence

Sequence	Part	See Page
1	System unit cover	5-2
2	Expansion board(s)	5-3
3	PCI/ISA backboard	5-5
4	3 1/2-inch diskette and hard disk drives	5-5
5	Front panel assembly	5-7
6	Blank panel	5-8
7	Speaker assembly	5-8
8	SIMM memory	5-9
9	5 1/4-inch devices	5-10
10	Power supply	5-11
11	System board	5-13

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.
- All screws are Phillips-head, 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 test (see in Section 2, Setup and Operation). If a fault occurs, verify that the reassembly was performed correctly.

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

System Unit Cover Removal

Remove the system unit cover as follows.

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.

1. Power off and unplug the keyboard, mouse, power and all other peripheral cables attached to the system unit.
-

2. Remove the two cover screws shown in Figure Section 5-1.

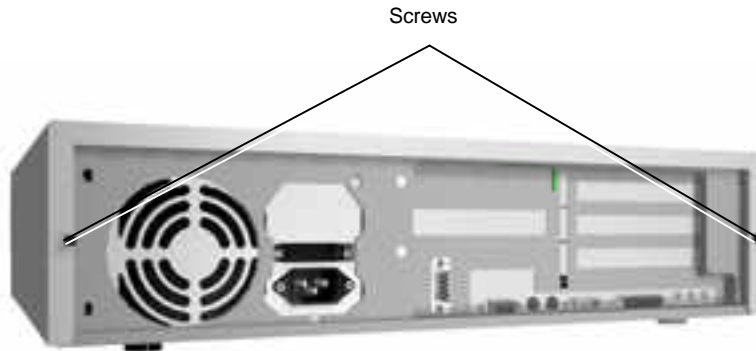


Figure Section 5-1 System Unit Cover Screws

3. Slide the system unit cover toward the front about one inch.
4. Lift the system unit cover up and off (see Figure Section 5-2).



Figure Section 5-2 Removing the System Unit Cover

Expansion Board Removal

Remove any installed expansion board(s) using Figure Section 5-4 through Figure Section 5-6 and the following steps.

1. Remove the system unit cover as previously described.
 2. Disconnect any cables leading from the expansion board(s).
 3. Remove the screw from the expansion slot bracket (see Figure Section 5-4).
-

To remove a board on the inside of the PCI/ISA backboard, remove the two slot cover support screws shown in Figure Section 5-6. The slot cover support secures the expansion board in place.

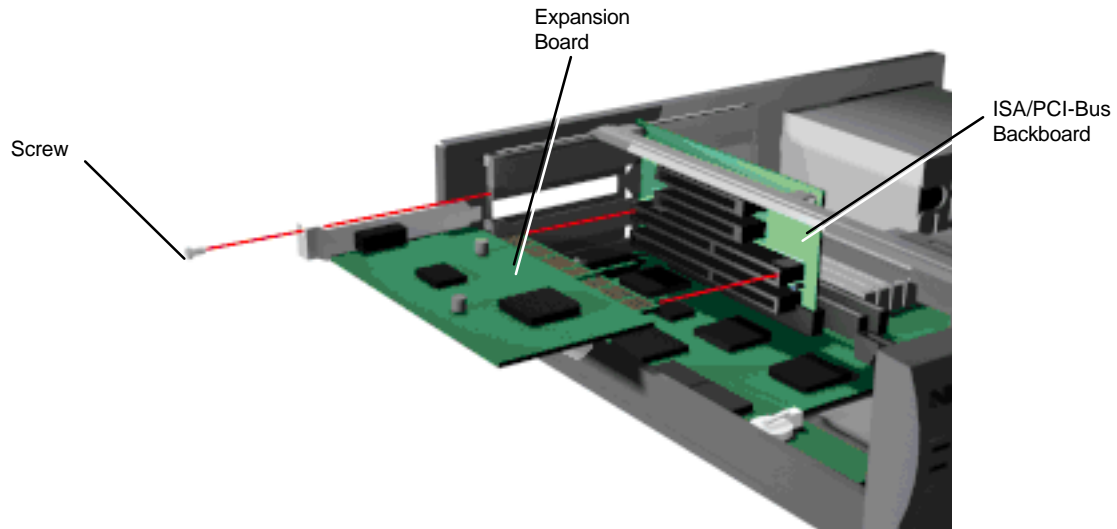


Figure Section 5-4 Expansion Slot Screw

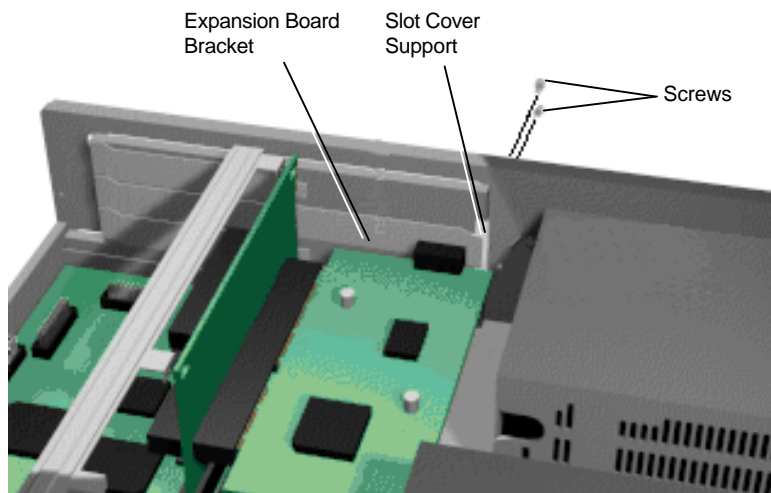


Figure Section 5-6 Inside Expansion Slot Screw

4. Remove the board from the expansion slot connector and out of the system unit.
-

PCI/ISA Backboard Removal

Remove the PCI/ISA backboard from the system unit as follows.

1. Remove the system unit cover and all expansion slot boards as previously described.
2. Remove the two screws that secure the backboard to the support bracket (see Figure Section 5-8).
3. Pull the backboard out from its connector on the system board and remove it from the system. Be careful not to overflex the system board when you remove the backboard.

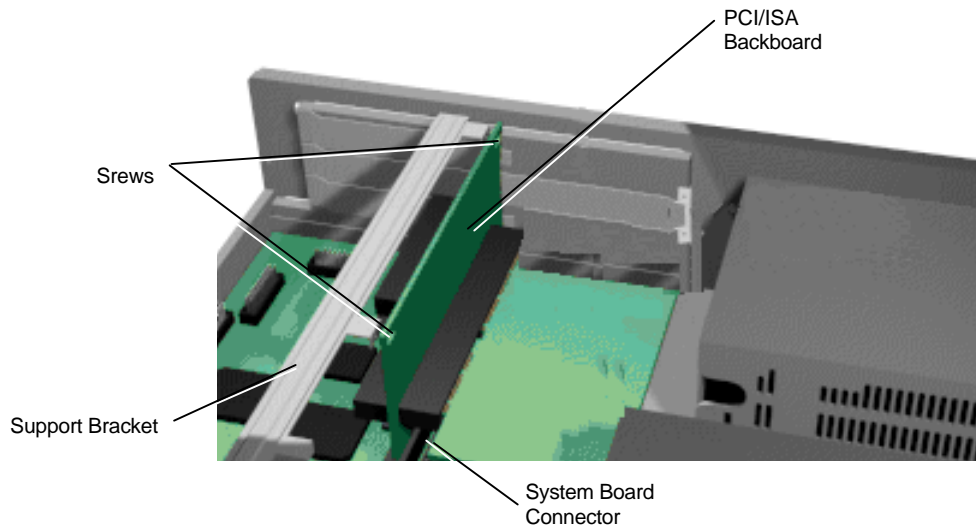


Figure Section 5-8 PCI/ISA Backboard Screws

3 1/2-inch Diskette and Hard Disk Drive Removal

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

1. Remove the system unit cover as previously described.
2. Unplug the diskette drive power cable and signal cable from the diskette drive.
3. Unplug the hard disk drive power cable and signal cable from the hard disk drive.

NOTE: When reinstalling the drives, note that all power cables are keyed to fit only in the correct position.

4. Remove the 3 1/2-inch drive bracket screw (see Figure Section 5-10).

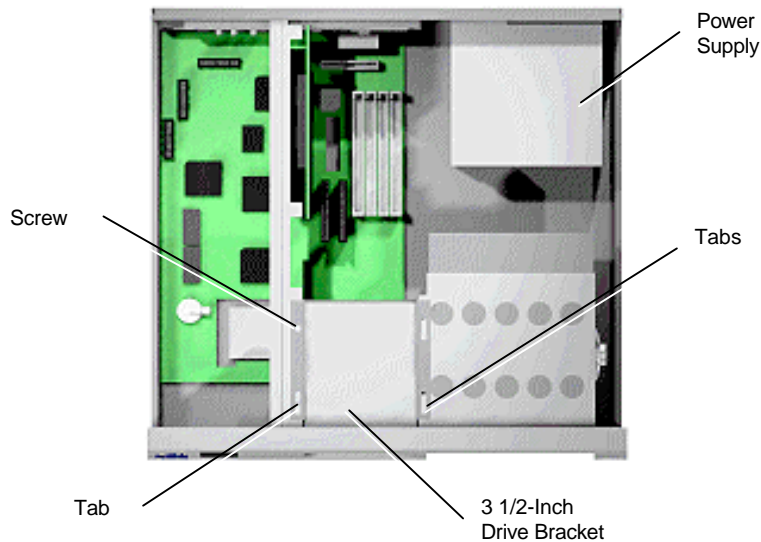


Figure Section 5-10 3 1/2-Inch Drive Bracket

5. Remove the four 3 1/2-inch diskette drive screws; two on each side of the drive bracket (see Figure Section 5-12).

Remove the two 3 1/2-inch hard disk drive screws; two on each side of the drive bracket (see Figure Section 5-12).

6. Pull the drives out from the front of the bracket.

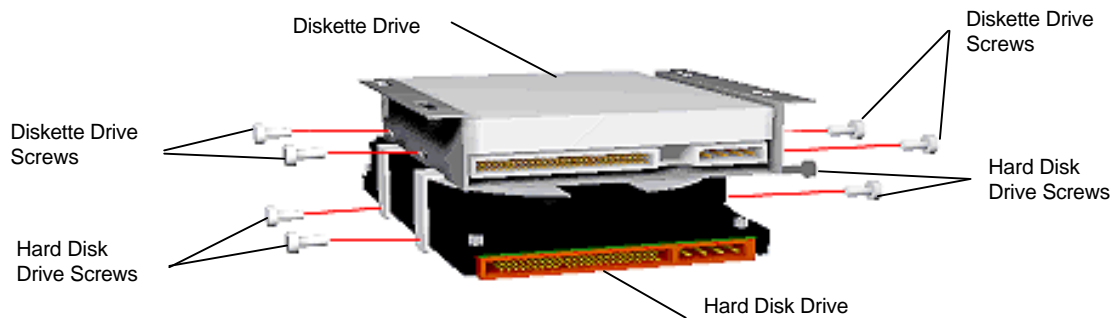


Figure Section 5-12 3 1/2-Inch Diskette and Hard Disk Drive Screws

Front Panel Assembly Removal

Remove the front panel assembly from the system unit as follows.

1. Remove the system unit cover and 3 1/2-inch drive bracket as previously described.
2. Unplug the following cables from their connectors (see Figure Section 5-14).
 - Power lamp (connector J6)
 - Hard disk drive busy lamp (connector J30)
 - Reset button (connector J25)
3. Remove the five front panel screws (see Figure Section 5-14).
4. Feed the two lamp and reset cables through the hole in the front of system unit chassis when removing the front panel assembly.
5. Remove the front panel by releasing the four tabs from the back of the front panel.

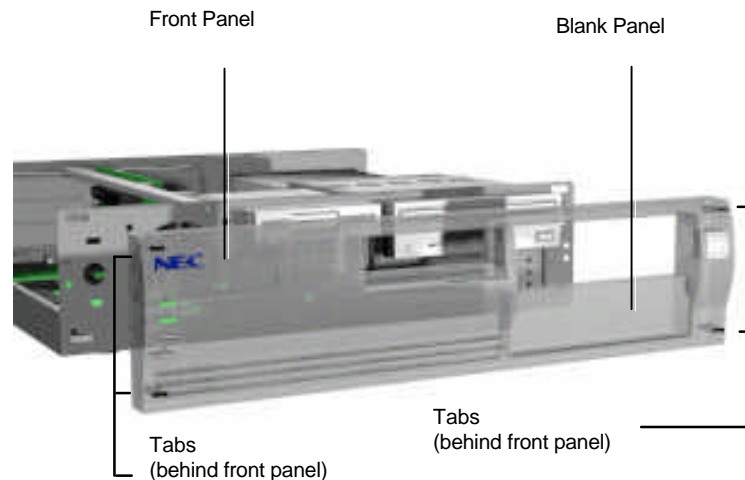


Figure Section 5-14 Indicator Panel Connectors

6. Separate the lamps and reset button from the front panel assembly by pulling them out from their socket in the panel assembly.

Blank Panel Removal

Remove the blank panels from the front panel as follows.

1. Remove the system unit cover and front panel as previously described.
2. Remove the blank panel from the selected slot by pressing the panel tabs from inside the front panel and pushing the blank panel out (see Figure Section 5-16).

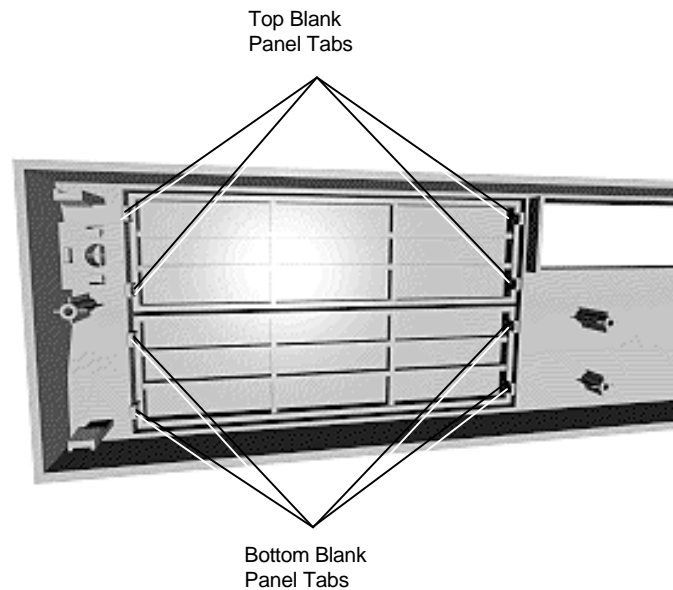


Figure Section 5-16 *Blank Panel Tabs*

Speaker Assembly Removal

Remove the speaker from the device cage as follows.

1. Remove the system unit cover as previously described.
2. Unplug the speaker from its connector on the system board (see Appendix A for connector assignments).

3. Slide the speaker out from the tabs on the device cage (see Figure Section 5-18).

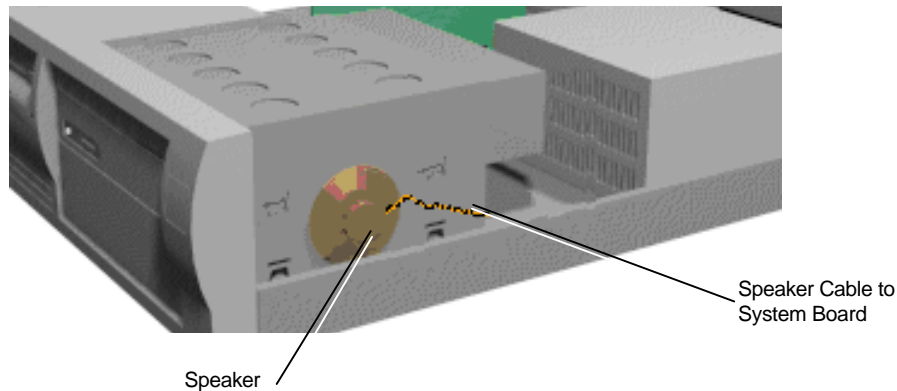


Figure Section 5-18 Internal Speaker

SIMM Removal

Remove SIMM sticks from the system board as follows.

1. Remove the system unit cover, and any full size expansion boards as previously described.
2. Spread apart the two clips at each end of the SIMM stick (the clips are part of the system board's connectors). Tilt the SIMM stick forward, allowing the post to slide out of the hole in the SIMM stick.
3. Remove the SIMM stick from the system board. Repeat step 2 for each SIMM to be removed.

NOTE: If more information is needed, see the installation instructions in Section 3, Options.

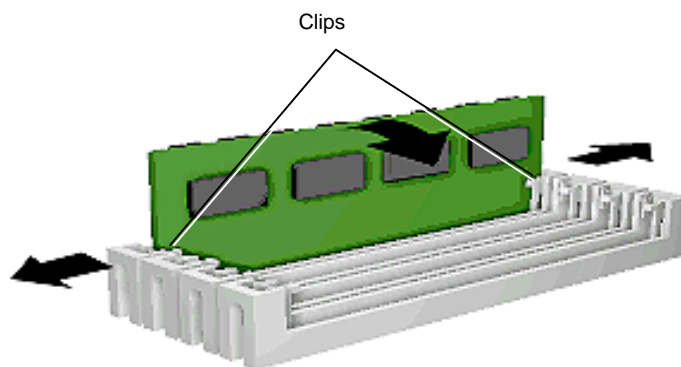


Figure Section 5-20 SIMM Socket

5 1/4-Inch Device Removal

Remove an 5 1/4-inch device from the 5 1/4-inch device cage per Figure Section 5-21, and the following steps.

1. Remove the system unit cover, front panel, and 3 1/2-inch drive bracket as previously described.
2. Unplug all signal and power cables from the device(s) in the 5 1/4-inch device cage (see Figure Section 5-21).
3. Remove the four device screws; two from each side of the 5 1/4-inch device cage (see Figure Section 5-21).
4. Remove the device out of the 5 1/4-inch device cage from the front of the system unit.

NOTE: When reinstalling the 5 1/4-inch device, note that all power cables are keyed to fit only in the correct position.

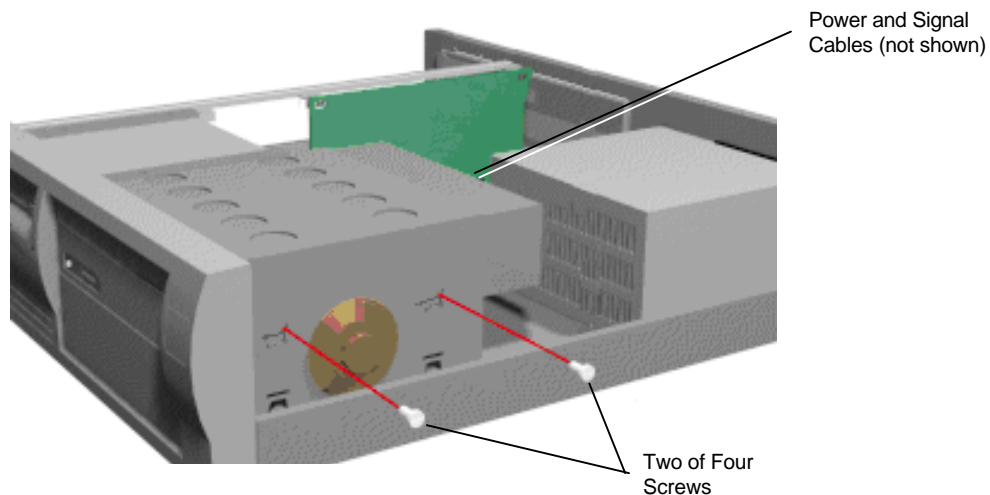


Figure Section 5-21 5 1/4-Inch Device Screws

Power Supply Removal

Remove the power supply from the system unit as follows.

1. Remove the system unit cover and front panel as previously described.
2. Unplug the two power cables attached to the system board's connectors.
3. Unplug the power cables from all installed devices.
4. Remove the two screws securing the power button to the front of the system unit (see Figure Section 5-23).

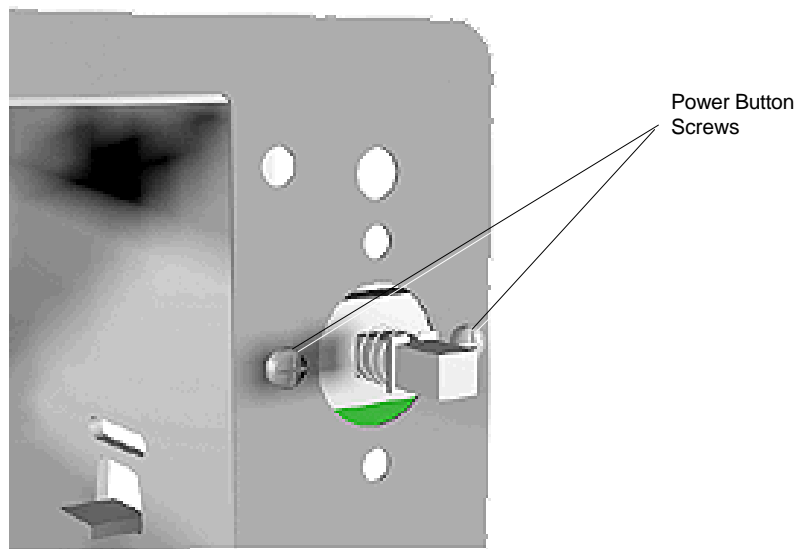


Figure Section 5-23 Power Button Screws

5. Remove the four screws holding the power supply to the system unit (see Figure Section 5-25).
-

6. Slide the power supply toward the system board to release the two tabs at the front, then lift it out of the system unit.

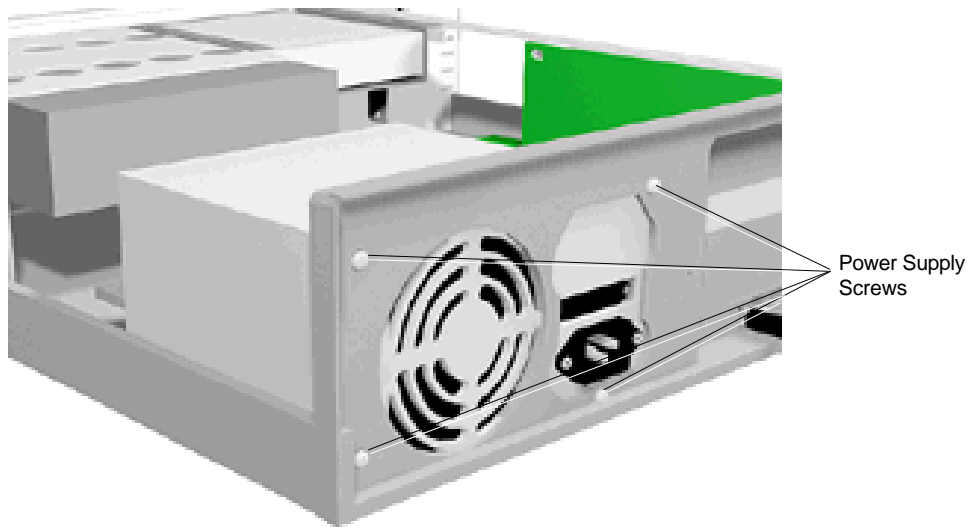


Figure Section 5-25 Power Supply Screws

System Board Removal

Remove the system board per Figure Section 5-27 and the following steps.

1. Remove the following components as previously described.
 - system unit cover
 - expansion slot boards
 - PCI/ISA backboard
 - 3 1/2-inch drive bracket
 - SIMMs installed on the system board

NOTE: Remove the optional video DRAM chips if installed, see Section 3, Options.

2. Remove and label all cables connected to the system board Figure Section 5-27 provides the general locations of the connectors for the system board. Appendix A provides the pin assignments for each connector.
3. Remove the seven screws that hold the system board to the system unit chassis (see Figure Section 5-27). Remove the system board out the side of the system unit.

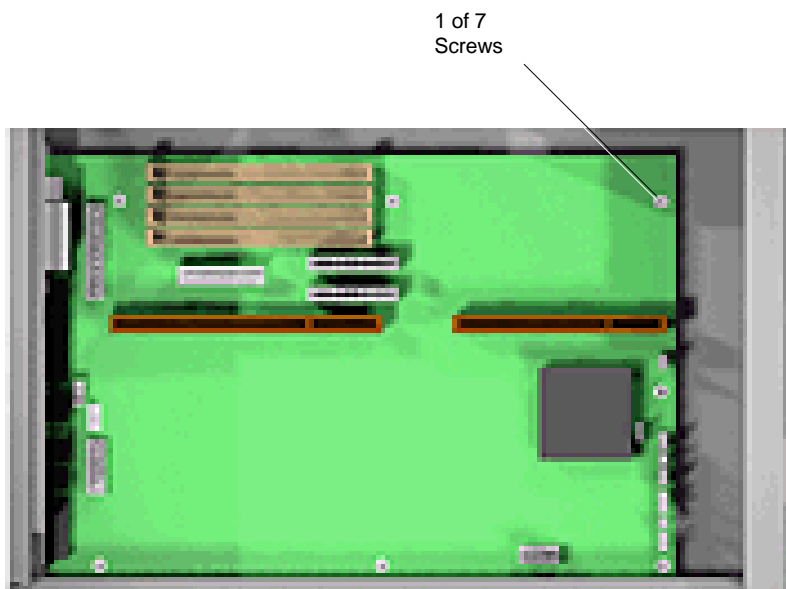


Figure Section 5-27 System Board Connectors and Screws



Illustrated Parts Breakdown

This subsection contains the illustrated parts breakdown (IPB) and NEC part numbers for the PowerMate Ve computer. Table Section 5-2 lists the field-replaceable parts for the computer. Figure Section 5-16 is the illustrated parts breakdown.

NOTE: Dealers in the U.S., should call 1(800) 632-4525 to order NEC spare parts. All other user's in the U.S. must call 1(800) 233-6321 for parts. To order options in the U.S., call the NEC sales office at 1(800) NEC-INFO.

Table Section 5-2 PowerMate Ve Field-Replaceable Parts List*

Item	Description	Part Number
1	Mouse, PS/2	158-050789-000
2A	3 1/2-Inch 635 MB Hard Drive	158-050395-365
2B	3 1/2-Inch 1.2 GB Hard Drive	158-050395-366
3	3 1/2-Inch 1.44 MB Diskette Drive	158-050966-000
4	3 1/2-Inch Drive Bracket	158-030807-000
5	3 1/2-Inch Diskette Drive Signal Cable (3 connector)	158-050503-002
6	3 1/2-Inch Hard Drive IDE Signal Cable (3 connector)	158-050562-008
7	CD-ROM Reader IDE Signal Cable (2 connector)	158-050562-004
8	Ethernet Network Interface Card (network-ready systems only)	158-050796-000
9	PCI/ISA Backboard	158-026204-000A
10	System Unit Cover	158-050883-002
11A	4 MB, 1x32 EDO SIMMs (2)	158-082629-060
11B	8 MB, 2x32 EDO SIMMs (2)	158-082630-060
12	5 Watt External Speakers with Cables	158-050990-000
13	Power Supply	158-050730-000
14	CPU Heatsink (with clip)	158-060324-001
15A	Pentium 75 MHz Processor	158-082502-006

* This data was prepared May 1996. For an up-to-date listing of spare parts, please call FastFacts (800) 366-0476 and order document number 42181406.

Table Section 5-2 PowerMate Ve Field-Replaceable Parts List*

Item	Description	Part Number
15B	Pentium 100 MHz Processor	158-082502-008
16	Audio Cable (for CD-ROM)	158-050824-000
17A	System Board, Multimedia (with audio)	158-050978-000A
17B	System Board, Non-Multimedia (without audio)	158-050978-001A
18	CMOS 3 Volt Lithium Coin Battery	158-060367-000
19	Speaker Assembly (internal)	158-050685-003
20	Quad-Speed CD-ROM Reader	CDR-273BR
21	5 1/4-Inch Blank Plastic Panel	158-050685-029
22A	PowerMate V75e Logo	158-030872-009
22B	PowerMate V100e Logo	158-030872-010
23	Front Bezel without IR	158-050992-000
24	Fan Assembly	158-050865-006
25	Card Edge Guide	158-050883-005
26	Microphone	158-050878-000
27	Keyboard, Chicony	158-050939-000
28	Power Cord	808-857649-101A
29	Second Serial Interface & Cable Assembly	158-050454-004

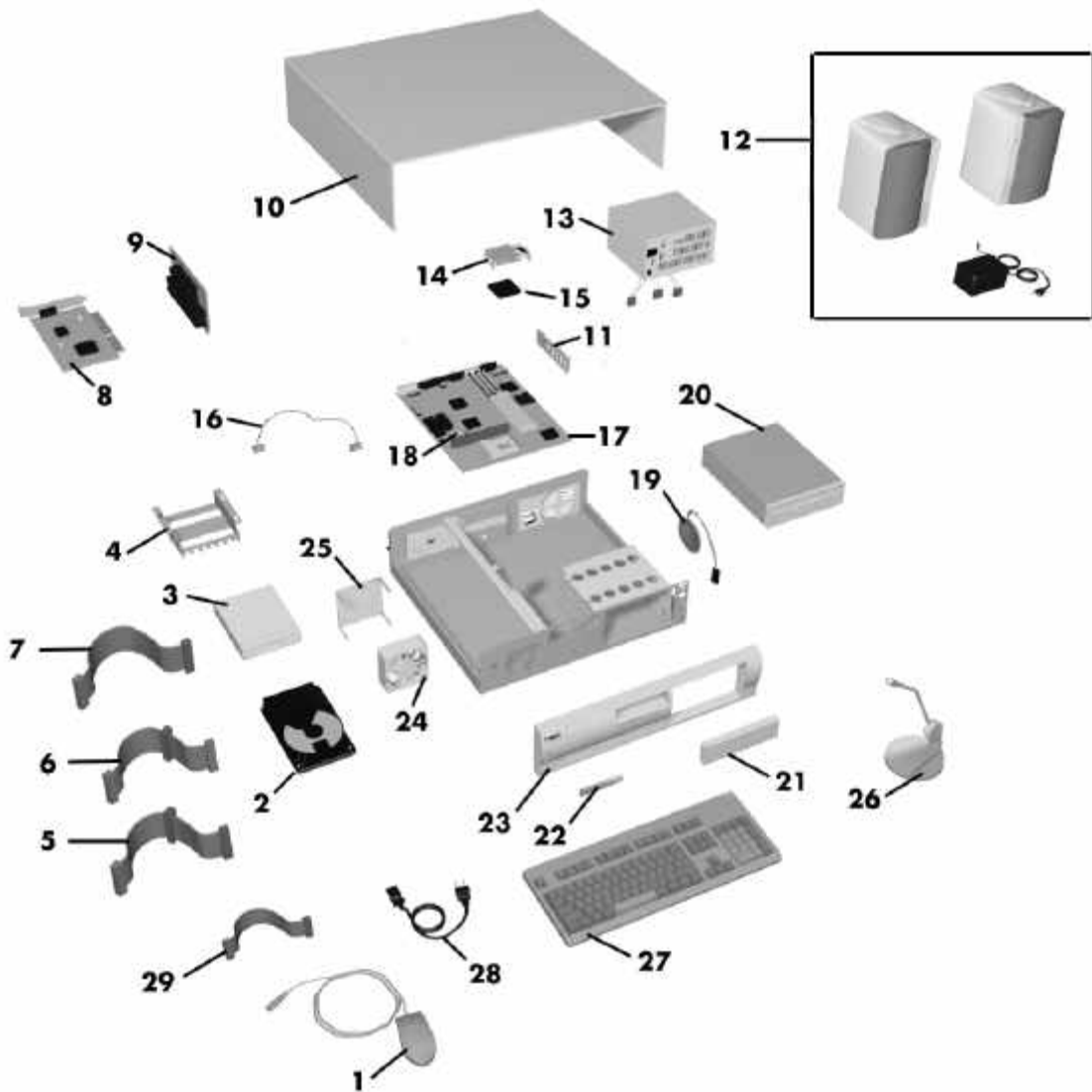


Figure Section 5-16 PowerMate Ve Illustrated Parts Breakdown*

* This data was revised May 1996. For an up-to-date listing of spare parts, please call FastFacts (800) 366-0476 and order document number 42181406.

Table Section 5-3 lists the PowerMate Ve replacement parts and Table Section 5-4 lists the PowerMate Ve options.

Table Section 5-3 PowerMate Ve Optional Replacement Part*

Item	Description	Part Number
1	256 KB 15 ns L2 Synchronous Cache	158-082737-015
2	Feature Connector Cable	158-050559-005

Table Section 5-4 lists PowerMate Ve documentation and packaging.

Table Section 5-4 PowerMate Ve Documentation and Packaging*

Description	Part Number
<i>PowerMate Ve Series System User's Guide</i>	819-181404-000
<i>PowerMate Ve Series Quick Setup/Roadmap</i>	819-181403-000
<i>PowerMate Ve Series Service and Reference Manual</i>	819-181406-000
<i>Network Board User's Guide</i>	819-181173-001
PowerMate Ve Shipping Carton (non-multimedia)	158-040442-008
PowerMate Ve Shipping Carton (multimedia)	158-040490-003
Shipping Carton Corner Inserts (4)	158-040395-004

* This data was prepared May 1996. For an up-to-date listing of spare parts, please call FastFacts (800) 366-0476 and order document number 42181406.

Appendix A

Connector Pin Assignments

This appendix describes the system board connector pin assignments. Figure Appendix A-1 shows the locations of the system board connectors. Table A-1 identifies the connector function with the connector number. Descriptions of the connectors are provided in the following subsections.

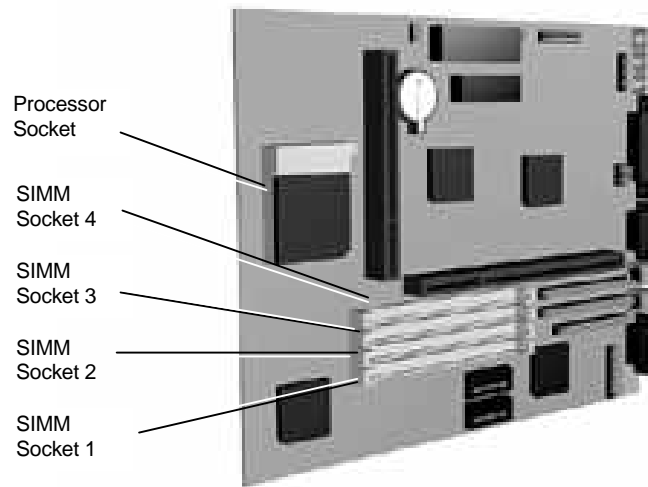


Figure Appendix A-1 System Board Layout

Table Appendix A-1 System Board Connectors

Function	Connector Number	Type
VGA Monitor	J3	15 pin female sub D-shell
Microphone In	J19	1/8-Inch banana connector
Speaker In	PJ2	1/8-Inch banana connector
Line In	J17	1/8-Inch banana connector
Line Out	J26	1/8-Inch banana connector
Parallel Interface	J16	25 pin female sub D-shell
Serial Interface COM1/COM2	J9, J10	9 pin D-shell
Mouse	J8	6-pin PS/2 style connector
Keyboard	J4	6-pin PS/2 style connector
Diskette Drive	J5	2 x 17 pin header
Power Supply	J1	1 x 12 pin locking header
SIMM Memory Sockets	SIMM 1, 2, 3, 4	72 pin single inline connector
PCI/IDE Interface (primary)	J7	2 x 20 pin header
IDE Interface (secondary)	J6	2 x 20 pin header
Secondary Cache Module		160-pin single inline connector
Fan	J35	1 x 3 pin header
Infrared (IRDA)	J13	1 x 4 pin header
Suspend Button		1 x 2 pin header
Hard disk LED	J30	1 x 4 pin header
Power LED	J6	1 x 5 pin header
Reset Button	J25	1 x 4 pin header
Speaker	J23	1 x 4 pin header
ISA/PCI-Bus Backboard	SLOT1	98-pin header
Video Feature	J2	2x13 pin header

SERIAL INTERFACE CONNECTORS

Serial interface signals are output from the system board through two 9-pin COM port connectors. The 9-pin, D-subconnectors are located at the rear of the system unit. Pin locations and pin assignments for the serial interface connectors are shown in Table Appendix A-2 and Figure Appendix A-2.

Figure Appendix A-2 Serial Interface

Table Appendix A-2 RS-232C Serial Port Connector Pin Assignments

Pin	Signal
1	Carrier detect
2	Receive data
3	Transmit data
4	Data terminal ready
5	Signal ground
6	Data set ready
7	Request to send
8	Clear to send
9	Ring indicator

PARALLEL INTERFACE CONNECTOR

The system has a 25-pin parallel port on the system board. Parallel interface specifications for this port conform to the IBM-PC interface. Pin locations and pin assignments for the parallel interface connector are shown in Table Appendix A-4 and Figure Appendix A-4.

Figure Appendix A-4 Parallel Interface Connector

Table Appendix A-4 Parallel Printer Port Connector Pin Assignments

Pin	Signal
1	Strobe
2	Data bit 0
3	Data bit 1
4	Data bit 2
5	Data bit 3
6	Data bit 4
7	Data bit 5
8	Data bit 6
9	Data bit 7
10	Acknowledge
11	Busy
12	PE
13	Select
14	Auto feed XT
15	Error
16	Initialize
17	Select in
18	
through	Ground
25	

VGA INTERFACE CONNECTOR PIN ASSIGNMENTS

Video signals are output from the system board through a VGA interface connector, which is a 15-pin, D-subconnector (VESA VS890803-2) located at the rear of the system unit.

Table Appendix A-6 and Figure Appendix A-6 shows the connector pin locations and pin assignments.

Figure Appendix A-6 VGA Interface Connector

Table Appendix A-6 VGA Interface Connector Pin Assignments

Pin	Signal
1	Red
2	Green
3	Blue
4	Monitor ID bit 2 (not used)
5	Ground
6	Red return (ground)
7	Green return (ground)
8	Blue return (ground)
9	Key (no pin)
10	Sync return (ground)
11	Monitor ID bit 0 (not used)
12	Monitor ID bit 1 (not used)
13	Horizontal sync
14	Vertical sync
15	Not used

SPEAKER CONNECTOR PIN ASSIGNMENTS

Speaker connector pin locations and pin assignments are shown in Table Appendix A-8.

Table Appendix A-8 Speaker Connector Pin Assignments

Pin	Signal
1	Speaker data out
2	Key
3	NC
4	+5 Volts

POWER SUPPLY CONNECTOR

Voltages from the power supply are input to the system board through the power supply connector. Figure Appendix A-8 shows the connector pin locations and pin assignments.

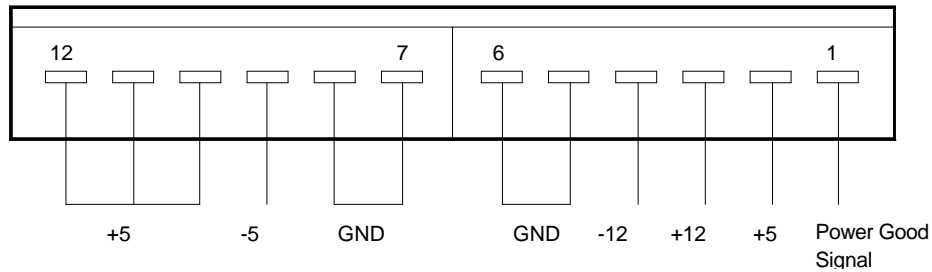


Figure Appendix A-8 Power Supply Connector Pin Assignments

KEYBOARD AND MOUSE CONNECTORS

The keyboard and mouse use standard PS/2 connectors. Pin assignments are given in Table Appendix A-10.

Table Appendix A-10 Keyboard and Mouse Connector Pin Assignments

Pin	Keyboard Connector	Mouse Connector
1	Keyboard Data	Mouse Data
2	N/C	N/C
3	GND	GND
4	+5V, (fused)	+5V, (fused)
5	Keyboard Clk	Mouse Clk
6	N/C	N/C

SUSPEND BUTTON CONNECTOR

The suspend button connector pin assignments are given in Table A-7.

Table Appendix A-7 Suspend Connector Pin Assignments

Pin	Signal
1	+5V
2	Power control

FAN CONNECTOR

Fan connector pin assignments are given in Table A-8.. The connector plugs into one of the power supply cable connectors.

Table A-8 Fan Connector Pin Assignments

Pin	Signal
1	Ground
2	+12V (fused)
3	Ground

DISKETTE DRIVE INTERFACE PIN ASSIGNMENTS

Table A-9 provides the pin assignments for the diskette drive interface.

A-9 Diskette Drive Connector Pin Assignments

Ground Pin	Signal Pin	I/O	Signal Name
1	2	O	FDHDIN
3	4		Not used
5*	6		FDEDIN
7	8		INDEX
9	10		MOTEN1
11	12	O	DS2
13	14	O	DS1
15	16	O	MOTEN2
17	18	O	DIR
19	20	O	STEP
21	22	O	WRT DATA
23	24	O	WRT EN GATE
25	26	I	TRK0
27	28	I	WRT PROT
29	30	I	READ DATA
31	32	O	HS SEL
33	34	I	DSKT CHG

*Pin 5 is reserved for connector polarization.

IDE INTERFACE CONNECTORS

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 V and 0.70 V.

The two system board IDE connectors are physically identical. Electrically the primary IDE/PCI bus IDE connector is faster and the secondary IDE/PCI connector is slower. Table A-10 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.

Table Appendix A-10 IDE/PCI Connector Pin Assignments

Pin	Signal	Pin	Signal
01	HOST RESET	02	GND
03	+HOST DATA 7	04	+HOST DATA 8
05	+HOST DATA 6	06	+HOST DATA 9
07	+HOST DATA 5	08	+HOST DATA 10
09	+HOST DATA 4	10	+HOST DATA 11
11	+HOST DATA 3	12	+HOST DATA 12
13	+HOST DATA 2	14	+HOST DATA 13
15	+HOST DATA 1	16	+HOST DATA 14
17	+HOST DATA 0	18	+HOST DATA 15
19	GND	20	KEY
21	DRQ3	22	GND
23	HOST IOW	24	GND
25	HOST IOR	26	GND
27	IOCHRDY	28	+HOST ALE
29	DACK3	30	GND
31*	+HOST IRQ14	32	HOST IO16
33	+HOST ADDR 1	34	GND
35	+HOST ADDR 0	36	+HOST ADDR 2
37	HOST CS0	38	HOST CS1
39	HOST SLV/ACT	40	GND

*The Primary IDE/PCI connector uses IRQ15

SIMM SOCKETS

Table A-11 provides the SIMM socket pin assignments.

Table Appendix A-11 SIMM Socket Pin Assignments

Pin	Signal	Pin	Signal	Pin	Signal
1	GND	25	D22	49	D8
2	D0	26	D7	50	D24
3	D16	27	D23	51	D9
4	D1	28	A7	52	D25
5	D17	29	N/C	53	D10
6	D2	30	+5V	54	D26
7	D18	31	A8	55	D11
8	D3	32	A9	56	D27
9	D19	33	N/C	57	D12
10	+5V	34	RAS2	58	D28
11	N/C	35	MP2	59	+5V
12	A0	36	MP0	60	D29
13	A1	37	MP1	61	D13
14	A2	38	MP3	62	D30
15	A3	39	GND	63	D14
16	A4	40	CAS0*	64	D31
17	A5	41	CAS2*	65	D15
18	A6	42	CAS3*	66	N/C
19	N/C	43	CAS1*	67	PD0 (N/C)
20	D4	44	RAS0	68	PD1 (N/C)
21	D20	45	N/C	69	PD2 N/C
22	D5	46	N/C	70	PD3 N/C
23	D21	47	WE	71	N/C
24	D6	48	N/C	72	GND

ISA/PCI-BUS BACKBOARD CONNECTOR PIN ASSIGNMENTS

Table A-12 provides the pin assignments for the ISA/PCI-bus backboard connector on the system board.

Table A-12 ISA/PCI-Bus Backboard Connector Pin Assignments

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	IOCHCK	B1	GND	E1	GND	F1	GND
A2	SD07	B2	RSET DRV	E2	GND	F2	GND
A3	SD06	B3	+5V	E3	PCIINT1	F3	PCIINT3
A4	SD05	B4	IRO09	E4	PCIINT2	F4	PCIINT4
A5	SD04	B5	5V	E5	+5V	F5	+5V
A6	SD03	B6	DRQ2	E6	Key	F6	Key
A7	SD02	B7	12V	E7	+5V	F7	+5V
A8	SD01	B8	0WS	E8	PCIRST	F8	PCLKF
A9	SD00	B9	+12V	E9	GNT0	F9	GND
A10	IOCHRDY	B10	GND	E10	REQ0	F10	GNT1
A11	AEN	B11	SMEMWR	E11	GND	F11	GND
A12	SA19	B12	SMEMRD	E12	PCLKE	F12	REQ1
A13	SA18	B13	IORD	E13	GND	F13	AD31
A14	SA17	B14	IOWR	E14	AD30	F14	AD29
A15	SA16	B15	DACK3	E15	+3.3V	F15	+3.3V
A16	SA15	B16	DRQ3	E16	Key	F16	Key
A17	SA14	B17	DACK1	E17	+3.3V	F17	+3.3V
A18	SA13	B18	DRQ1	E18	AD28	F18	AD27
A19	SA12	B19	REFRESH	E19	AD26	F19	AD25
A20	SA11	B20	BCLK	E20	AD24	F20	CBE3
A21	SA10	B21	IRQ07	E21	AD22	F21	AD23
A22	SA09	B22	IRQ06	E22	AD20	F22	AD21
A23	SA08	B23	IRQ05	E23	AD18	F23	AD19
A24	SA07	B24	IRQ04	E24	+3.3V	F24	+3.3v
A25	SA06	B25	IRQ03	E25	Key	F25	Key
A26	SA05	B26	DACK2	E26	+3.3V	F26	+3.3V
A27	SA04	B27	T/C	E27	AD16	F27	AD17

Table A-12 ISA/PCI-Bus Backboard Connector Pin Assignments

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A28	SA03	B28	BALE	E28	FRAME	F28	IRDY
A29	SA02	B29	+5V	E29	CBE2	F29	DEVSEL
A30	SA01	B30	OSC	E30	TRDY	F30	PLOCK
A31	SA00	B31	GND	E31	STOP	F31	PERR
C1	SBHE	D1	MEMCS16	G1	SDONE	H1	SERR
C2	LAB23	D2	I/OCS16	G2	SB0	H2	AD15
C3	LAB22	D3	IRQ10	G3	CBE1	H3	AD14
C4	LAB21	D4	IRQ11	G4	PAR	H4	AD12
C5	LAB20	D5	IRQ12	G5	GND	H5	GND
C6	LAB19	D6	IRQ15	G6	Key	H6	Key
C7	LAB18	D7	IRQ14	G7	GND	H7	GND
C8	LAB17	D8	DACK0	G8	AD13	H8	AD10
C9	MEMRD	D9	DRQ0	G9	AD11	H9	AD8
C10	MEMWR	D10	DACK5	G10	AD9	H10	AD7
C11	SD08	D11	DRQ5	G11	CBE0	H11	AD5
C12	SD09	D12	DACK6	G12	AD6	H12	AD3
C13	SD10	D13	DRQ6	G13	AD4	H13	AD1
C14	SD11	D14	DACK7	G14	AD2	H14	AD0
C15	SD12	D15	DRQ7	G15	Key	H15	Key
C16	SD13	D16	+5V	G16	+5V	H16	+5V
C17	SD14	D17	MASTER	G17	+5V	H17	+5V
C18	SD15	D18	GND	G18	GND	H18	GND

ISA EXPANSION BUS CONNECTOR PIN ASSIGNMENTS

The expansion slots signals, voltages, and grounds are supplied through the bus connectors. There are no active components on the ISA/PCI-bus backboard. Table A-13 provides the pin assignments for the ISA expansion slots.

Table A-13 ISA Expansion Slot Pin Assignments

Pin	Direction	Signal	Pin	Direction	Signal
A1	Input	IOCHCK	B1	Ground	GND
A2	Input/Output	SD07	B2	Output	RSET DRV
A3	Input/Output	SD06	B3	Power	+5V
A4	Input/Output	SD05	B4	Input	IRO09
A5	Input/Output	SD04	B5	Power	5V
A6	Input/Output	SD03	B6	Input	DRQ2
A7	Input/Output	SD02	B7	Power	12V
A8	Input/Output	SD01	B8	Input	0WS
A9	Input/Output	SD00	B9	Power	+12V
A10	Input	IOCHRDY	B10	Ground	GND
A11	Output	AEN	B11	Output	SMEMWR
A12	Input/Output	SA19	B12	Output	SMEMRD
A13	Input/Output	SA18	B13	Input/Output	IORD
A14	Input/Output	SA17	B14	Input/Output	IOWR
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	IRQ07
A22	Input/Output	SA09	B22	Input	IRQ06
A23	Input/Output	SA08	B23	Input	IRQ05
A24	Input/Output	SA07	B24	Input	IRQ04
A25	Input/Output	SA06	B25	Input	IRQ03
A26	Input/Output	SA05	B26	Output	DACK2

Table A-13 ISA Expansion Slot Pin Assignments

Pin	Direction	Signal	Pin	Direction	Signal
A27	Input/Output	SA04	B27	Output	T/C
A28	Input/Output	SA03	B28	Output	BALE
A29	Input/Output	SA02	B29	Power	+5V
A30	Input/Output	SA01	B30	Output	OSC
A31	Input/Output	SA00	B31	Ground	GND
C1	Input/Output	SBHE	D1	Input	MEMCS16
C2	Input/Output	LAB23	D2	Input	I/OCS16
C3	Input/Output	LAB22	D3	Input	IRQ10
C4	Input/Output	LAB21	D4	Input	IRQ11
C5	Input/Output	LAB20	D5	Input	IRQ12
C6	Input/Output	LAB19	D6	Input	IRQ15
C7	Input/Output	LAB18	D7	Input	IRQ14
C8	Input/Output	LAB17	D8	Output	DACK0
C9	Input/Output	MEMRD	D9	Input	DRQ0
C10	Input/Output	MEMWR	D10	Output	DACK5
C11	Input/Output	SD08	D11	Input	DRQ5
C12	Input/Output	SD09	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	MASTER
C18	Input/Output	SD15	D18	Ground	GND

CD AUDIO IN CONNECTOR PIN ASSIGNMENTS

The pin assignments for the CD audio-in connector are provided in Table A-14.

Table A-14 CD Audio In Connector

Pin	Signal
1	Speaker Data
2	Key
3	NC
4	+5V

Appendix B

System Board Jumpers

This appendix provides jumper setting information for configuring the system for a particular system requirement. Situations that require changing the jumper settings include the following:

- upgrading the processor
- clearing a password

CAUTION: Jumpers are set correctly at the factory for the shipped configuration. If the system requires a jumper change, change only the jumper setting for that condition. Otherwise, keep the jumpers at their factory settings.

JUMPER LOCATIONS

Figure Appendix B-1 shows the location of the system board jumpers.

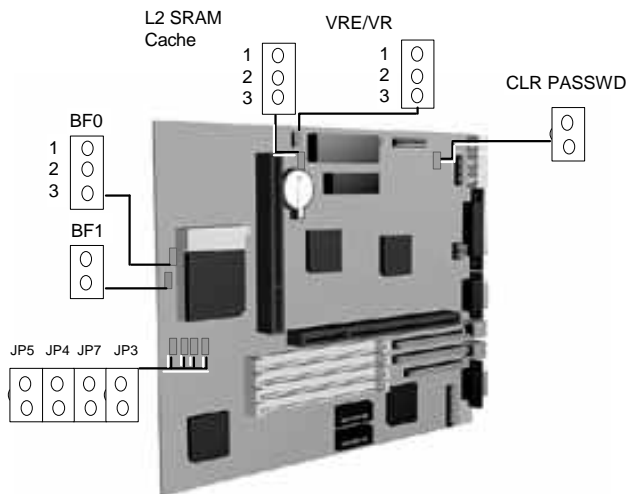


Figure Appendix B-1 System Board Jumper Locations

CHANGING PROCESSOR JUMPER SETTINGS

Use the following procedure when replacing the installed processor with a faster speed processor. Jumpers requiring setting changes include the Processor/Bus Speed.

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

WARNING: System power must be off before removing the cover and changing a jumper setting.

2. Remove the system unit cover (see Section 3, Option Installation, for cover removal).
3. Replace the processor (see Section 3 for processor upgrade procedures).
4. Remove any expansion boards blocking access to the jumpers.
5. Locate the Processor/Bus Speed jumper blocks on the system board (see Figure Appendix B-1).
6. Set the Processor/Bus Speed jumpers per Figure Appendix B-2.

CAUTION: Unless updating the processor, leave the processor jumpers at the factory setting. Changing the settings jumpers could damage the processor.

Processor/Bus Speed	JP5 JP4 JP7 JP3	BF1 BF0
75-MHz Processor/ 50-MHz Bus Speed		
90-MHz Processor/ 50-MHz Bus Speed		
100-MHz Processor/ 66-MHz Bus Speed		
120-MHz Processor/ 60-MHz Bus Speed		
133-MHz Processor/ 66-MHz Bus Speed		
150-MHz Processor/ 60-MHz Bus Speed		
166-MHz Processor/ 66-MHz Bus Speed		
1-2 VRE		
2-3 VR		

Figure Appendix B-2 Processor Upgrade Jumpers

7. Reinstall any removed expansion boards.
8. Reinstall the system cover.
9. Reconnect any disconnected peripherals and turn on the system.

SETTING THE CACHE JUMPER

If you install an optional cache module, you are required to set the cache jumper. Use the following procedure to set the cache jumper.

CAUTION: Only change (or check) the cache jumper setting if you are installing optional cache. Otherwise, keep the jumper at its factory setting.

1. Power off and unplug the system and any peripherals.
2. Remove the system unit cover (see Section 3, Option Installation, for cover removal).
3. Locate the L2 SRAM Cache jumper on the system board (see Figure Appendix B-1).

4. You may have to remove any installed expansion boards to access the jumper.
5. Set the L2 SRAM Cache jumper on pins 1–2 for an asynchronous cache module or on pins 2–3 for a synchronous pipeline burst cache module.

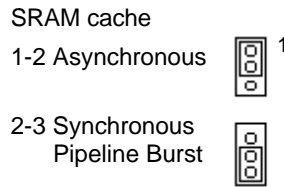


Figure Appendix B-4 SRAM cache jumper

6. If you removed any expansion boards, replace them.
7. Replace the system unit cover.
8. Reconnect any disconnected peripherals and turn on the system.

CHANGING THE PASSWORD

If a password is forgotten, use the following procedures to clear the current password and to set a new one.

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

WARNING: System power must be off before removing the cover and changing a jumper setting.

2. Remove the system unit cover (see Section 3, Option Installation, for cover removal).
3. Locate the Password Clear jumper block on the system board (see Figure Appendix B-1). Remove any expansion boards blocking access to the jumper.
4. Set a jumper on the Password Clear jumper block pins.

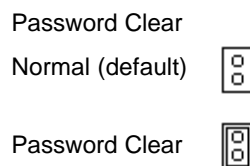


Figure Appendix B-5 Password clear jumper

5. Reinstall the system cover.
 6. Connect system power cables and external options.
 7. Turn on the system. The system boots up and clears the password.
 8. Turn off the system and unplug the system and any connected peripherals.
 9. Remove the system cover.
 10. Remove the jumper from the Password Clear jumper block.
 11. Reinstall any removed expansion boards.
 12. Reinstall the system cover.
 13. Connect and power up the system and any removed peripherals.
 14. Rerun Setup to set a new password (see Section 2, Setup and Operation).
-

Appendix C

Hard Disk Drive Specifications and Jumper Settings

This appendix provides specifications and jumper settings for the Western Digital 635-MB, and 1.2-GB hard disk drives used in the PowerMate Ve series computer configurations. Table 1-1 and Table 1-2 in Section 1 identifies which hard disk drives ship in which configurations.

The standard IDE hard disk drives are mounted in the bottom front slot of the chassis. The drive is connected via a two-connector IDE cable to the primary IDE channel on the system board. The hard drive is set as the master device on the primary IDE channel.

The drive is auto-configurable, meaning that once the master/slave jumpers are set, the hard disk type is automatically detected by the system and the remaining drive parameters are automatically set by the system. (See Section 2, Setup and Operation, for information on auto setup using the Autotype Fixed Disk parameter.)

NEC part numbers for the hard drives are provided in Section 5, System Unit Repair.

635-MB HARD DISK DRIVE SPECIFICATIONS AND JUMPER SETTINGS

Specifications for the 3 1/2 inch IDE hard disk drive are given in Table Appendix C-1. Jumper settings are described following Table Appendix C-1.

Table Appendix C-1 Specifications for 635-MB Hard Disk Drive

Features	Western Digital WDAC2635 635-MB Hard Disk Drive
Physical Configuration	
Dimensions (H x D x W)	1.0 x 5.75 x 4.00 in. (25.4 x 146.2 x 101.6 mm)
Weight	1 lb. (385 grams)
Formatted Capacity	639.9 MB
Interface	40 Pin AT
Actuator Type	Rotary voice-coil
Number of Disks	2
Data Surfaces	3
Data Heads	3
Logical Organization	1240 cyl. x 16 hd. x 63 spt.
Servo Type	Embedded

Table Appendix C-1 Specifications for 635-MB Hard Disk Drive

Features	Western Digital WDAC2635 635-MB Hard Disk Drive
Track Density	
Bytes per Sector	512
User Sectors per Drive	1,249,920
Recording Method	1, 7 Run Length Limited (RLL)
Recording Density	
Flux Density	
Head Parking	Automatic
First Acceptable Revision Level	CCC Revision C2
ECC	Reed Solomon (24 bit On-the-fly)
Maximum Data Rate from Media	84 Mb/second
Performance	
Track-to-track seek	4 ms
Average seek	12.5 ms
Maximum seek	24 ms
Average Latency	6.67 ms
Rotation Speed	4500 rpm
Controller Overhead (ms)	0.3 ms average
Interleave	1:1
Data Transfer Rate	
Buffer to Disk (Mbits/s)	51 maximum
Buffer to Host (Mbytes/s)	PIO Mode3, DMA MODE 2
Spindle Start Time (TYP)	9 sec
Spindle Start Time (MAX)	15 sec
Spindle Stop Time (TYP)	5 sec
Spindle Stop Time (MAX)	10 sec
Start/Stop Cycles	50,000 CSS
Buffer Size	64 KB
Interface	IDE

635-MB HARD DISK DRIVE JUMPER SETTINGS

The 635-MB hard drive uses one user selectable jumper block to configure the master/slave and cable select options of the hard drive. The jumper block has three jumper settings: MA (master), SL (slave), and CS (cable select). See Figure Appendix C-1 for jumper settings.

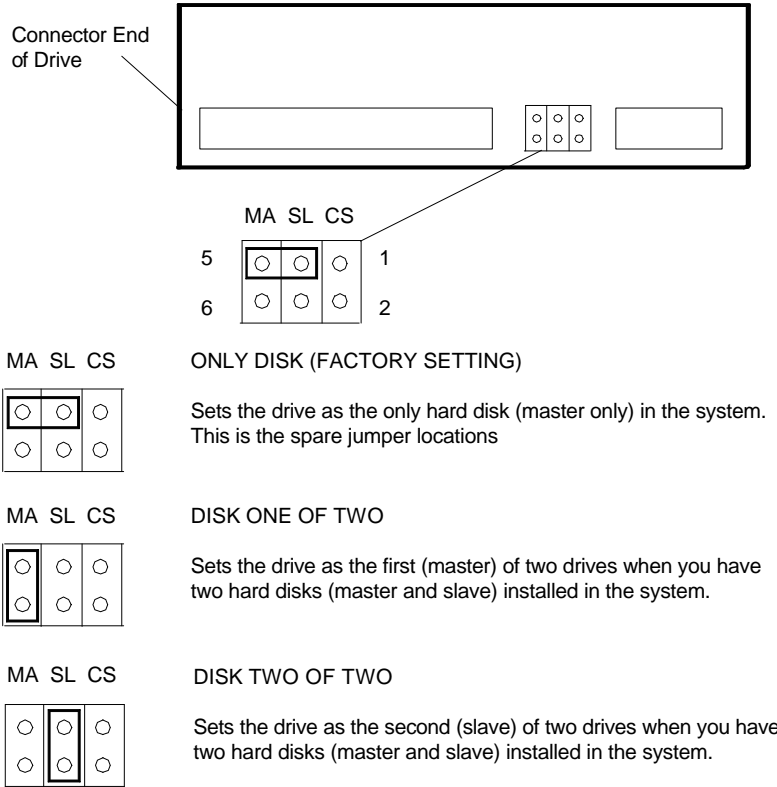


Figure Appendix C-1 Western Digital 635-MB Jumper Settings

1.2-GB HARD DISK DRIVE SPECIFICATIONS AND JUMPER SETTINGS

Specifications for the 3 1/2 inch IDE hard disk drive are given in Table Appendix C-2. Jumper settings are described following Table Appendix C-2.

Table Appendix C-2 Specifications for 1.2-GB Hard Disk Drive

Features	Western Digital WDAC21200 1.2-GB Hard Disk Drive
Physical Configuration	
Formatted Capacity	1.278 GB
Actuator Type	Rotary voice-coil
Number of Disks	3
Data Heads	6
Servo Type	Embedded
Tracks per Inch (tpi)	3,849 tpi

Table Appendix C-2 Specifications for 1.2-GB Hard Disk Drive

Features	Western Digital WDAC21200 1.2-GB Hard Disk Drive
Bytes per Sector	512
Maximum Data Rate from Media	45.4 MB/second
Dimensions (H x D x W)	1.0 x 5.75 x 4.00 in. (25.4 x 146.2 x 101.6 mm)
Weight	1.3 lb. (589 grams)
Performance	
Track-to-track seek	3.0 ms
Average seek	14 ms
Maximum seek	26 ms
Average Latency	8.3 ms
Rotation Speed	3600 rpm
Data Transfer Rate	
Buffer to Disk	45.4 MB/s maximum
Buffer to Host	16.6 MB/s, Mode 4
Start/Stop Cycles	40,000 minimum
Buffer Size	64 KB
Interface	IDE

The drive uses one jumper block (JP7) to configure the master/slave and cable select options of the hard drive. Jumper block JP6 has three user-selectable jumper settings: C/D (master/slave select), A/C (no functionality), and CS (cable select). The remainder of the jumpers are reserved for factory use. The user selectable jumpers and their settings are as follows:

- C/D
 - Master drive, pins 1 and 2 jumpered (factory default)
 - Slave drive, pins 1 and 2 not jumpered
 - A/C
 - No functionality, pins 3 and 4 not jumpered
 - CS
 - Cable select disabled, pins 5 and 6 not jumpered (factory default)
 - Cable select enabled, pins 5 and 6 jumpered.
-

Appendix D

CD-ROM Reader Specifications and Jumper Settings

This appendix provides specifications and jumper settings for the IDE CD-ROM readers used in the PowerMate Ve Series multimedia configurations. Table 1-1 and Table 1-2 in Section 1 identifies the configurations using the quad-speed CD-ROM reader.

All CD-ROM readers come pre-installed in the top 5 1/4-inch accessible device slot. The reader is connected to the secondary PCI/IDE connector on the system board via an I/O cable. An audio cable connects the reader to the sound system. The reader is assigned as drive E.

See Section 2 for information on the CD-ROM reader's controls and indicators. NEC part numbers for the hard drives are provided in Section 5, System Unit Repair.

CD-ROM READER SPECIFICATIONS

The PowerMate Ve multimedia configurations shipped with an NEC quad-speed IDE CD-ROM reader. This fast CD-ROM reader allows the user to obtain data faster and to see smoother animation and video. Table Appendix D -1 lists the specifications for the CD-ROM reader.

Table Appendix D -1 Specifications for NEC Quad-Speed CD-ROM Reader

Feature	Quad-Speed Specification
Performance	
Data Transfer Rate	600 KB/sec
Burst Transfer Rate	PIO Mode 3 support
Full Stroke Access	500 ms (typical)
Memory Buffer	128 KB
Photo CD Compatibility	Multisession Photo CD™ Single Session Photo CD™

Table Appendix D -1 Specifications for NEC Quad-Speed CD-ROM Reader

Feature	Quad-Speed Specification
General Specifications	
Capacity	656 MB (Mode 1), 748 MB (Mode 2)
Physical Format	Audio disc: red book Data disc: yellow book (Mode 1 and Mode 2) orange book (read-only)
Logical Format	Data disc: ISO 9660 file format
Weight	1.76 lb. (0.8 K grams)
Operating Temperature	5°C to 50°C

CD-ROM Reader Connectors and Jumper Settings

The back of the CD-ROM readers provides the following connectors and jumpers:

- Audio output connector — connects the reader to the system's sound system via an audio cable.
- Configuration jumpers — enables or disables the cable select feature, slave device configuration, or master device configuration. The CD-ROM reader is set as the master device on the secondary PCI/IDE channel.
- IDE connector — connects the reader to the secondary PCI/IDE connector on the system board via an I/O cable.
- Power connector — connects the reader to the power supply via a power supply cable.

There are two jumper blocks on the back of the CD-ROM reader. Jumpers on the block next to the IDE connector configures the reader as a master (factory set) or slave. Jumpers on the second block enables or disables the eject function of the reader and sets test modes (factory use only). Descriptions of the jumpers are as follows:

- CSEL (cable select) — enables/disables the cable select feature. Factory set at disabled (pins not jumpered).
 - SL (slave) — enables/disables the slave feature. Factory set at disabled (pins not jumpered)
 - MA (master) — enables/disables the master feature. Factory set at enabled (pins jumpered)
 - T0 (test mode) — used at the factory for hard drive tests. Factory set at disabled (pins not jumpered)
-

- T1 (test mode) — used at the factory for hard drive tests. Factory set at disabled (pins not jumpered)
- PRV/AIW (prevent/allow) — disables or enables the CD-ROM disc tray eject function. Factory set at allow (pins jumpered).

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(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 and power cables 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 your computer maintains system configuration information. In the event that the battery fails to maintain system configuration information, NEC recommends that you replace the battery. See Chapter 4 for battery replacement information.

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 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-hydride 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. In MINNESOTA, call 1-800-225-PRBA if further disposal information is required.

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