

PowerMate[®] P Series

PowerMate

Service and Reference Manual

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Preface

This service and reference manual for the NEC PowerMate® P series computer systems contains hardware and interface information for users who need an overview of system design. The manual also includes system setup information, procedures for installing options, and illustrated parts lists. 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 system features, hardware design, interface ports, and internal devices. System specifications are listed including dimensions, weight, environment, safety compliance, power consumption, and memory.

Section 2 — Setup and Operation, includes unpacking, setup, and operation information. Also included are procedures for configuring the system through the Setup utility program, setting passwords and power management features, and using the BIOS Update utility.

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

Section 4 — Maintenance and Troubleshooting, provides information on cleaning the system and helps isolate system malfunctions.

Section 5 — Repair, includes disassembly procedures along with an exploded view diagram of the system. Also included are parts lists for field-replaceable parts.

Appendix A — Connector Pin Assignments, provides a list of the system boards' internal connector pin assignments.

Appendix B — System Board Switches, includes information on setting switches for processor upgrades and clearing a passwords.

Abbreviations

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

mA	milliamps	SW	switch
max	maximum	TAC	Technical Assistance Center
MB	megabyte	TSC	Technical Support Center
MDA	Monochrome Display Adapter	TTL	transistor/transistor logic
MFM	modified frequency modulation	tpi	tracks per inch
MHz	megahertz	V	volt
MIC	microphone	Vac	volts, alternating current
MIDI	musical instrument device interface	Vdc	volts, direct current
MPC	multimedia PC	VESA	video electronics standards association
mm	millimeter	VGA	Video Graphics Array
MPEG	Motion Picture Experts Group	VRAM	video RAM
ms	millisecond	W	watt
NASC	National Authorized Service Center	W	write
NC	not connected		
NMI	Non-maskable Interrupt		
ns	nanosecond		
NSRC	National Service Response Center		
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		

Section 1

Technical Information

The PowerMate[®] P Series systems include the following configurations:

- hard disk systems (diskette drive, hard disk)
- multimedia systems (diskette drive, hard disk, quad-speed CD-ROM reader, speakers, microphone)

All systems come standard with an Intel Pentium[™] processor (120 MHz, or 133 MHz), a 3 1/2-inch diskette drive, 256 kilobyte (KB) asynchronous secondary cache, 16-megabyte (MB) random access memory (RAM), and 2 MB of video dynamic random access memory (DRAM). Each system incorporates power management features, and has factory installed software including Microsoft[®] Windows for Workgroups[™] and Windows 95[™].

The following paragraphs give an overview of the systems. Differences between systems are noted as they occur.

SYSTEM CHASSIS

The chassis provides an enclosure for the system board, power supply, six PCI/ISA expansion slots and six storage device slots. The expansion slots include two 8-/16-bit ISA slots, one shared PCI/ISA slot, and three 32-bit PCI slot.

The six storage device slots accommodate up to four accessible devices and two internal hard disk drive devices. The accessible devices include the standard one-inch high 3 1/2-inch 1.44-MB diskette drive and up to three 1.6-inch high 5 1/4-inch storage devices. The internal device slots support up to two 1-inch high 3 1/2-inch hard disks.

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 three accessible 5 1/4-inch storage device slots and one internal slot 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 two accessible 5 1/4-inch storage device slots and one internal slot available for optional devices.

Figure 1-1 shows the front panel features and the locations of the accessible storage devices in a system. (Multimedia systems come with a quad-speed CD-ROM reader installed.)

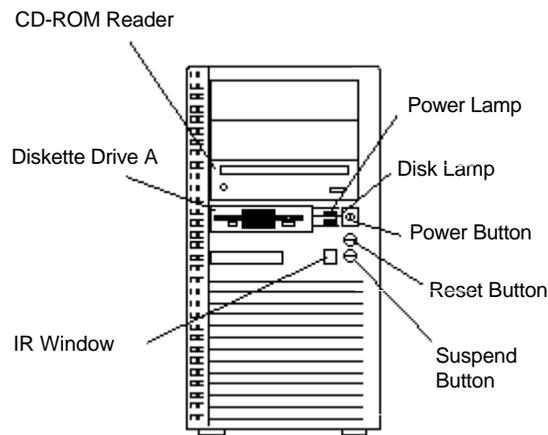


Figure 1-1 System Controls and Storage Device Slots

SYSTEM BOARD

Key features of the system board include the following:

- Intel Pentium 120- or 133-MHz Pentium processor, depending on system configuration
- 16-KB internal dual write-back cache integrated on the processor (8 KB data, 8 KB instructions)
- 256-KB asynchronous write-back secondary cache memory
 - 15-nano second (ns), pipeline burst, static random access memory (SRAM) cache
- 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, a parallel port, and an IR port.
- PCI local bus for fast data transfer
- support for Intel processor upgrades
- 16-MB RAM
 - ships with 32-bit, non-parity, 70-ns, Fast Page Mode, single-inline memory modules (SIMMs)
 - RAM expandable up to 128 MB using four SIMM sockets (2 banks with two sockets each)

- integrated graphics
 - Peripheral Component Interconnect (PCI) graphical user interface (GUI) accelerator and motion video playback controller; supports MPEG-1 and Video for Windows[®]
 - standard 2-MB video DRAM using four 256 KB x 16-bit DRAM chips
 - video DRAM supports resolutions of 800 x 600 with up to 16.8 million colors, 1024 x 768 with up to 64K colors, 1280 x 1024 with up to 64K colors, and 1600 x 1200 with 256 colors
 - support for 16-bit bidirectional VESA advanced feature connector
 - support for VESA Display Power Management Signalling (DPMS) monitor power saving modes
 - video BIOS integrated in system BIOS
 - integrated sound (multimedia configurations only)
 - Sound Blaster compatible chip on system board
 - OPL3 FM synthesis chip on system board
 - built-in 16-bit stereo and FM synthesis
 - Wavetable sound upgradeable (Wave Blaster MIDI synthesizer)
 - 3D sound effects (Surround Sound)
 - 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
 - PCI/ISA backboard configurations using six expansion slots
 - three 32-bit PCI slots
 - two 8/16-bit ISA slots
 - one shared ISA or PCI slot
-

- 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 transfer rates of up to 19.2 KB per second
 - multimedia speakers, microphone, and headphone connectors (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 1-1 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 Switches”, for a description of board switches.

Table 1-1 System Board Chips

Chip	Description
Pentium Chip	120/60-MHz Intel Pentium processor 133/66-MHz Intel Pentium processor
Intel Triton 82430FX PCI/ISA Chip Set	System controller
82437FX	Data path unit
82438FX	PCI ISA/IDE accelerator bridge chip
824371FB	
National Semiconductor PC87306	Super I/O controller NS16C550 UARTS supports multimode parallel port supports industry-standard floppy controller integrated, battery-backed real-time clock and CMOS RAM integrated 8042 keyboard controller and AMI megakey keyboard/mouse controller code
S3 Trio 64V+	PCI GUI graphics controller

Table 1-1 System Board Chips

Chip	Description
Intel 28F100BXT 1 Mb component	128k x 8 Flash ROM (128 KB)
Socketed 3V lithium coin cell battery Can be replaced by Sanyo CR2032 coin cell battery or equivalent	Real-time clock battery for integrated RTC on PC87306
Vibra 16S (CT2504) (multimedia systems only)	Multimedia codec (digital audio and analog mixing chip)
Yamaha OPL3-L Synthesizer Chip (multimedia systems only)	Frequency modulated synthesizer

Processor

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

- PowerMate P120 — 120-MHz processor with internal speed of 120 MHz and external speed of 60 MHz
- PowerMate P130 — 133-MHz processor with internal speed of 133 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.

To use the Pentium processor's power, the system features an optimized 64-bit memory interface and complementary asynchronous pipelined 256-KB secondary cache.

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 256 KB of secondary cache, external to the processor. The cache uses 15-ns SRAM that 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.

High-performance features include:

- pipelined 32-bit addressing
- 64-bit data
- direct mapped write-back and write-through support
- system support 256 kilobytes (KB) of asynchronous 15-ns secondary cache

The cache is connected directly to the processor address bus and uses physical addresses. A bus feature known as burst enables fast cache fills. Memory areas (pages) can be designated as cacheable or non-cacheable by software. The cache can also be enabled and disabled by software.

The write strategy of the cache (primary and secondary) is write-back. If the write is a cache hit, an external bus cycle is not generated and information is written to the cache. Any area of memory can be cached in the system. Non-cacheable portions of memory are defined by software. The cache can be cleared by software instructions.

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 the rest is utilized as listed in Table 1-2. 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.

NEC's Flash ROM allows fast, economical BIOS upgrades. NEC Flash ROMs are reprogrammable system and video EPROMs. With NEC's Flash ROM, a ROM BIOS change:

- is fast and easily done using a Flash utility
- eliminates the expensive replacement of ROM BIOS chips, and reduces system maintenance costs
- reduces inadvertent system board damage that can take place when replacing ROMs
- facilitates adopting new technology while maintaining corporate standards
- gives network administrators company-wide control of BIOS revisions.

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 1-2.

Table 1-2 System Memory Map

Memory Space	Size	Function
100000-800000	127 KB	Extended memory
F0000-FFFFF	64 KB	AMI System BIOS
EE000-EFFFF	8 KB	FLASH boot block (available as UMB)
ED000-EDFFF	4 KB	ECSD (Plug and Play configuration area)
EC000-ECFFF	4 KB	OEM logo (available as UMB)
E0000-EBFFF	48 KB	BIOS reserved (currently available as UMB)
C8000-DFFFF	96 KB	Available HI DOS memory (open to ISA and PCI bus)
A0000-C7FFF	160 KB	Available HI DOS memory (normally reserved for Video BIOS)
9FC00-9FFFF	1 KB	Extended BIOS data
80000-9FBFF	127 KB	Extended conventional
00000-7FFFF	512 KB	Conventional base memory

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. The suspend button quickly puts the system into a full power reduction mode of operation. This is a convenient way to save power when away from the computer for a short period of time. Press a key or move the mouse and the system returns to full power.

NOTE: Power management can also be activated by pressing the Suspend button on the front of the chassis or by entering a user-configurable hot-key sequence from the keyboard. See Section 2 for power management Setup information.

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 1-3.

Table 1-3 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, speaker control
0064	Keyboard controller, command/status byte
0070, bit 7	Enable NMI
0070, bits 6 through 0	Real time clock, address
0071	Real time clock, data
0078-0079	Reserved - board configuration
0080-008F	DMA page registers
00A0-00A1	Interrupt controller 2
00C0-00DE	DMA controller 2
00F0	Reset numeric error
0170-0177	Secondary IDE channel
01F0-01F7	Primary IDE channel
0278-027F	Parallel port 2
02F8-02FF	On-board serial port 2
0376	Secondary IDE channel command port
0377	Secondary IDE channel status port
0378-037F	Parallel port 1

Table 1-3 I/O Address Map

Address (Hex)	I/O Device Name
03BC-03BF	Parallel port x
03E8-03EF	Serial port 3
03F0-03F5	Floppy channel 1
03F6	Primary IDE channel command port
03F7 (write)	Floppy channel 1 command
03F7, bit 7	Floppy disk change channel 1
03F7, bit 6 through 0	Primary IDE channel status port
03F8-03FF	On-board serial port 1
LPT + 400h	ECP port, LPT + 400h
0CF8-0CFB*	PCI configuration address register
0CFC-0CFF*	PCI configuration data register
FF00-FF07	IDE bus master register

* Accessible only by DWORD accesses.

System Memory

All configurations ship with 16 MB of 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.

The memory configuration consists of two banks (bank 0 and bank 1) with two sockets each. The SIMM memory sockets accept 32-bit (non-parity) 4-, 8-, 16-, or 32-MB 70 ns Fast Page Mode (FPM) or 60 ns Extended Data Out (EDO) SIMMs.

NOTE: 36-bit SIMMs may be used, but parity bits are ignored.

The four SIMM sockets are integrated on the system board. Systems ship with two 2-MB x 32 FPM SIMMs (16 MB total) installed in two sockets.

Single or double-sided SIMMs must be added in pairs. SIMM banks can be populated in either order. EDO and FPM SIMMs can be mixed in separate banks.

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 Bank 0 (2 sockets) and Bank 1 (2 sockets).

All configurations have two 8 MB SIMMs are installed in bank 0. SIMMs must be installed in pairs of the same memory type. Both sockets must be populated within a bank for the system to work. No switch or jumpers are required to set when the memory is changed. The system BIOS automatically detects the SIMMs. Table 1-4 shows the SIMM memory upgrade path.

Table 1-4 SIMM Memory Upgrade Path

Total Memory	Bank 0	Bank 0	Bank 1	Bank 1
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.

Interrupt Controller

The interrupt controller operates as an interrupt manager for the entire 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 1-5. 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 1-5 Interrupt Level Assignments

Interrupt Priority	Interrupt Device
NMI	I/O channel check
IRQ00	Reserved, Interval Timer
IRQ01	Reserved, Keyboard buffer full
IRQ02	Reserved, Cascade interrupt from slave
IRQ03	Serial Port 2
IRQ04	Serial Port 1
IRQ05	On-board audio (default) or Parallel Port 2
IRQ06	Diskette Drive Controller
IRQ07	Parallel Port 1
IRQ08	Real-time clock
IRQ09	User Available
IRQ10	User Available
IRQ11	User Available
IRQ12	On-board mouse port (available if no PS/2 mouse)
IRQ13	Reserved, Math Coprocessor
IRQ14	Primary IDE
IRQ15	Secondary IDE if present, or else user available

Integrated Graphics

The system has an S3 Trio64V+ 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 2 MB of fast 64-bit DRAM (not upgradeable).

Motion Video Controller

The Trio64V+ incorporates a 64-bit graphics engine with a 24-bit RAMDAC, dual programmable clock generators, and a high performance accelerator in a single device. In addition, the Trio64V+ incorporates the S3 Streams[™] processor that enables the device to convert YUV formatted video data to RGB and provides acceleration for scaling the video display without compromising picture quality or frame rate. The on-chip RAMDAC/clock synthesizer is capable of outputting pixel data rates of 135 Mhz, providing interlaced screen resolutions of up to 1600 x 1200 x 256 colors at 48.5 Hz (with 2 MB of DRAM).

The motion video controller integrates the 64-bit 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 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.

The VESA feature connector can be used for synchronizing graphics output with an external NTSC or PAL signal and a shared frame buffer interface to maximize multimedia performance.

Feature Connector

In addition to the standard VGA connector, the system provides a VESA-compliant feature connector on the system board. The VESA-compliant 8514/A feature connector is provided on the system board in addition to a standard 15-pin analog VGA connector on the back panel. The VESA pass-through connector is useful when an auxiliary video subsystem is installed in one of the expansion slots such as an 8514/A compatible video card or DVI board.

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 2 MB of on-board video DRAM. The video DRAM consists of four 256 KB by 16 chips on the system board. The 2 MB of video DRAM supports the following resolutions, colors, and refresh rates:

- 1600 by 1200 pixels, 256 colors, 48.5 Hz (interlaced)
- 1280 by 1024 pixels, 64K colors, 48.5 Hz (interlaced), 60 Hz, 72 Hz, and 75 Hz
- 1024 by 768 pixels, 64K colors, 43 Hz (interlaced), 60 Hz, 70 Hz, 72 Hz, and 75 Hz
- 800 by 600 pixels, 16.8 million colors, 60 Hz, 72 Hz, and 75 Hz.

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.

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/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 and 1.2 GB hard disk systems only) is connected to the secondary PCI/IDE port.

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 30 minutes (the default), 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 power-saving Suspend mode by pressing the suspend button or by entering a user-configurable hot-key sequence. 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.

Through Setup, the amount of inactive time is adjustable. Power management can also be disabled and the hot-key sequence set through Setup (see Section 2).

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 1-6.

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

Table 1-6 Parallel Port Addressing and Interrupts

Starting I/O Address	Interrupt Level	Port
378	IRQ05	LPT1
278	IRQ05	LPT1 or LPT2
3BC	IRQ05	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 and the IR interface (see Table 1-7). 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 1-7. 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 1-7 Serial Port Addressing and Interrupts

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

* Used for IrDA data transfer

Note that the COM2 port is factory set for IrDA data transfer and can only be reset to “Disabled”. See Section 2, “Setup and Operation”, for information on resetting the port through Setup.

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.

Infrared Interface

The I/O controller incorporates an infrared interface that provides two-way wireless communication through the IR window (port) on the front of the system. The interface uses infrared as the transmission medium instead of a traditional serial cable.

The IR port permits transfer of files to or from portable devices such as laptops and personal digital assistant (PDA) products using the pre-installed Puma TranXit applications software or other software supporting IrDA data transfer. The port supports data transfers at 115 Kbps from a distance of 1 meter (3 feet 3 inches).

The IR port uses the system's COM2 serial port to transfer data. The port shares registers and function logic with COM2.

DISKETTE DRIVE

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

All systems ship with one internal 3 1/2-inch hard disk (1-inch high, thin-height) installed behind the front panel at the bottom of the chassis. The three-connector drive cable plugs into the primary (fast) connector on the system board. An optional second hard drive can be connected to the cable. Adding a third hard drive to the internal bay requires an optional two-drive connector. The optional cable plugs into the secondary connector on the system board. If adding a fourth hard drive (in a 5 1/4-inch accessible slot), it connects to the unused connector on the optional cable.

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 provides 200 watts. Connector locations are in Appendix A.

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.

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.

MULTIMEDIA COMPONENTS

Systems configured for multimedia come with audio integrated on the system board, a quad-speed 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 Creative Labs Vibra 16S Sound Blaster-compatible chip, the Yamaha OPL3 FM synthesizer chip, and a Sound Retrieval System[®] for 3D sound effects. 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 Sound Blaster Pro[™], Sound Blaster[™] 2.0, Ad Lib[™], MPU-401, and Microsoft[®] Windows Sound System[™] for PC sound applications. The components work with the pre-installed Voyetra AudioStation audio/telephony software and Creative Vibra 16S Windows 3.11 drivers.

Music Synthesizer

The music synthesizer in your system uses Frequency Modulation (FM) Synthesis based on the OPL3-L synthesizer chip, the de facto standard sound source for multimedia personal computers (MPC) and interactive entertainment products.

FM Synthesis exploits the fact that modulating one waveform with another waveform will produce a waveform with many more harmonics than were present in the modulator or carrier (the modulated waveform).

The frequency of modulator to carrier determines which harmonics result. The amount of modulator determines how many of the potential harmonics result. Using integer and non-integer ratios allow the application to create rich harmonics and inharmonics sounds.

Surround Sound

Surround sound, also called SRS 3D sound, in your system is a Sound Retrieval System®, which goes beyond stereo sound. It creates a three-dimensional sound image with only two conventional speakers. Using pre-recorded music, it retrieves the spatial information and restores the original three-dimensional sound field. The reproduced sound is much closer to a live performance.

MIDI Interface

The system board in your system provides a musical instrument device interface (MIDI) and connector for the installation of a MIDI/Joystick kit.

Wavetable Synthesis

Your system is Wave Blaster™ upgradeable for wavetable synthesis. A connector on the system board supports a Wavetable upgrade card for more accurate representations of the sound of musical instruments. Using an industry-standard Wave Blaster™ module, you can achieve a better playback sound quality. Wave Blaster is a MIDI synthesizer with capabilities for producing extremely high fidelity stereo music for computer audio systems.

Quad-Speed CD-ROM

The IDE quad-speed CD-ROM reader is pre-installed as drive E on multimedia 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 connected to the secondary IDE/PCI port.

Speakers

The multimedia systems come with a high-quality stereo speaker set, 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 provided with the AudioStation application program. 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 AudioStation application program.

SPECIFICATIONS

System specifications are included in Table 1-8.

Table 1-8 Specifications

Item	Specification
Dimensions and Weight	Width: 8.3 inches (21 cm) Depth: 17 inches (43.35 cm) Height: 15.5 inches (39 cm) Weight: 21.4 lb (9.79 kg) (dependent upon options)
Keyboard Dimensions and Weight:	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	Three 1.6-inch high, 5 1/4-inch, front accessible slots One 1.6-inch high, 3 1/2-inch front access slot Two 1-inch high, 3 1/2-inch internal slots
Expansion Slots	Six slots: three 32-bit PCI slots two 8-/16-bit ISA slots one shared ISA or 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 and indicator lamp Reset button Consumer Infrared (IR) receiver; infrared IrDA transceiver
Processor	Intel Pentium 120-MHz or 133-MHz (dependent on system)
Cache Memory	16 KB of primary cache (8 KB data, 8 KB instruction) integrated in the processor, 256 KB secondary cache
Flash ROM	128 KB (28F100BXT) Flash ROM
Chip Set	Intel 82430FX Triton Data Path (TDP) PCI/ISA Chip set
System Memory	
Standard	16-MB standard, expandable to 128 MB using SIMM sockets
Optional SIMMs	4-, 8-, 16-, and 32-MB; 32-bit, non-parity, 70-ns FPM SIMMs
Integrated Graphics	S3 Trio64V+ SVGA PCI GUI Accelerator and Motion Video Playback Controller supports MPEG-1 2-MB video DRAM standard Maximum resolution 1600 x 1200 pixels

Table 1-8 Specifications

Item	Specification
Battery	Replaceable 3-volt lithium, non-rechargeable coin-type
Power Supply	200 Watt, 115 V/230V switch selectable
CD-ROM Reader	Standard in multimedia systems Quadruple speed Disc format: ISO 9660 Data transfer rate: 600 KB/sec mode 1, 684.4 KB/sec mode 2 Access time (typical): 230 msec Built-in buffer: 128 KB Host interface: IDE (ATAPI) Photo CD Compatible: Multisession Photo CD, Single session Photo CD
Integrated Sound	Creative Labs Vibra™ 16S chip, standard in multimedia systems Yamaha OPL3 FM Synthesis Built-in 5 or 7-channel 16-bit step multimedia PC level 2 (MPCII) compliance Sound Blaster™ and Adlib™ compatible Stereo jacks for microphone: line in and line out Wave Blaster upgradeable for wavetable synthesis Built-in MPU-401 MIDI and game port interface
Speakers	Standard in multimedia systems Magnetic shielded 8-watt stereo speakers Power on/off switch, power lamp, volume control Treble and bass tone control Magnetically shielded Built-in stereo amplifier 10W RMS power output 2-way speaker system 2-inch tweeter 4-inch woofer AC adapter — 120V to +15V, - 15V Dimensions — 140D x 130W x 240H mm
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 P 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 switches are described in Appendix B, “System Board Switches.”

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 non-multimedia configurations include the system unit, keyboard, mouse, power cord, and user documentation. The carton contents for multimedia configurations include the previous items along with a microphone.

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.”

SYSTEM SETUP

Set up the system components 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 power socket (see Figure Section 2-1).

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.

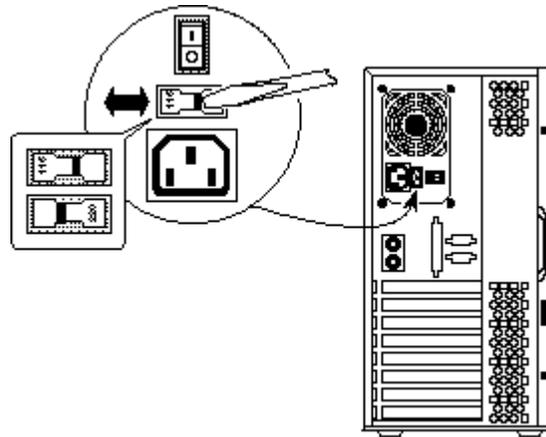


Figure Section 2-1 Voltage Selector Switch

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

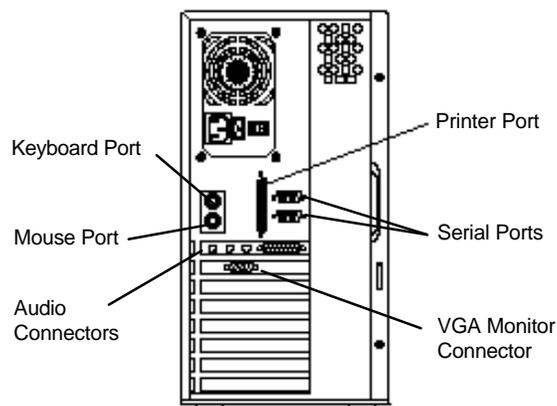


Figure Section 2-2 Peripheral Connections

3. If installing a multimedia system, connect the speakers and microphone according to the procedures in “Adding External Options” in Section 3. Figure Section 2-4 identifies the audio connectors.

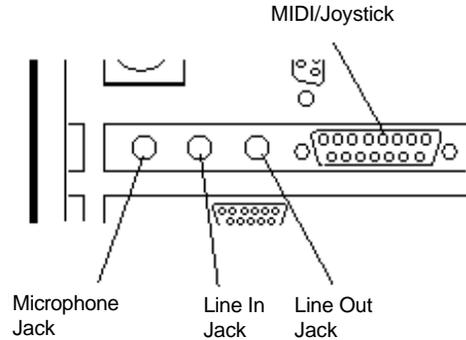


Figure Section 2-4 Audio Connectors

4. 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 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 the system and Troubleshoot.

If a problem occurs and is not indicated by beeps, power off the system and troubleshoot.

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

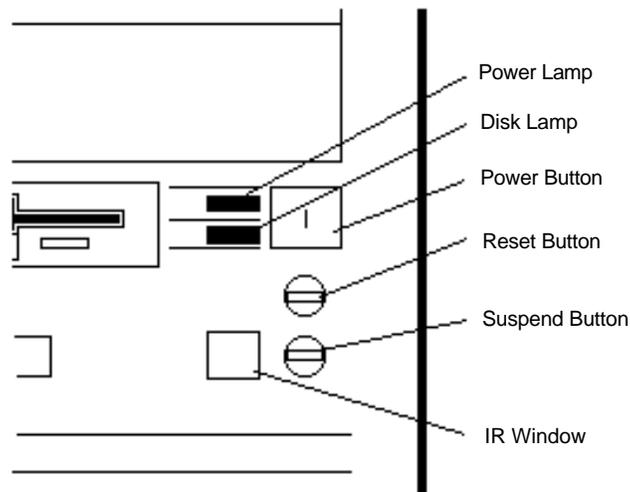


Figure Section 2-6 System Buttons, Lamps, and IR Window

5. Press the suspend button (see Figure Section 2-6) to place the unit in the power management mode.

The power lamp blinks, indicating that the system is in the power-saving Suspend mode.

If the system is left alone for a preset time, it goes into the automatic Suspend mode. The screen goes blank and the system goes into the power-saving mode of operation. Moving the mouse or pressing a key on the keyboard activates the Standby mode.

CD-ROM READER

A quad-speed CD-ROM reader (see Figure Section 2-8) 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.

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
- eject/reject button for opening or closing the CD tray when the power is on
- CD tray that opens and closes when the eject/retract button is pressed
- 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.

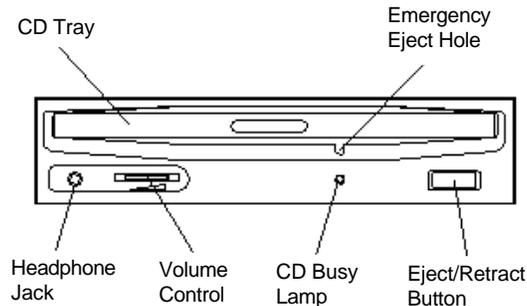


Figure Section 2-8 *Typical CD-ROM Reader Controls and Indicators*

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

1. Press the stop/eject button. The CD tray opens.
2. Put the CD, printed side up, into the tray.
3. Press the stop/eject button. The tray closes.
4. To remove the disc, press the stop/eject 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 battery, either a coin-type battery or a real-time clock/battery module on the system board. The battery supplies continuous power to the CMOS memory and maintains configuration information when system power is off.

NEC UTILITIES AND DRIVERS

Click on a topic for information about using NEC utilities and drivers.

- Setup Utility
- Flash Utility
- Video Drivers
- NEC Backup Utility
- Desktop Management Interface

Setup Utility

The Setup utility program allows you to enter system configuration information and control special features of the system.

NOTE: Your system ships from the factory with the correct system parameters for your configuration. Unless you add optional hardware, you do not need to run Setup to operate your system. However, you might wish to run the Setup utility to set features that customize your system, such as security features.

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

NOTE: NEC recommends that you print out or write down your current Setup parameters and store the information in a safe place. This lets you restore your system to the current parameters if you ever need to replace the battery.

When to Use Setup

The Setup utility lets you view and set system parameters. Use the Setup utility program:

- to set the time and date.
- to update or check system parameters when you add or remove expansion options.
- to change or set power management features.
- to correct a hardware discrepancy when the Power-On Self-Test (POST) displays an error message and prompts you to run Setup.
- to check the installation of optional memory by comparing the amount of memory installed with the amount of memory displayed by Setup.
- to change certain system operating parameters, such as boot device sequence and keyboard parameters.
- to configure system connections for peripherals such as your diskette drive, hard disks, and devices connected to the printer port and serial ports.
- to customize your system with security features.
- to set system parameters in the event that you need to replace the complimentary metal oxide semiconductor (CMOS) battery.

How to Start Setup

To start the Setup utility, follow these steps:

1. Turn on or reboot the system.
2. Press **F1** after POST, but before the system boots up, to start the memory test.

There is about five seconds to press **F1** before system boot continues.

3. Setup's Main Menu appears and looks similar to the following screen.

Main	Advanced	Security	Exit
System Date	July 28 1995		F1 Help
System Time	08:18:20		ESC Back
Floppy Options	Press Enter		Enter Select
Primary IDE Master:	Conner Peripherals		↑ Previous Item
Primary IDE Slave:	Not Installed		↓ Next Item
Secondary IDE Master:	Not Installed		← → Select Menu
Secondary IDE Slave:	Not Installed		
Language	English (US)		F5 Setup Defaults
Boot Option	Press Enter		F6 Previous Values
Video Mode	EGA/VGA		F10 Save & Exit
Mouse	Installed		
Base Memory	640 KB		
Extended Memory	15360 KB		

Main Menu

How to Use Setup

Use the keys shown on the right of the Setup menu to make your selections or exit the current menu. The following table describes the navigation keys and their alternates.

Table Section 2-1 Navigation Keys

Key	Function
F1	Provides help for the parameter field being displayed.
Esc	Exits the menu.
Enter	Executes Command or Selects submenu.
↑ or ↓ arrow keys	Moves cursor up and down.
← or → arrow keys	Selects next menu.
F5	Loads the Default Configuration values for this menu.
F6	Selects the Previous Value for the field.
F10	Loads the Previous Configuration values for this menu.

To display a submenu, use the arrow keys to move the cursor to the submenu you want. Then press **Enter**.

Main Menu

The following is a list of available parameters when you select the Main Menu in the legend bar. Other Main Menu parameters are available by selecting submenus.

NOTE: See How to Start Setup for a look at a typical Main menu screen.

Use the arrow keys to move the cursor to parameter and press **Enter** to select a submenu. Items with lighter text are not available. The following subsections describe the Main Menu parameters.

System Date/Time

Use this menu to set the current time and date. The settings remain in memory even after you turn off the system power.

To set the date, enter the current day, month, and year in dd/mm/yyyy format.

To set the time, enter the current hour, minute, and seconds in hh:mm:ss, 24-hour format. To example, type **13:30:00** for 1:30 P.M.

Diskette Drive

This menu selects the type of diskette drive in your system. Unless you are changing your hardware, you do not need to change the diskette drive (floppy) A or B settings.

If you add an optional 5 1/4-inch diskette drive to your system, select “Floppy B” and change the parameter to “1.2 MB, 5.25”.

Hard Disk

The “Hard Disk C:” through “Hard Disk F:” field reports the presence of, and identification string reported by, up to four physical IDE drives (two on each PCI/IDE connector). When the cursor is placed on one of these fields and it is selected by pressing the Enter key. The Hard Disk Submenu appears (see the following table) allowing parameters the drive parameters to be set.

Jumper settings on the IDE device set the device to master or slave (see the documentation that comes with the device). Drive letters will be assigned to physical drives as follows.

Table Section 2-2 Hard Disk Assignments

IDE Interface Connector	Master/Slave	Hard Drive Assignment
Primary IDE Connector Only	Primary Master Primary Slave	C: D:
Secondary IDE Connector Only	Secondary Master Secondary Slave	C: D:
Primary and Secondary IDE Connectors (two drives)	Primary Master Secondary Master	C: D:
Primary and Secondary IDE Connectors (three drives)	Primary Master Secondary Master Primary or Secondary Slave	C: D: E:
Primary and Secondary IDE Connectors (four drives)	Primary Master Primary Slave Secondary Master Secondary Slave	C: D: E: F:

When drives have multiple partitions on them, partitions beyond the primary partition will be assigned in ascending order, based on available drive letters and other installed drives. Partitions are assigned to primary partitions first, and then to secondary partitions. This means that when there are multiple drives with multiple partitions, the logical drive numbering scheme may result in discontinuous logical partitions on the same physical drive.

For instance, if “Drive 1” is the master drive on the primary connector has two partitions, “Drive 2” is the slave drive on the primary connector with three partitions, and “Drive 3” is the master drive on the secondary connector with two partitions, the drive letters will be assigned as follows.

Table Section 2-3 Partitioned Hard Disk Assignments

Installed Hard Drives	Number of partitions	Hard Drive Assignment
Drive 1	First partition Second partition	C: F:
Drive 2	First partition Second partition Third partition	D: G: H:
Drive 3	First partition Second partition	E: I:

Hard Disk Submenu

The Hard Disk Submenu lets you check or change the following hard disk drive parameters.

- Hard Disk Type
- Maximum Capacity
- IDE Translation Mode
- Multiple Sector Setting
- Fast Programmed I/O Modes

Hard Disk Type

The system is shipped with default is “Auto Detected” selected in this submenu. The system then automatically detects the hard disk type and sets the remaining parameters.

If your IDE hard disk does not features auto IDE type detection or your IDE hard disk was formatted on another system with parameters different than those reported by the drive. You need to select “User Definable,” and set the “Number of Cylinders,” “Number of Heads,” and “Number of Sectors.”

Maximum Capacity

The hard disk maximum capacity value is calculated from the cylinder, head, and sector information in the Hard Disk Type.

IDE Translation Mode

The IDE Translation Mode parameter controls the way in which the BIOS interacts with the drive in terms of drive geometry. Proper choice is dependent upon the drive’s size, capabilities, and the operating system (OS) used. the following choices are available.

- Standard CHS – is the translation mode that has been in use for years. Its use limits IDE capacity to a maximum of 528 MB regardless of the size of the drive used.
 - Logical Block – mode overcomes the 528 MB maximum size limitations imposed by the Standard CHS mode. It should be used only when the drive supports logical block addressing (LBA), and the OS supports LBA, or uses the BIOS to access the disk.
-

- Extended CHS – mode also overcomes the 528 MB maximum size limitations imposed by the Standard CHS mode. It can be used with drives which are larger than 528 MB, but does not support the LBA mode.
- Auto Detected (default) – allows the BIOS to examine the drive and determine the optimal mode. The first choice is to utilize Logical Block mode if it is supported by the drive. The second choice is to utilize Extended CHS mode in the drive topology allows. If neither of the above two methods are possible, then Standard CHS mode is used.

CAUTION: When set to Auto Detected the BIOS will detect what the drive is capable of, not the translation mechanism which was used to format the drive.

If a drive is run in a mode other than the mode in which it was partitioned and formatted, unpredictable results may occur, including data loss.

Different OS have different abilities regarding IDE translation Modes:

- UNIX – does not currently support either LBA or ECHS and must utilize the Standard CHS method. UNIX can support drives large than 528 MB, but does so in its own way.
- OS/2 2.1 and OS/2 WARP – can support LBA, ECHS, or Standard CHS methods. Note that LBA support may require a switch setting on an OS/2 driver in order to operate in the mode.
- OS/2 2.0 and Novel Netware – can support either, ECHS or Standard CHS methods, but not LBA.
- DOS and Windows – can support LBA, ECHS, or Standard CHS methods. If the “Fast 32-bit IDE” option of Windows is utilized, make sure to use the Standard CHS setting only, unless a version of WDCDRV.386 is being used which supports this advanced geometry.

You will get better performance not using “Fast 32-bit IDE” if using a drive which employs Mode 3 PIO on the PCI interface, unless using a version of WDCDRV.386 which supports these advanced modes.

Multiple Sector Setting

The Multiple Sector Setting field controls the number of sectors which are transferred by an IDE drive per interrupt generated. the choices are as follows:

- Disabled – generates an interrupt generated for each sector transferred, even if the OS issues a multisector transfer.
- 4 Sector/Block or 8 Sectors/Block – transferred 4 or 8 sectors per interrupt (for a requests that are as large or larger than 4 or 8 sectors).
- Auto Detect (default) – transfers x sectors transferred per interrupt, where x is the maximum value supported by the drive. If a drive does not support multiple sectors/block then the BIOS will operate as “Disabled.”

If the drive does not support the 4 or 8 sectors, the BIOS will default to the largest number of sectors smaller than the value supported by the drive.

Fast Programmed I/O Modes

The Fast Program I/O mode field controls the speed in which programmed I/O (PIO) transfers occur on the PCI IDE interface. This field should only be set to “Disabled” if a drive is being used which incorrectly reports an ability to function with advanced timings. The following two choices are available:

- Disabled – transfers occur at an unoptimized (Mode 0) speed.
- Auto Detect (default) – transfers occur at the rate which the drive reports as its maximum (up to and including the maximum mode 4 timing).

Language

The installed language will appear in the Setup and BIOS text strings. English (US) is the default in the U. S. and Canada

Boot Options

When the cursor is placed in the Boot Option field and you can select it by pressing Enter. The Boot Options Submenu appears allowing parameters which affect the boot process to be set.

Boot Options Submenu

The Boot Options Submenu lets you check or change the following bootup parameters.

Boot Sequence

The BIOS attempts to load the operating system in the sequence listed here. The defaults are as follows.

- First boot device – floppy disk
- Second boot device – hard drive
- Third boot device – disabled
- Fourth boot device – disabled

System Cache

The default for the System Cache field is “Enabled.” This field controls both the primary and secondary caches. Setting the system cache to “Disabled” will hurt performance, but might be required when running software which utilizes software timing loops and needs to be slowed down to execute properly.

Boot Speed

Boot speed refers the system CPU cycles. The default boot speed is “Turbo.” “De-turbo” mode slows the CPU by disabling the system cache and adding increased refresh cycles.

NOTE: “De-turbo” does not reduce the CPU speed to 8 MHz. If “De-turbo” is selected it will automatically “Disable” the System Cache.

NumLock

The NumLock field turns controls whether the NumLock key on the keyboard will be “On” or “Off” at bootup. The default is “On.”

Setup Prompt

The Setup Prompt field allows you to disable the “Press <F1> Key To Enter Setup” message displayed during POST. It does not control access, just the message. This field can be either “Enabled” or “Disabled,” the default is “Enabled.”

Typematic Rate Programming

The parameter controls whether the default of user configuration values are used for Typematic Rate Delay and Typematic Rate.

- Default – sets the Typematic Rate to 250 msec and Typematic Rate is set to 30.
- Override – provides the following two options. These options allowing the you to customize the values.

Typematic Rate Delay

The Typematic Rate Delay field controls how long it takes for the keyboard to auto-repeat function to start when a keyboard key is held down. The delay times are as follows.

- 250 msec (default)
- 500 msec
- 750 msec
- 1000 msec

Typematic Rate

The Typematic Rate Delay field controls the speed characters repeat when you hold down a keyboard key. The higher the number the faster the repeat, delay times are as follows.

- 6 char/sec
- 8 char/sec
- 10 char/sec
- 12 char/sec
- 15 char/sec
- 20 char/sec
- 24 char/sec
- 30 char/sec (default)

Video Mode

This field cannot be entered, it is an information field only. The system has a built-in video controller, the default is “Installed.”

Mouse

This field cannot be entered, it is an information field only. The system supports a PS/2 mouse. If the mouse is not installed the field will not be displayed. The default is “Installed.”

Base Memory

This field cannot be entered, it is an information field only. The system uses 640 KB of base memory.

Extended Memory

This field cannot be entered, it is an information field only. Displays the amount of system memory above 1 MB.

Advanced Menu

Selecting “Advanced” from the menu bar on the Main Menu displays a menu with the following options. Click on a topic for a description of the Advanced Menu options.

- Processor Type
- Processor Speed
- Cache Size
- Peripheral Configuration
- Audio Configuration
- Advanced Chipset Configuration
- Power Management Configuration
- Plug and Play Configuration

CAUTION: Setting items in this menu to incorrect values can cause your system to malfunction.

Processor Type

This field cannot be entered, it is an information field only. The processor is Pentium processor that is backward compatible with 8086, 80286, I386, and Intel 486 processors.

Processor Speed

This field cannot be entered, it is an information field only. The processor operates at internal speed of 120 MHz or 133 MHz and an external speed of 60 MHz for the 120-MHz processor or 66 MHz for the 133-MHz processors.

Cache Size

This field cannot be entered, it is an information field only. The processor has 16 KB of primary cache and the system board has 256 KB of secondary cache.

Peripheral Configuration

When the cursor is placed in the Peripheral Configuration field, you can select it by pressing Enter. The “Peripheral Submenu” appears for setting parameters which affect the IDE devices, diskette drive, serial ports, and parallel port.

Peripheral Submenu

The Peripheral Submenu lets you check or change the following peripheral parameters.

Peripheral Configuration Mode

The Peripheral Configuration Mode fields control whether the onboard resources are manually or automatically setup. The options are as follows.

- Auto (default) – automatically configures the IDE devices, diskette drive, serial ports, and parallel port during power up.
- Manual – provides the following options. This selection allowing the you to customize the peripheral ports.

PCI IDE Interface

The PCI IDE Interface field enables the PCI interface connector on the system board. This field can be either “Enabled” or “Disabled.” The default is “Enabled.”

Floppy Interface

The Floppy Interface field enables the diskette drive interface connector on the system board. This field can be either “Enabled” or “Disabled.” The default is “Enabled.”

Serial Port (1 and 2) Address

The serial ports 1 and 2 may be “Disabled.” When “Enabled” is not selected, you must choose an address.

The serial COM port and addresses are as follows. When an option is selected for one serial port the selection is not available for the second port.

- Disabled
- COM1, 3F8h (port 1 default)
- COM2, 2F8h (port 2 default)
- COM3, 3E8h
- COM4, 2E8h

Serial Port 2 IR Mode

The Serial Port 2 IR Mode field allows you to dedicate Serial Port 2 for Infra-red applications. This field can be either “Enabled” or “Disabled.” The default is “Enabled.”

Parallel Port Address

The parallel ports may be “Disabled.” When “Disabled” is not selected, you must choose an address. The parallel port address options are as follows.

- Disabled
- LPT3, 3BCh
- LPT1, 378h (default)
- LPT2, 278h

Parallel Port Mode

The Parallel Port Mode field options are as follows.

- Compatible – sets the parallel port to the standard AT compatibility.
- Bi-directional (default) – sets the parallel port to input/output mode only.
- ECP – sets the parallel port to the Enhanced Capabilities Port (ECP) mode.
- EPP – sets the parallel port to the Enhanced Parallel Port (EPP) mode.

Audio Configuration Mode

The Audio Configuration Mode field controls whether the onboard audio resources. The options are as follows.

- Auto (default) – automatically configures the audio subsystem during power up.
- Manual – allows the user to configured onboard audio subsystem.
- Disabled – removes the onboard audio resources.

Advanced Chipset Configuration

When the cursor is placed in the Advanced Chipset field and you can select it by pressing Enter. The “Advanced Chipset Submenu” appears allowing parameters which affect the system performance.

Advanced Chipset Submenu

The Advanced Chipset Submenu lets you check or change the following chipset parameters

- Base Memory Size
 - ISA LFB Size
 - ISA LFB Base Address
 - Video Palette Snoop
 - Latency Timer (PCI Clocks)
-

- PCI Burst
- Banks 0 and 1 SIMM Detected

Base Memory Size

The Base Memory Size field controls the mapping of addresses between “512 KB” and “640 KB.” The two choices are described as follows.

- 512 KB – directs address mapping between 512 KB and 640 KB to the ISA bus.
- 640 KB (default) – directs address mapping between 512 KB and 640 KB to the system DRAM. Unless using an ISA expansion board that requires access to this address range, this field should not be changed.

ISA LFB Size

The ISA Video Linear Frame Buffer (LFB) Size provides a mechanism for creating a hole in the system memory map. Address accesses made to this hole will be directed to the ISA bus instead of main memory.

This “Disabled” setting should not be changed unless you are using an ISA board which has memory greater than 64K, needs to be accessed by the CPU, and you are not using the Plug and Play run-time utilities. The following choices are available.

- Disabled (default)
- 1 MB

ISA LFB Base Address

This field cannot be entered, it is an information field only. If the ISA LFB field is “Disabled” this field does not appear.

The ISA Video LFB Base Address field displays “15 MB” (the starting address of the ISA memory hole) if “1 MB” is chosen the ISA LFB Size parameter.

Video Palette Snoop

The Video Palette Snoop field enables card “snoop” (also called RAMDAC shadowing) write cycles to the ISA video card’s palette registers. This field can be either “Enabled” or “Disabled,” the default is “Disabled.”

This should only be set to “Enabled” if all of the following conditions are occur.

- An ISA card connects to a PCI Graphics card via the VESA connector
 - The ISA card connects to a color monitor
 - The card uses the RAMDAC on the PCI card
 - The palette snooping feature is broken on the PCI card
-

Latency Timer (PCI Clocks)

The Latency Timer (PCI CLOCKS) field controls the length of time an agent on the PCI bus can hold the bus when another agent has requested the bus. Value choices range between 0 and 256, the default value is 66.

In general this should not be changed. If there are latency sensitive cards in the system (such as audio cards and/or network cards with small buffers) this can be set to a lower value to reduce latency.

If there are no latency sensitive cards in the system, but I/O intensive applications are being run, this can be increased to slightly improved performance.

PCI Burst

Disable PCI Burst when installing slower PCI video cards. The default is “Enabled”.

Banks 0 and 1 SIMM Detected

These fields cannot be entered, it is an information field only. These fields displays either “Fast Page Mode,” “EDO Mode,” or “None installed” depending upon what the BIOS detects.

Power Management Configuration

When the cursor is placed in the Power Management field and you can select it by pressing Enter. The “Power Management Submenu” appears for setting parameters which affect the power saving features.

Power Management Submenu

The Power Management Submenu lets you check or change the Advanced Power Management parameter. Selecting the Advanced Power Management field enables or disables power management support in BIOS.

Power management reduces the amount of energy used after specified periods of inactivity. The Advanced Power Management menu offers you the choice of operating the system in a full on state or standby state with partial power reduction when idle.

NOTE: This field must be enabled to be Energy Stay Compliant.

- Enabled (default) – allows the BIOS to work with the OS and reduce power consumption when idle. This selection allowing the you to customize the following power management fields.
-

- Disabled – keeps the computer in a full on state and eliminates the following power management options.

IDE Drive Power Down

The IDE Drive Power Down field controls whether or not a spin down command will be issued to the IDE drives when the system goes into low power mode. This field can be either “Enabled” or “Disabled.” The default is “Enabled”.

VESA Video Power Down

The VESA Video Power Down field controls the VESA power management command issued to the graphics card when the system goes into low power mode. Setting are dependent upon the VESA mode(s) supported by your graphic card. The following choices are available.

- Disabled
- Standby (default)
- Suspend
- Sleep

Inactivity Timer (Minutes)

The Inactivity Timer (Minutes) field controls the number of minutes that the system will detect no user activity before going into low power mode. Minutes range between 0 and 255; the default value is 30 minutes.

Hot Key

The hot key field is used to define a key which, when entered, will cause the BIOS to put the OS into power management mode. Use this field to choose an *alphabetic character*. Press **CTRL + ALT + *user defined alphabetic character*** when not in Setup to use the feature. Typically, there is some delay before the system enters power manage mode; the speaker issues two tones.

If there is a User Password in effect the Num Lock, Caps Lock, and Scroll Lock lamps on the keyboard to flash in sequence, indicating that the system is in Secure Mode. (See Set User Password field in “Security Menu.”)

In this case the password will have to be entered before you regains control of the system. This password will not be echoed to the screen. The following table describes how the Powerdown hot key interacts with the Security Hot Key.

Table Section 2-4 Hot Key Parameters

Hot Key	Function
Powerdown Hot Key Enabled Only	System powers down Powers up when any key/mouse activity is detected.
Security Hot Key Enabled Only	System secure immediately Keyboard lamps blink Input accepted when password typed
Both Hot Keys Enabled	System secure immediately System powers down Keyboard lamps blink Input accepted when password typed Powers up when any key/mouse activity is detected.

Plug and Play Configuration

When the cursor is placed in the Plug and Play Configuration field, you can select it by pressing Enter. The Plug and Play Submenu appears for setting parameters which allow the BIOS to setup PCI and ISA Plug and Play expansion boards.

Plug and Play Submenu

The Plug and Play Submenu lets you check or change the Configuration Mode parameters.

The Configuration Mode field is used to choose the method in which information about legacy ISA expansion boards (ISA boards which do not have Plug and Play capabilities) is conveyed to the BIOS to allow the BIOS to set up PCI and ISA plug and Play expansion boards without conflicting with the legacy ISA cards. The choices are as follows.

- Use ICU – The BIOS depends upon the information provided by run-time Plug and Play software (Configuration Managers and ICU). When “Use ICU” is chosen, the BIOS depends on run-time software to ensure that there are no conflicts between ISA boards with plug and play capabilities and those without.
 - Use Setup Utility (default) – The BIOS depends upon the information provided by you in the following fields to prevent conflicts between the Plug and Play and ISA legacy boards. You should not install and use run-time Plug and Play software such as Configuration Managers and the ISA Configuration Utility (ICU).
-

ISA Shared Memory Size

The ISA Shared Memory Size field is used to set a block of system memory which will not be shadowed (shadowing is a technique which copies a block of memory from an add in the expansion board's ROM to the same address in the system memory to allow faster access to the code and achieve higher performance).

If "Disabled," all upper memory is shadowed and ISA Shared Memory Base Address field is not displayed. This field provides the following choices.

When a value other than "Disabled" is selected, a block is unshadowed and the ISA Shared Memory Base Address field will appear.

- Disabled
- 16 KB
- 32 KB
- 48 KB
- 64 KB (default)
- 80 KB
- 96 KB

NOTE: If a value of "96 KB" is selected, then the ISA Shared Memory Base Address field can only be set to C8000h; if "80 KB," then a value of C8000 or CC000h, etc.

ISA Shared Memory Base Address

The ISA Shared Memory Base Address field is only displayed when an ISA Shared Memory Size has been selected. The choices are as follows.

- C8000h (default)
 - CC000h
 - D0000h
 - D4000h
 - D8000h
 - DC000h
-

Boot with PnP OS

The Boot with PnP OS field enables the system to boot with an operating system capable of managing plug and play add-in cards. The choices are as follows.

- None
- Other
- Windows95 (default)

Available interrupt requests (IRQ) between IRQ3 through IRQ15 will be displayed. Interrupts consumed by on-board resources will not be visible (IRQ3 serial port 1, IRQ4 serial port 2, IRQ5 parallel port, and IRQ15 IDE interface).

NOTE: All but one IRQ can be set to “Used By ISA Card.” One must remain available for a PCI expansion board.

Security Menu

There are two types of passwords available: “User Password” and “Administrative Password”. The user passwords can be used to access the Setup Utility, the keyboard upon initial boot and the keyboard when used in conjunction with the Security Hot Key. The Administrative Password is used to control access to the Setup Utility. The following table describes the interaction between these passwords.

Table Section 2-5 *Security Passwords*

Password Enabled	Password at Boot	Access Setup	Access All Setup Fields	Set Unattended Start	Set Security Hot Key
User Password Only	Yes	No	Yes	Yes	Yes
Administrative Password Only	No	Yes	Yes	No	No
Both User and Administrative Passwords	Yes	No	No (User) Yes (Admin)	Yes	Yes
No Passwords Enabled	No	No	Yes	No	No

If the Administrative Password is in effect and Setup is entered with the User Password only the following fields may be changed.

- System Date
- System Time
- User Password
- Security Hot Key
- Unattended Start
- Power Management Hot Key

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

The Security Submenu lets you check or change the following password parameters.

NOTE: If neither the User or Administrative Password is “Enabled,” the Unattended Start and Security Hot Key fields are not displayed.

- User Password

This field allows you to enable a user level password during POST and to enter Setup. When both the “User Password is” and “Administrative Password is” are “Enabled,” only the Administrative Password gives you full access to all Setup fields. This field can be either “Enabled” or “Disabled,” the default is “Disabled.”

- Administrative Password

This field allows you to enable an administrative level password during POST and to enter Setup. When both the “User Password is” and “Administrative Password is” are “Enabled,” only the Administrative Password gives you full access to all Setup fields. This field can be either “Enabled” or “Disabled,” the default is “Disabled.”

Set User Password and Set Administrative Password

Enable either or both the User or Administrative Passwords and a dialog box with the following prompts appears. Passwords are not case sensitive.

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

```
Enter new password: [      ]  
Confirm new password: [      ]
```

If there is already a User or Administrative Password and a dialog box with the following prompts appears.

```
Enter current password: [      ]  
Enter new password: [      ]  
Confirm new password: [      ]
```

Unattended Start

The Unattended Start field controls the point at which the User Password is required. The Unattended Start field can only be set if a User Password is in effect.

Disabled (default) – prompts the user for the password before the system boots. The text string prompt “Enter Password (1).” is displayed.

Enabled – completely boots the system (including running CONFIG.SYS and AUTOEXEC.BAT), then locks the keyboard. The User Password must be entered to unlock it. The BIOS does not provide any prompt string.

Security Hot Key (CTRL-ALT-)

The Security Hot Key field is used to lock the keyboard when you step away from the system. When you press **CTRL + ALT + *alpha-numeric key*** (the alpha-numeric key is defined by the user) the system enters secure mode (locks the keyboard).

When this Hot Key combination is entered the Num Lock, Caps Lock, and Scroll Lock lamps on the keyboard will flash in sequence, indicating that the system is in secure mode.

Exit Menu

Selecting “Exit” from the menu bar displays the following exit options. Click on a topic for a description of the Exit Menu options. Note that **Esc** does not exit this menu. You must select one of the items from the menu or menu bar to exit.

- Exit Saving Changes
 - Exit Discarding Changes
 - Load Setup Defaults
 - Discard Changes.
-

Exit Saving Changes

After making your selections on the Setup menus, always select “Exit Saving Changes” to make them operative.

When “Exit Saving Changes,” has been selected, the program displays this message:

```
Exit Saving Changes?  
Press Enter to Continue  
Press ESC to Abort
```

To save the changes and exit Setup press **Enter**. Press **Esc** to return to the Exit submenu without affecting your changes.

Exit Discarding Changes

Use this option to exit Setup without recording any changes you may have made. After you select “Exit Discarding Changes, the program displays this message:

```
Exit Discarding Changes?  
Press Enter to Continue  
Press ESC to Abort
```

To exit Setup without saving the changes press **Enter**. Press **Esc** to return to the Exit submenu without affecting your changes.

Load Setup Defaults

To load all the default Setup values in the Setup menus, select “Load Setup Defaults” from the Exit Submenu. Reloading the defaults does not affect the any set passwords. The program displays this message:

```
Load Setup Defaults?  
Press Enter to Continue  
Press ESC to Abort
```

To load the defaults shipped with the system press **Enter**. Press **Esc** to return to the Exit submenu without affecting your changes.

Discard Changes

To undo any changes you have made in the Setup menus in since Setup was last saved, select “Discard Changes.” The program displays this message:

```
Discard Changes?  
Press Enter to Continue  
Press ESC to Abort
```

To reset all changes made in the current session of Setup, press **Enter**. Press **Esc** to return to the Exit submenu without affecting your changes.

Flash 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.

See the following subsection, "NEC Bulletin Board Service," for information about using the bulletin board (available in the U.S. and Canada).

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.

Video Drivers

Video drivers let you take advantage of your computer's integrated video hardware and extended graphics modes. Your system ships with the following Windows video drivers preinstalled on the hard disk:

- 640 by 480, 16 colors
 - 640 by 480, 256 colors
 - 640 by 480, 64K colors
 - 640 by 480, 16.8 million colors
 - 800 by 600, 16 colors
 - 800 by 600, 256 colors
 - 800 by 600, 64K colors
 - 800 by 600, 16.8 million colors
 - 1024 by 768, 16 colors
-

- 1024 by 768, 256 colors
- 1024 by 768, 64K colors
- 1280 by 1024, 16 colors
- 1280 by 1024, 256 colors
- 1600 by 1200, 16 colors
- 1600 by 1200, 256 colors.

The default video mode is 800 by 600 pixels with 256 colors. You can change the default video resolution in Windows Control Panel. You can also change the video resolution and other video features such as refresh rates in Windows (see the following subsection “Changing Video Drivers”).

Additional VGA drivers are available for a variety of software applications through the NEC Bulletin Board Service (see “NEC Bulletin Board Service” earlier in this section).

NOTE: A multifrequency monitor, such as an NEC MultiSync[®] monitor, is required to access the extended graphics mode.

Changing Video Drivers

If Windows 95 is installed change the video drivers through the control panel.

1. Start Windows 95, and Point to Settings.
2. Click on Control Panel.
3. Double-click the Display Icon on the Control panel. The Display Properties sheet appears.
4. Click the Settings tab.
5. Choose the number of colors by setting the Color palette box.
6. Choose a video resolution supported by both the system and the monitor by sliding the Desktop Area slide bar.
7. Click the Apply button to restart your computer with the new settings.

When using Windows 3.11, changes to the resolution in the system by using the Galileo control panel. To access the control panel,

1. Start Windows.
2. In the Main program group, open the Control Panel icon.
3. Open the panel called Galileo to view the graphics system control panel.

The Galileo control panel provides five buttons that you can select to either make changes to the graphics configuration or get information about the graphics system. When you click on any of the buttons, a menu or information screen appears.

NEC Backup Utility

NEC Backup is a utility that makes Microsoft Backup easier to use. It helps you start up the proper backup procedure. When you choose a backup option, NEC Backup runs Microsoft Backup with the proper configuration file for your choice.

NEC Backup gives you two backup options:

- **Full Backup** — Use this option to back up all of the files on your hard disk. NEC recommends that you select this option when you first start up your system. Full Backup provides you with a copy of all of the software on the system as it was delivered to you.

CAUTION: Perform a Full Backup immediately. This procedure provides the only way to restore your system in the event of a hard disk failure.

- **Incremental Backup** — Select this option to back up only the files that have changed since the last backup. Use this option between Full Backups to retrieve only the few files that have changed during the normal operation of your computer.

Incremental Backup is fast, takes only a few diskettes and usually gets your most important files (the ones that you have changed) rather than every miscellaneous file on your drive).

NEC Backup Controls

NEC Backup provides the following controls for selecting backup functions:

- Type of backup box — Contains the list of backup procedures that you can choose, “Full backup” and “Incremental backup.”
- Full backup button — Selects the Full Backup procedure for Microsoft Backup.
- Incremental backup button — Selects the Incremental Backup procedure for Microsoft Backup.
- Start the selected backup button — Runs Microsoft Backup using the backup procedure you selected in the “Type of backup box”. The utility verifies the selected backup procedure before it runs Microsoft Backup.
- Remove from StartUp group button — Removes NEC backup from your Windows StartUp group.

NEC Backup was placed in your Windows StartUp group to prompt you to do a backup when you run your new system for the first time. It appears automatically every time you run Windows. If you do not want NEC Backup to run every time you enter Windows, click on this button to remove NEC Backup from your StartUp group.

- Help — Brings up this help document.
- Exit — Exits NEC Backup.

Start Up

To use the NEC Backup, follow these simple steps:

1. Choose (click) a backup procedure in the “Type of backup box.” This provides a backup type for Microsoft Backup to run, but does not start the backup procedure.
2. Click on “Start the selected backup.” NEC Backup prompts you to verify the selected backup type. Confirm the backup type. Microsoft Backup runs the selected procedure.
3. Select the “Exit” button to exit NEC Backup.

Guidelines for Backups

Incremental Backups are particularly useful right before you do something that might endanger data files for certain sets of files. For example, before you make modifications to a database or set of drawings. Or when you write new code and need to test it.

However, if you are making major changes to your system, such as installing a large new software product or a new operating system, perform a Full Backup before the installation. This lets you restore your software in the event that a problem causes a hard disk failure or severely changes the setup of your system.

Full backups are also recommended after you do several incremental backups. This lets you recover a full system with much fewer disk swaps. There is a greater chance for error when too many incremental backups fall between full backups. If incremental backups are restored out of order, files may be lost inadvertently.

NEC recommends the following two-month backup schedule for reliable backups with the least amount of diskettes:

- A monthly Full Backup with new diskettes.
- Four weekly Incremental Backups using new diskettes each week so files aren't lost.
- A monthly Full Backup with new diskettes at the same time as the fourth weekly backup.

If there are any severe problems during the backup, this monthly backup will be the same as the four weekly incremental backups plus the last month's full backup. Therefore, it is important NOT re-use last month's Full Backup diskettes at this time.

- Four weekly Incremental Backups using last month's weekly diskettes. Since the monthly Full Backup was successful, the weekly diskettes are no longer needed.
- A monthly Full Backup using the diskettes from two months ago. Since last month's Full Backup replaces the two-month old backup, the diskettes are now safe to use.

Follow this schedule and you will never lose more than a week's work at most.

DESKTOP MANAGEMENT INTERFACE

The Desktop Management Interface (DMI) is the new standard for managing computer systems. DMI is an interface between management applications and managed components such as systems, network boards, and printers used with or without networked computers.

DMI allows a computer running a network management application to retrieve system information such as the system serial number, product model number, BIOS revision number, memory capacity, disk capacity, expansion board settings, or applications.

It is easy to get the status of each system via DMI even if the network consists of computers from different manufacturers. DMI is not a protocol but an interface. It 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
- Windows Management Information Format (MIF) 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 Products

Manageable products are hardware, software, or peripherals that occupy or are attached to a desktop computer or network server. These can be hard disks, word processors, CD-ROMs, printers, operating systems, graphics boards, modems, etc. Manageable products or components can come with the system or be added later. Each component supplies information to the MIF database by means of a MIF file 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 CI module is a Windows Direct Interface application provided by NEC Technologies. The module uses the CI to communicate with the SL and provides management for a set of components defined in the PC system group standard MIF. The NEC implementation of this MIF provides management for a variety of attributes. Windows starts the CI module which must be running in the background. The module is added to the Windows StartUp program group during DMI setup.

DMI Browser

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

The Browser is a local application; it only accesses 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 *Viewer* has two sections: a QuickViewer and a detailed browser. The QuickViewer displays initially and contains a great deal of pertinent information. It also displays eight buttons that allow you to display more information on each subject. The organization of the data is designed to make it easier for a user to get a comprehensive view of the system.

To display the original browser, select either the Details tab or the Details option on the View menu. This initiates a hierarchical view of the MIF database and allows the user to make some changes to maintain system consistency. For example, if a system is transferred to another department or user, the primary user name, telephone number and system location should 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 buttons are defined as follows (starting at the left):

- Install — to install a new MIF file. Use to add a component, such as a printer that supports DMI, to the MIF database.
- Remove — to remove a MIF file. Use to remove a component from the MIF database. Only remove the system component when it needs to be replaced.
- 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.

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.

If trouble is experienced in using the NEC DMI Browser, here are a few suggestions on how to clear up the problem.

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.

Section 3

Option Installation

This section provides instructions for installing the following options:

- expansion boards
- SIMM upgrade
- processor upgrade
- data storage devices
- audio wave upgrade
- external options.

All options require that the system cover be removed. Procedures for removing the cover are 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 you work inside the system and when you handle computer components. Avoid electric shock or personal injury by observing the following warning.

NOTE: Before removing the system unit side panel, 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 the computer components by following these safety instructions.

CAUTION: Electrostatic discharge can damage computer components. Discharge static electricity by touching a metal object before you remove the system unit side panel.

- Avoid carpets in cool, dry areas. Leave an option, such as a board or chip, in its anti-static packaging until you are 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 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, be sure to route the cable so it is not pinched by other components and it is out of the path of the system unit side panel. Prevent damage to the connectors by aligning connector pins before connecting the cable.

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

Optional Hardware

The system supports a variety of NEC and industry-standard options. Many optional components are available for customizing the computer.

The following information describes the hardware that the system can accommodate.

CAUTION: Review the “Precautions” before following any installation procedures for the system.

- Monitors

The system supports the connection of a VGA-compatible monitor, such as NEC MultiSync 3V and MultiSync XE and XP series monitors, and a resolution (dependent on the monitor) of up to 1600 by 1200 with 256 colors, 1280 by 1024 with 256 colors, 1024 by 768 with 64,000 colors, 800 by 600 with 64,000 colors, or 800 by 600 with 16.8 million colors.

- Memory expansion

There are four single in-line memory module (SIMM) sockets located on the system board for the installation of SIMM upgrade kits. The system supports up to 128 MB of high-speed memory (see “SIMM Upgrade”).

- Drives

System accommodates a total of six data storage devices. With the standard diskette drive and hard disk installed in the 3 1/2-inch drive bracket, there is still one more 3 1/2-inch slot available for a second hard disk drive.

The system also provides three accessible, 5 1/4-inch, 1.6-inch high device slots for optional storage devices. In multimedia configurations a CD-ROM reader is installed in the top slot. See “Data Storage Devices” for information on installing optional devices.

- Processor upgrade

- A 320-pin zero insertion force (ZIF) socket on the system board supports the primary processor or an OverDrive processor for upgrades.

NOTE: Incorrect installation of the processor chip can damage the system board, the chip, or both. See “Processor Upgrade” for detailed information.

- External options

Peripherals, such as state-of-the-art parallel printers and serial devices are compatible with the system. See “Adding External Options” for information about attaching peripherals to the system unit ports.

REMOVING THE SYSTEM UNIT SIDE PANEL

Before installing optional hardware inside the computer, first remove the system unit side panel. The side panel must be removed to access internal configuration switches.

Removing the Side Panel

WARNING: Before removing the system unit side panel, 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 device (such as a printer) connected from the rear of the system.

CAUTION: Electrostatic discharge can damage computer components. Discharge static electricity by touching a metal object before you remove the system unit side panel.

3. Remove the two side panel screws from the rear of the system unit. If you have installed a padlock on the system, unlock the padlock and remove it.

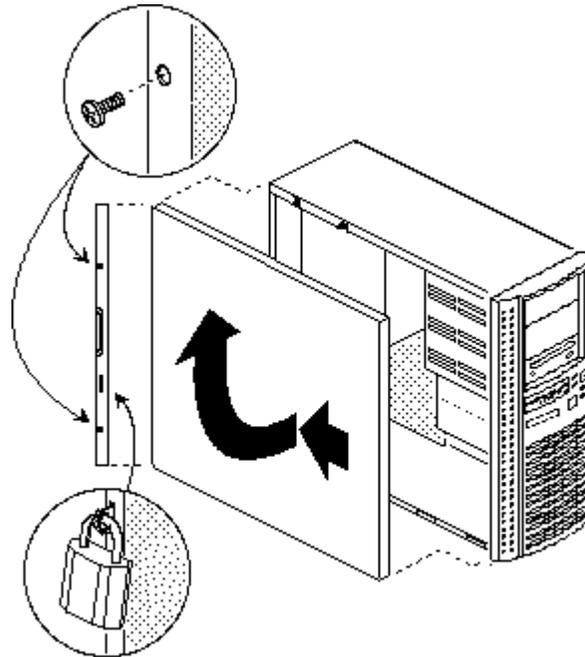


Figure Section 3-1 Side Panel Removal

4. From the rear of the system, position one hand on the protruding handle and the other hand under the side panel and slide the panel toward the rear about one inch.
5. Lift the side panel away from the system unit.

To replace the side panel, see the following procedure “Replacing the Side Panel.”

Replacing the Side Panel

CAUTION: To prevent damage to system cables, carefully tuck the cables out of the path of the side panel.

1. Position the side panel on the side of the system unit about one inch back from the front panel. Turn off and unplug the system unit.
2. Insert the tabs along the inside top and bottom of the panel with the slots in the unit frame.
3. Slide the side panel forward to meet the front panel.
4. Secure the side panel with the two panel screws removed earlier. Lock the system with a padlock if you desire.
5. Connect the monitor, keyboard, mouse, and any other external options to the rear of the system unit.

ADDING INTERNAL OPTIONS

This subsection provides instructions for installing the following options:

- expansion boards
 - SIMM upgrade
 - processor upgrade
 - data storage devices
 - audio wave upgrade
-

All options require that the system cover be removed. Procedures for removing the cover are included in this section. Use the figure to locate the sockets and connectors for system board upgrades.

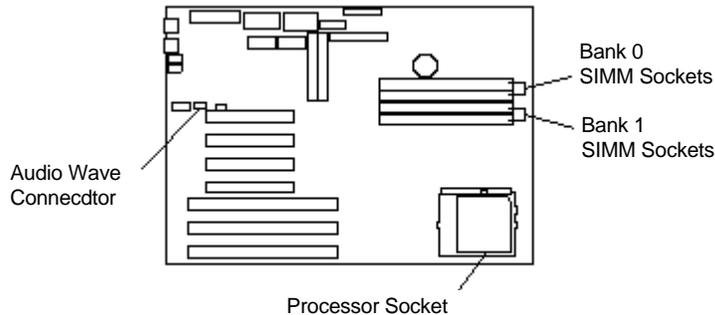


Figure Section 3-2 System Board Upgrade Sockets and Connectors

Expansion Boards

The computer supports ISA Plug and Play expansion boards (see “Plug and Play Support” in Section 1. Plug and Play expansion boards allow you to simply install the 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- or 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.

NOTE: The system unit side panel must be removed before installing an expansion board. See “Removing the Side Panel”.

Slot Locations

The system has six expansion board slots:

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

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.

ISA expansion slots support industry-standard 8-bit or 16-bit expansion boards. The shared PCI/ISA slot can be used either for a PCI or an ISA expansion board.

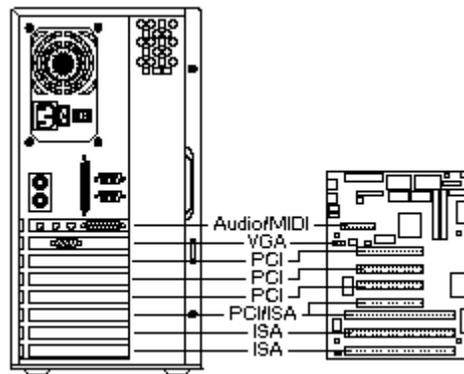


Figure Section 3-3 Expansion Slots Locations

Expansion Board Installation

1. Remove the system unit side panel (see “Removing the Side Panel” in this section).
2. Follow any preinstallation instructions that comes with the expansion board (such as setting switches or jumpers on the board).
3. Remove the screw securing an expansion slot cover and remove the cover.

Save the screw for installing the expansion board. Store the slot cover in case you choose to remove the expansion board in the future.

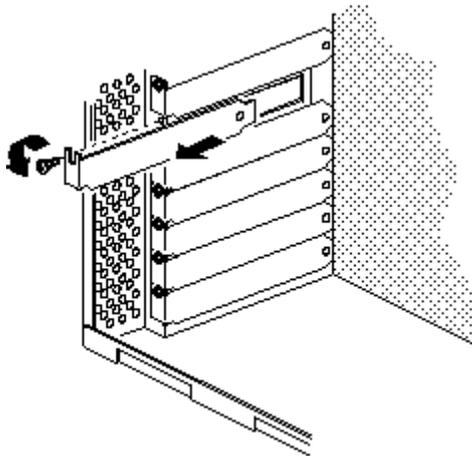


Figure Section 3-4 Removing a Slot Cover

4. Hold the board by its edges and insert it into the expansion slot. 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. You might have to gently rock the board from side-to-side to seat it into the connector.

5. Insert the screw removed earlier to secure the expansion board to the support bracket.

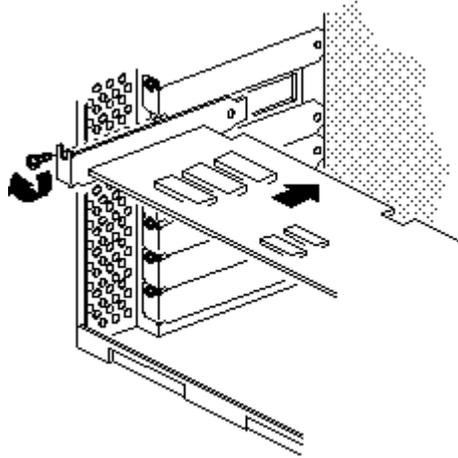


Figure Section 3-5 Inserting the Expansion Board

6. Attach any signal cables required by the expansion board.
7. Replace the system unit side panel (see “Replacing the Side Panel” in this section).

Expansion Board Removal

1. Remove the system unit side panel (see “Removing the Side Panel” in this section).
 2. If you have any cables connected to the board that you need to remove, label the connectors before you remove them.
 3. Remove the screw that secures the board to the support bracket (see “Expansion Board Installation” in this section).
 4. Pull the board out of the connector. You might have to gently rock the board from side-to-side to release it from its connector.
 5. Replace the system unit side panel (see “Replacing the Side Panel” in this section).
-

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 memory. The system supports the following 32-bit (non-parity) 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).

36-bit SIMMs may be used, but parity generation and checking is not supported.

NOTE: SIMM sticks must have a speed of 70 nanoseconds (ns) with Fast Page Mode or 60 ns with Extended Data Output.

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

To determine the memory needed for the memory upgrade, see Table Section 3-1. If you are ready to install the SIMM sticks, see “SIMM Installation” in this section.

Checking the Memory in the System

Use the following procedure to:

- check the memory installed in the system
- to determine the SIMM configuration you need to increase the memory
- to identify the correct sockets for SIMM installation.

1. Locate the four SIMM sockets on the system board (see Figure Section 3-2).

If any cables block access to the SIMM sockets, label and disconnect them. If any boards block access to the sockets, remove them (see “Expansion Board Removal”).

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

Table Section 3-1 Recommended Memory Upgrade Path

Total Memory	Bank 0	Bank 0	Bank 1	Bank 1
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.

SIMM Removal

If the SIMM configuration requires the removal of a SIMM, remove the SIMM as follows.

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

1. Press the metal clips at the outer edges of the socket away from the SIMM.
2. Push the SIMM away from the locking tabs and remove it from the socket.

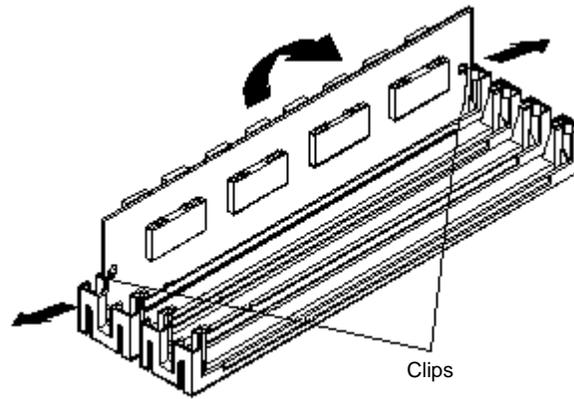


Figure Section 3-6 Removing a SIMM

SIMM Installation

1. Remove the system unit side panel (see “Removing the Side Panel”).
2. Locate the correct SIMM sockets for the desired configuration (see Figure Section 3-2).

If you need to remove a currently installed SIMM, see “SIMM Removal.”

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

3. Align the notched end of the SIMM with the socket end closest to the bottom of the system.
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.

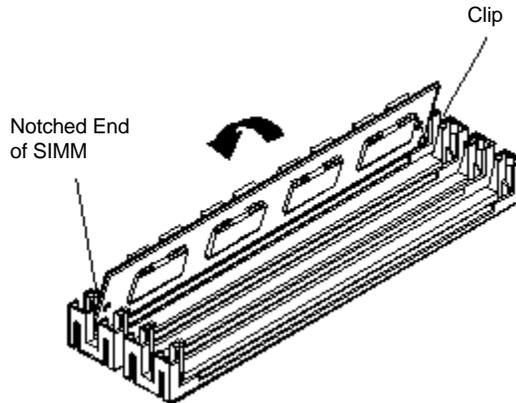


Figure Section 3-7 *Inserting the SIMM*

6. Replace any cables or boards that you may have removed during this procedure.
7. Replace the system unit side panel (see “Replacing the Side Panel”).

NOTE: If you find a discrepancy in the amount of memory displayed at the Power-On Self-Test with the amount of memory that you installed, check that you installed the SIMMs correctly.

Processor Upgrade

The zero-insertion force (ZIF) socket makes a processor upgrade easy. The 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 upgrade processor.

When upgrading the processor, you must first remove the processor currently installed in the system (see “Processor Removal”).

Once removed, you can then install the upgrade processor, see “Processor Installation.”

Processor Removal

To remove the installed processor on the system board, proceed as follows.

1. Remove the system unit side panel (see “Removing the Side Panel”).
2. Locate the processor socket (see Figure Section 3-2).
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.

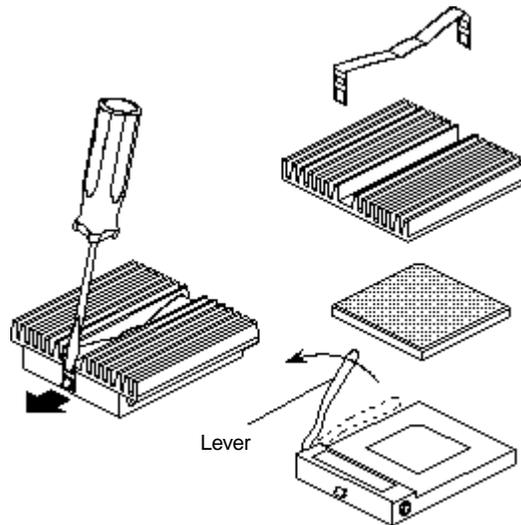


Figure Section 3-8 Releasing the processor

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.
 6. Install the new upgrade processor (see the following procedure “Processor Installation”).
-

Processor Installation

1. Remove the processor currently in the system (see the previous procedure “Processor Removal”).

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.

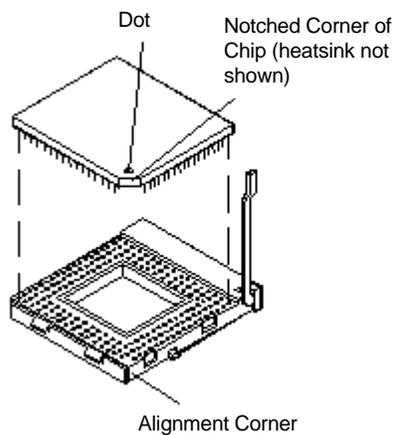


Figure Section 3-9 *Aligning the Processor with the Socket*

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 to install any new heatsink required for the upgrade processor.

4. Check to see if the newly installed processor requires the switches on the system board to be changed (see Appendix B, “System Board Switches”).
 5. Replace the system unit side panel (see “Replacing the Side Panel” earlier in this section).
-

Audio Wave Upgrade

The system board provides a connector for the installation of an industry standard audio Wave upgrade (see Figure Section 3-2). Follow the installation instructions provided with the option you purchased.

Data Storage Devices

The following sections provides information about installing storage devices in the system.

- Device Support
- Device Slots
- Device Preparation
- Device Cables
- Storage Device Installation

Device Support

The system board in the computer supports the following peripheral 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 system has six storage device slots:

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

You can install accessible devices such as a diskette drive, tape drive, or CD-ROM reader with a 5 1/4-inch form factor (frame) in the 5 1/4-inch slots.

You can also install a hard disk with a 5 1/4-inch form factor in the 5 1/4-inch slots.

Section 3

Option Installation

Figure Section 3-1 shows the device slot locations.

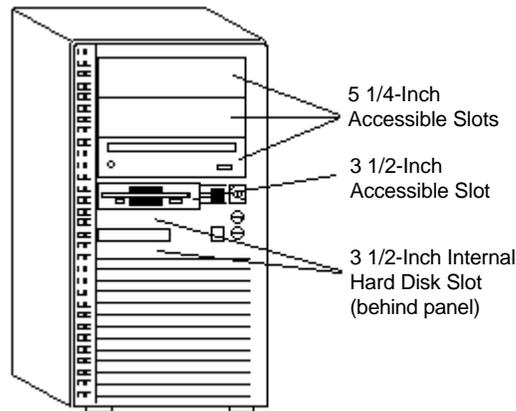


Figure Section 3-1 Device Slot Locations

Device Preparation

Before you install a storage device in the system, follow any preinstallation instructions that come with the device.

For example, check the following items for these devices:

- 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 you install 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 that you use to install optional storage devices in the system include:

- Diskette Drive Signal Cable
- IDE Signal Cables
- System Power Cables.

The existing diskette drive and IDE cables each support two devices. Cable connector locations on the system board are shown in the following figure.

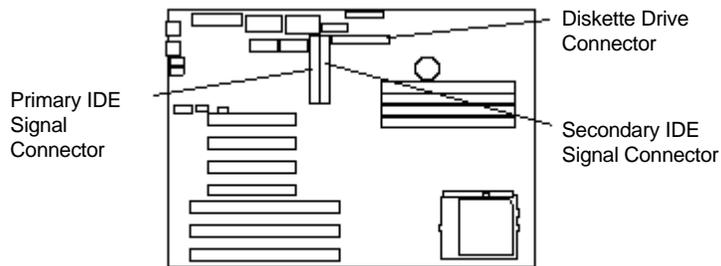


Figure Section 3-3 System Board Cable Connectors

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 the 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.

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

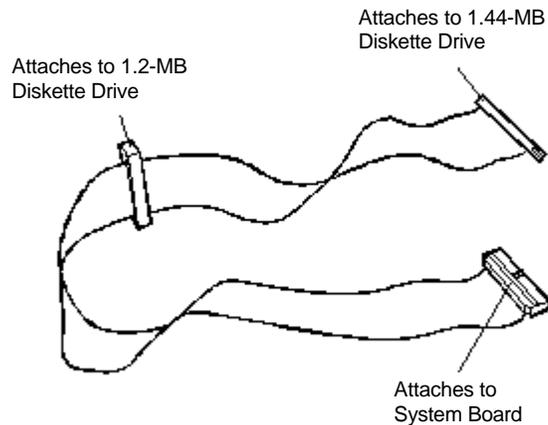


Figure Section 3-4 Diskette Drive Signal Cable

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 you install an optional IDE CD-ROM reader, connect it to the secondary IDE connector. This lets you use the primary IDE port for hard disks.

The following figure shows a typical three-connector IDE signal 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.

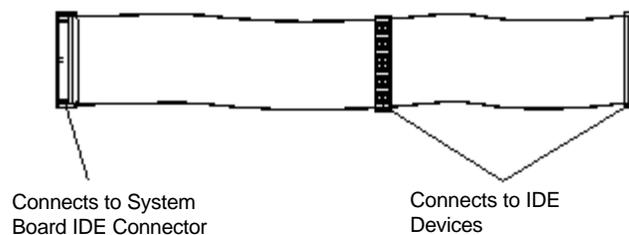


Figure Section 3-5 IDE Cable Connectors

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.

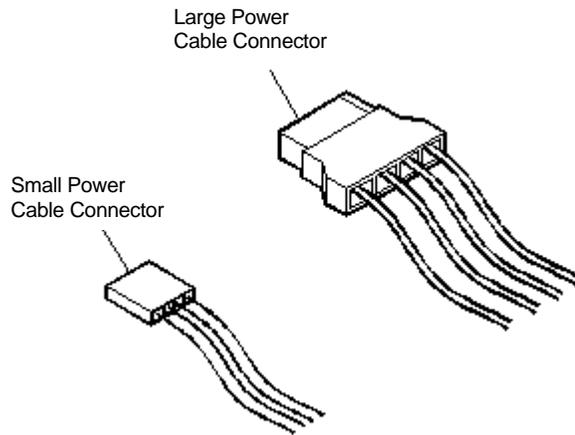


Figure Section 3-6 Power Cable Connectors

Device Cabling

All storage devices require a power and signal cable connection. Devices shipped with the system are already connected. When installing an optional storage device click on the type of connection required.

- Cabling an IDE Device, such as an IDE hard disk drive or CD-ROM reader.
- Cabling a Diskette Drive, such as the 1.2-MB diskette drive.

Cabling an IDE Device

1. Connect the appropriate connector on the IDE signal cable to the IDE connector on the IDE device. Align the colored edge of the cable with the pin 1 side of the device connector.

NOTE: For best performance, connect the standard and optional hard disk drive on the same IDE signal cable (using the primary IDE connector on the system board).

Take care to prevent bending drive connector pins. Be sure to align the IDE cable connector as shown in the figure.

2. Locate an available power connector coming from the power supply (see “System Power Cables”).

3. Connect the appropriate power cable to the power connector on the IDE device.

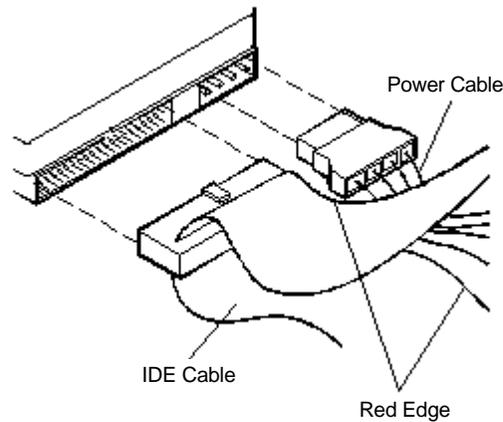


Figure Section 3-7 Connecting IDE Device Cables

4. If you are 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 appropriate connector on the Diskette Drive Signal Cable to the signal connector on the diskette drive. Align the colored edge of the cable with the pin 1 side of the device connector.
2. Locate an available power connector coming from the power supply (see “System Power Cables”).
3. Connect the appropriate power cable to the power connector on the device.

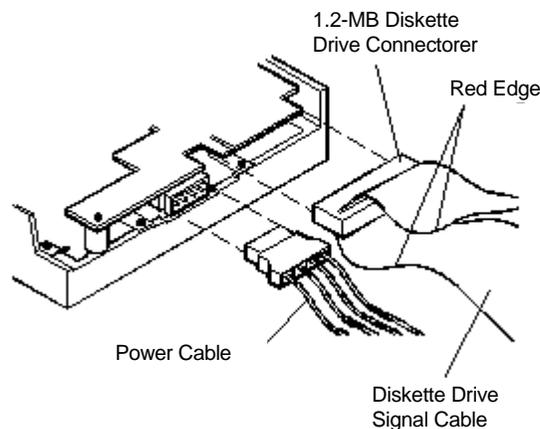


Figure Section 3-8 Connecting 1.2-MB Diskette Drive Cables

Storage Device Installation

Click on an appropriate procedure for installing a storage device in the system.

- Installing the 3 1/2-Inch Drive
- Installing the 5 1/4-Inch Device

Removing the 3 1/2-Inch Drive Bracket

The installation of a second 3 1/2-inch hard disk drive requires the removal of the 3 1/2-inch drive bracket.

Remove the 3 1/2-inch drive bracket containing the standard 1.44-MB diskette drive and hard disk drive as follows.

1. Remove the system unit side panel (see “Removing the Side Panel”).
2. Label and disconnect the cables attached to the diskette drive and any hard disk drive installed in the 3 1/2-inch bracket.
3. Remove the screw securing the drive bracket to the 5 1/4-inch device cage and slide the bracket toward the rear of the system (see the following figure).

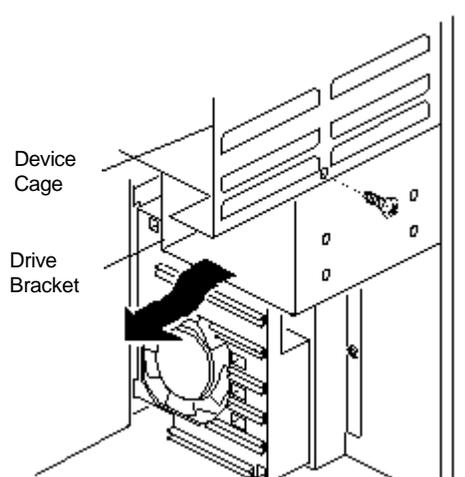


Figure Section 3-9 Removing the 3 1/2-Inch Drive Bracket

4. Continue to “Installing the 3 1/2-Inch Drive.”
-

Installing the 3 1/2-Inch Drive

Use the following procedure if you are installing a second 3 1/2-inch hard disk drive into the system.

1. Remove the system unit side panel (see “Removing the Side Panel”).
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. See “Device Preparation” for device preparation information.
5. Insert the hard disk drive so that the connectors are extended out the bracket on the same end as the standard diskette drive connectors.
6. Align the holes in the hard disk drive with the holes in the bracket.
7. Secure the drive to the bracket with the four screws that come with the drive (two screws on each side).

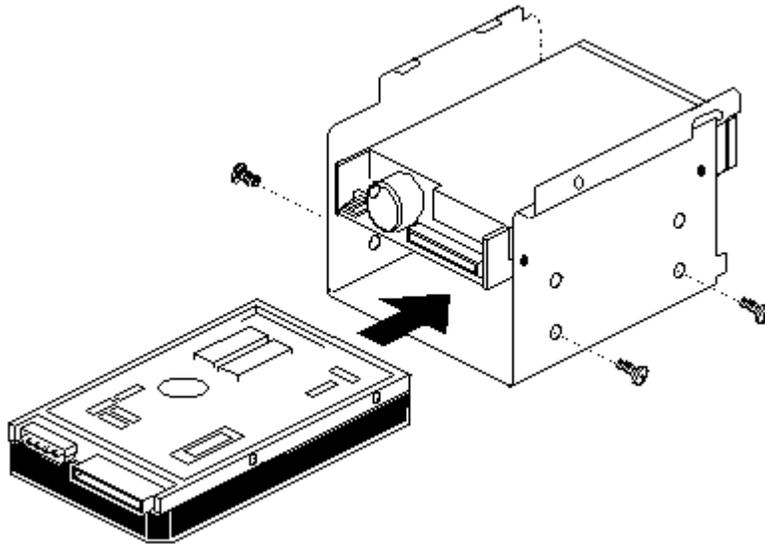


Figure Section 3-10 Securing a 3 1/2-Inch Drive

8. Continue to “Replacing the 3 1/2-Inch Drive Bracket.”
-

9. Connect the drive cables to the new drive (see “Cabling an IDE Device”). Reconnect any hard disk drive cables you labeled and removed earlier.
10. Replace the system unit side panel (see “Replacing the Side Panel”).
11. Run the Setup program to set the new configuration (see Section 2).

Replacing the 3 1/2-Inch Drive Bracket

Replace the 3 1/2-inch drive bracket only after it has been removed in a 3 1/2-inch drive installation.

1. Place the tabs on the 3 1/2-inch drive bracket into their slots on the bottom of the device cage.
2. Slide the drive bracket forward until the screw hole in the drive bracket is aligned with the hole in the 5 1/4-inch device cage.
3. Replace the bracket screw you removed earlier to secure the bracket in place.

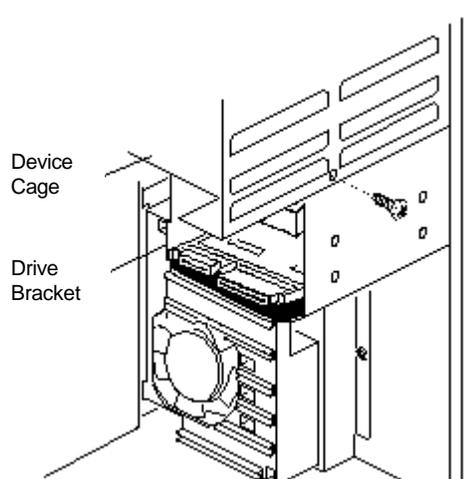


Figure Section 3-11 Securing the 3 1/2-Inch Drive Bracket

4. Continue at step 9 of the “Installing the 3 1/2-Inch Drive” procedure.
-

Removing the Front Panel

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

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

1. Remove the system unit side panel (see “Removing the Side Panel”).
2. Remove the front panel screw securing the panel to the system unit.
3. Release the two front panel tabs on the lower left side of the front panel.

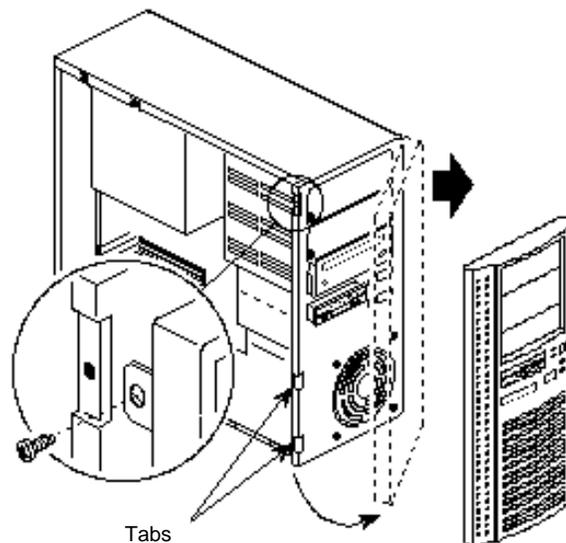


Figure Section 3-12 Removing the Front Panel

4. Disconnect the LED and IR cables on the front panel from the system board.
 5. Pull the left side out enough to clear the power, reset, and suspend buttons. When the buttons have been cleared, slide the right side of the front panel out from the system unit.
 6. Identify the slot for the device you plan to install.
 7. 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 3-13).
Store the blank panel in case you choose to remove the device in the future.
 8. Remove the metal slot cover from the selected slot by releasing the slot cover tab on the front of the system.
-

Store the slot cover in case you choose to remove the device in the future.

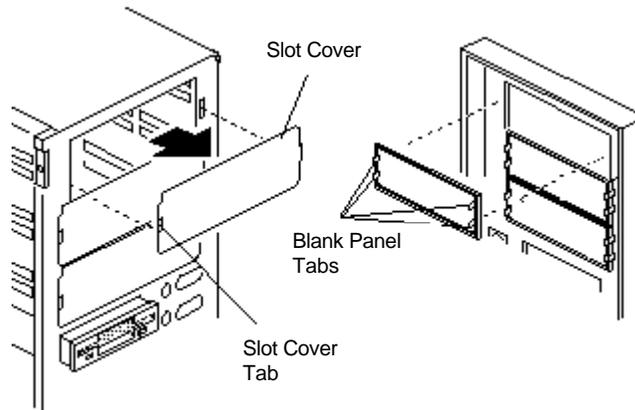


Figure Section 3-13 *Removing the Blank Panels*

9. Continue to “Installing the 5 1/4-Inch Device.”

Installing the 5 1/4-Inch Device

Use the following procedure to install an accessible device into the 5 1/4-inch device cage.

1. Remove the front panel (see “Removing the Front Panel”).
2. Follow the preinstallation instructions that come with the device, such as setting jumpers and switches.

See “Device Preparation” for device preparation information.

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

3. Locate the device rails and ground clips that ship with the system. Attach the rails and ground clips to the sides of the device with the four screws that come with the device. Install the ground clip under the front rail screws (see Figure Section 3-15).

NOTE: The device rails are labeled A and B and are not interchangeable. If the rails prevent the device from aligning properly in the system, reattach the rails on the opposite sides of the device.

If you are installing an accessible device (diskette drive, tape drive, or CD-ROM reader), attach the rails to the device so that the front of the device extends beyond the chassis and is even with the blank panels on the front of the system.

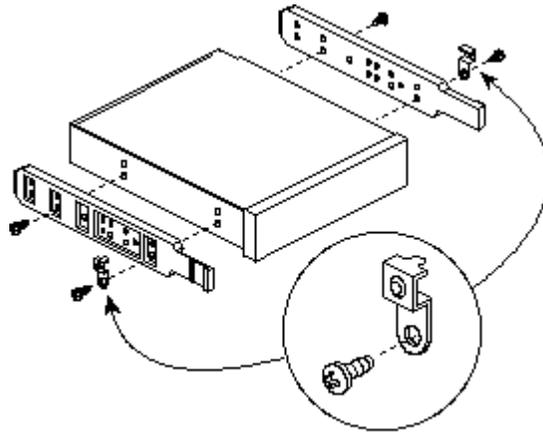


Figure Section 3-15 Attaching the Device Rails

4. Insert the device into the device slot from the front of the system unit, connector end first.
5. Align the rails with guides in the selected slot. Push the device into the slot until the rails lock in place.

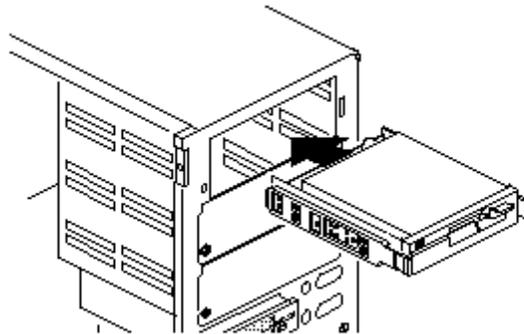


Figure Section 3-17 Inserting the Device

6. Connect the device cables (see “Device Cabling”).
7. Replace the system unit front panel (see “Replacing the Front Panel”).
8. Replace the system unit cover (see “Replacing the Side Panel”).

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

9. Run the Setup program to set the new configuration (see Section 2).

Replacing the Front Panel

Replace the front panel only after it has been removed in a 5 1/4-inch device installation.

If you are installing a 5 1/4-inch device, see “Installing the 5 1/4-Inch Device.”

1. Route the LED and IR cables on the front panel through the chassis to the system board, and connect the cables to the board.
2. Insert the tabs on the right side of the front panel with the holes in the front-right side of the system unit.
3. Swing the left side of the front panel to meet the system unit. The two tabs on the lower left side of the front panel will snap into the system frame.

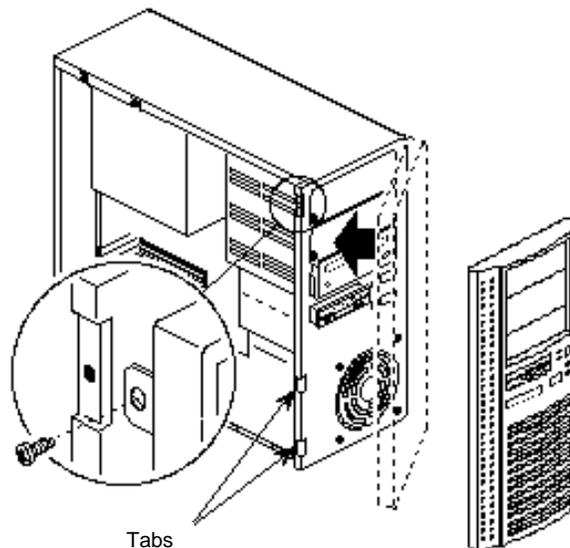


Figure Section 3-18 ***Aligning the Front Panel***

4. Replace the front panel screw removed earlier to secure the front panel.
5. Continue at step 8 of the “Installing the 5 1/4-Inch Device” procedure.

ADDING EXTERNAL OPTIONS

The following subsections provide information about attaching peripherals to the external connectors on the system unit.

- Parallel Printer
- Serial Devices
- Speakers (multimedia models)
- Microphone (multimedia models)

Parallel Printer

NOTE: Before connecting a printer to the system, be sure that you have set up the printer correctly. Follow the setup instructions that come with the printer.

1. Make sure the power to the system unit and printer are off.
2. Connect the printer cable to the printer port on the rear of the system unit.
3. Secure the cable with the screws provided.
4. Connect the other end to the printer.

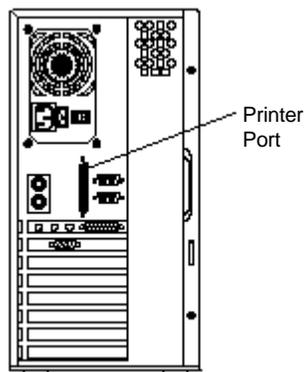


Figure Section 3-19 Connecting a Printer Cable

Serial Devices

NOTE: Before connecting a serial device to the system, be sure that you have set up the serial device correctly. Follow the setup instructions that come with the option.

1. Make sure the power to the system unit and serial device are off.
2. Connect one end of the serial cable to one of the two serial ports on the rear of the computer.
3. Secure the cable with the screws provided.
4. Connect the other end to the serial device.

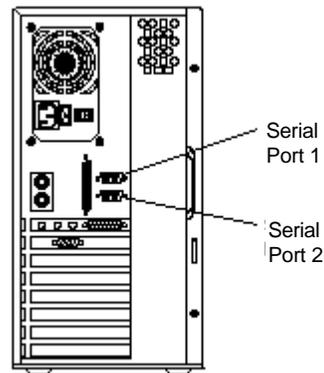


Figure Section 3-20 *Connecting an RS-232C Cable*

Speakers

Connect the speakers to the system unit as follows.

1. Locate the speaker with the control knobs. This is the right speaker.

2. Check the connectors on each speaker cable that came with the speakers. The left speaker cable has a black connector on each end. The other cable is a Y-cable. The Y-cable has a red and white connector at one end and the other end is black with two rings on the connector.

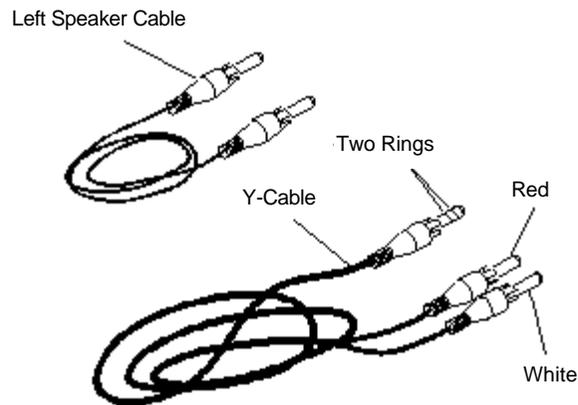


Figure Section 3-21 Speaker Cables

3. Attach the left speaker cable (with the black connectors at each end) to the speaker as follows.
 - Insert one end of the speaker cable into the jack marked “LEFT SPEAKER INPUT” on the back of the left speaker.
 - Insert the other end of the speaker cable into the jack marked “L SPEAKER OUTPUT” on the back of the right speaker.

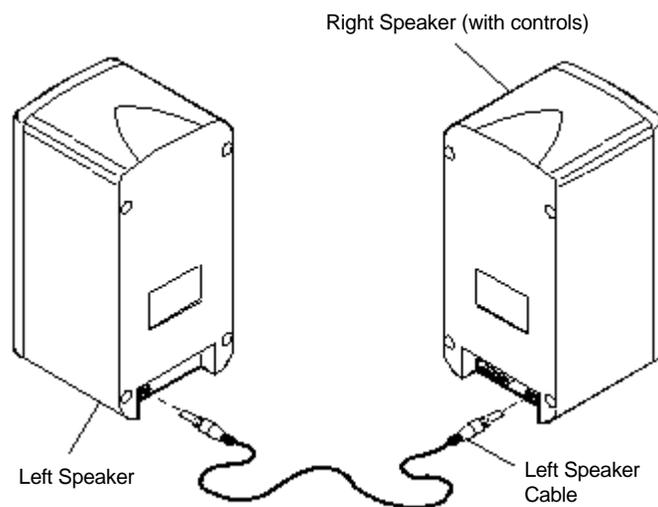


Figure Section 3-22 Connecting the Two Speakers

4. Attach the Y-cable as follows.

- Insert the red connector into the red jack marked “RIGHT LINE IN” on the back of the right speaker.
- Insert the white connector into the white jack marked “LEFT LINE IN” on the back of the right speaker.
- Insert the other end of the cable into the Line Out jack on the rear of the system unit (see “System Setup” in Section 2).

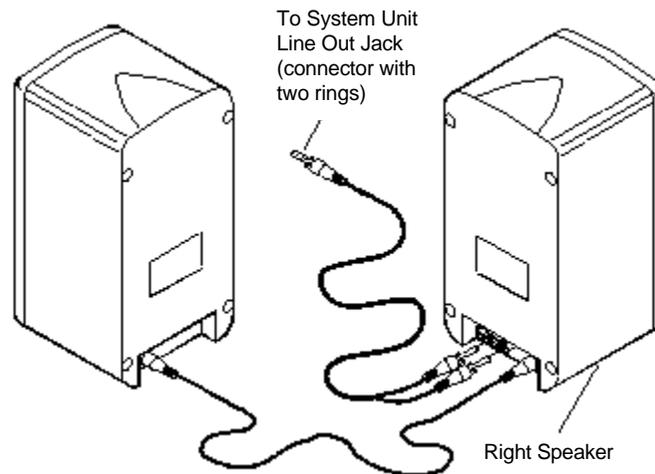


Figure Section 3-23 Attaching the Y-Cable

5. Locate the AC adapter.

6. Plug the AC adapter into the jack marked “ ± 15 DC” on the back of the right speaker.

7. Plug the other end of the cable into a properly grounded wall outlet.

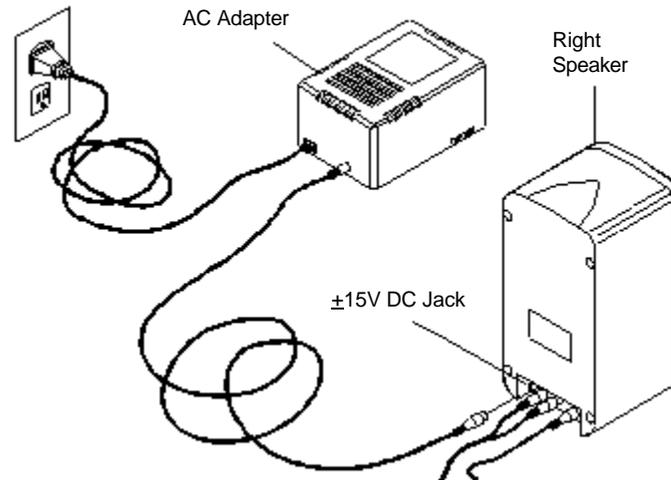


Figure Section 3-24 Connecting Speaker Components

To operate the speakers, turn on the system.

1. Push the power button on the front of the right speaker.
2. Turn on the audio source.
3. Adjust the volume by turning the volume control on the front of the right speaker.
4. Adjust the Base and Treble controls on the front of the right speaker to the desired levels.

NOTE: Headphones can be connected to the jack in the front of the left speakers.

Microphone

Set up the microphone that comes with the system as follows:

1. Insert the microphone holder into the slot in the microphone stand. Push the holder all the way into the slot.

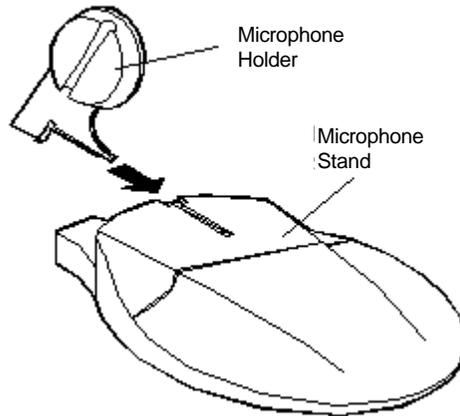


Figure Section 3-25 *Inserting the Microphone Holder into the Stand*

2. Insert the microphone into the holder as follows:
 - Place the microphone cable into the slot in the microphone holder.
 - Slide the microphone into the holder.

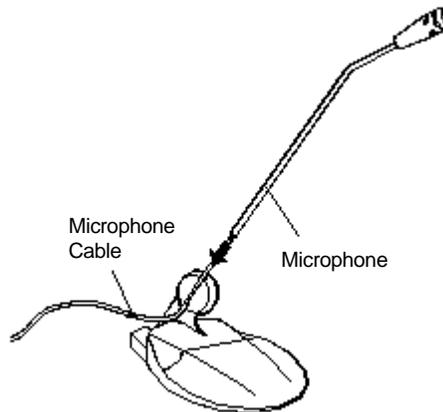


Figure Section 3-26 *Inserting the Microphone into the Holder*

3. Adjust the microphone by pivoting it up and down and side to side.

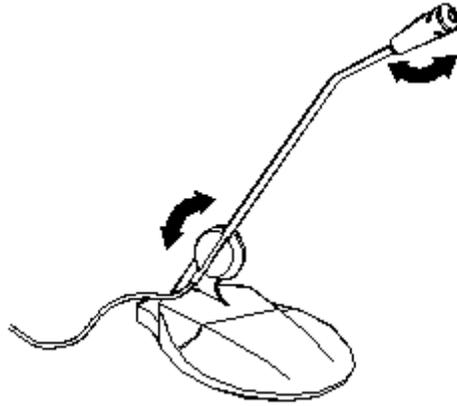


Figure Section 3-27 Adjusting the Microphone

Section 4

Maintenance and Troubleshooting

This section provides information on maintaining and troubleshooting the PowerMate P 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	In the U.S., call 1(800) 632-4525
To order options in the U.S.	Local Sales Office
To access the NEC Electronic Bulletin Board System (BBS) for down loading software drivers and the latest BIOS for ROM flashing	1(508) 635-4706 (see BIOS Update Utility in Section 2 or Section 3)
NEC Service	In the U.S., call 1(800)632-4525
Listen to the automated attendant and select the appropriate menu to reach one of the following departments.	
Information Center - literature, dealer locations, sales leads, response to ads	
NASC (National Authorized Service Centers)	
Administration - new dealer service authorization/warranty claims	
NSRC (National Service Response Center) - questions other than products, spare parts or technical support	
Service Contracts	
TAC (Technical Assistance Center) - technical support for NASC and NEC sales representatives only	
TSC (Technical Support Center) - technical support for everyone else Laptops/Notebooks (Versa/ProSpeed/UltraLite) Desktop/Tower Computers (Ready/Image/PowerMate/BusinessMate/Express) Printers (Silentwriter/Colormate/Pinwriter)	
FastFacts™, an automated service for sending the latest Technical Information Bulletins and other information about NEC products to your fax machine 24 hours a day.	In the U.S., call 1(800) 366-0476. Outside the U.S., call 1(708) 238-7800
Canadian Inquires	1(416) 795-3554

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. Remove the six screws holding the keyboard enclosure together (see Figure Section 4-1).

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.

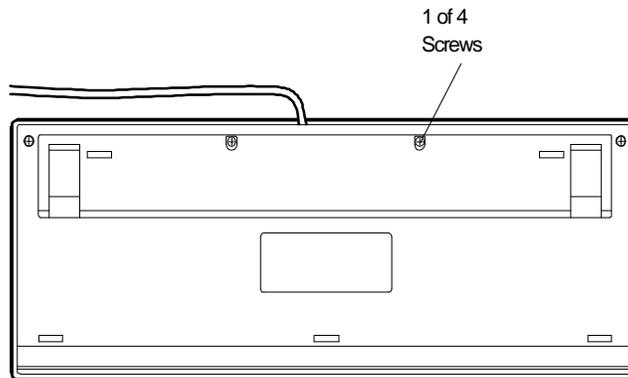


Figure Section 4-1 *Removing the Keyboard Enclosure*

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

Mouse Cleaning

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

1. Unplug the mouse from the system.
2. Turn the mouse upside down and locate the mouse ball cover (see Figure Section 4-2).
3. Turn the ball cover counterclockwise and remove the cover.

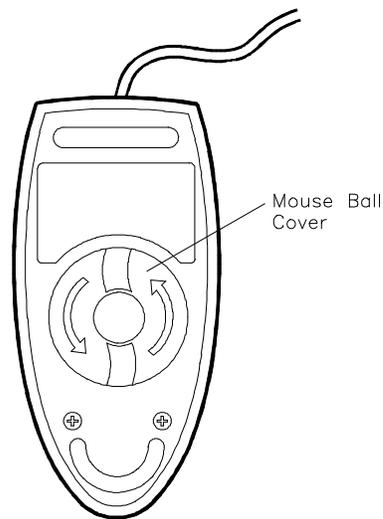


Figure Section 4-2 *Removing the Mouse Ball Cover*

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. Switch settings are given in Appendix B.

Error Messages

Messages may appear when running NEC utilities. Table Section 4-2 describes possible system error and warning messages. Table Section 4-4 describes possible ISA NMI error messages.

Table Section 4-2 System Error Messages

Message	Description
Address Line Short	Error in the address decoding circuitry on the system board.
Cache Memory Bad, Do Not Enable Cache	Cache memory is defective. Replace it.
CH-2 Timer Error	There is an error in timer 2.
CMOS Battery State Low	CMOS RAM battery power is low. Replace the battery (see battery replacement at the end of this section).
CMOS Checksum Failure	After CMOS RAM values are saved, a checksum value is generated for error checking. The previous value is different from the current value. Run Setup .
CMOS System Options Not Set	The values stored in CMOS RAM are either corrupt or nonexistent. Run Setup (see Section 2).
CMOS Display Type Mismatch	The video type in CMOS RAM does not match the type detected by the BIOS. Run Setup (see Section 2).
CMOS Memory Size Mismatch	The amount of memory on the system board is different than the amount in CMOS RAM. Run Setup (see Section 2).
CMOS Time and Date Not Set	Run Setup to reset (see Section 2).
Diskette Boot Failure	The boot disk in drive A is corrupt and cannot be used to boot the system. Use another boot disk and follow the screen instructions.
Display Switch Not Proper	System video switch is set to either color or monochrome. Turn the system off, set the switch, and turn the system on.
DMA Error	Error in the DMA controller.
DMA #1 Error	Error in the first DMA channel.
DMA #2 Error	Error in the second DMA channel.
FDD Controller Failure	The BIOS cannot communicate with the diskette drive

Table Section 4-2 System Error Messages

Message	Description
	controller. Power off the system and check all connections.
HDD Controller Failure	The BIOS cannot communicate with the hard disk drive controller. Power off the system and check all connections.
INTR #1 Error	Interrupt channel 1 failed POST.
INTR #2 Error	Interrupt channel 2 failed POST.
Invalid Boot Diskette	The BIOS can read the disk in diskette drive A, but cannot boot the system. Use another boot diskette.
Keyboard Is Locked	Keyboard lock on the system is engaged. The system must be unlocked to continue.
Keyboard Error	There is a timing problem with the keyboard. Set the Keyboard option in Setup to Not Installed to skip the keyboard POST routines.
KB/Interface Error	There is a error in the keyboard connector.
No ROM BASIC	Cannot find a bootable sector on either diskette drive A or hard disk drive C. The BIOS calls INT 18h which generates this message. Use a bootable disk.
Off Board Parity Error	Parity error in the installed expansion memory. The format is: OFF BOARD PARITY ERROR ADDR (HEX) = (XXXX) XXXX is the hex address where the error occurred.
On Board Parity Error	Parity is not supported and error will not occur
Parity Error ????	Parity error in system memory at an unknown address.

Table Section 4-4 ISA NMI Error Messages

Message	Description
Memory Parity Error at xxxxx	Memory failed. If the memory location can be determined, it is displayed as xxxxx. If not, the message is Memory Parity Error ????.
I/O Card Parity Error at xxxxx	An expansion card failed. If the address can be determined, it is displayed as xxxxx. If not, the message is I/O Card Parity Error ????.
DMA Bus Time-out	A device has driven the signal for more than 7.8 microseconds.

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 4-6. The table summarizes problems that may develop during system operation and lists (in sequential order) suggested corrective actions.

Table Section 4-6 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 4-6 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 switch 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 4-6 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 from both the 8-bit and 16-bit digitized 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.
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 Section 2). 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 monitor's resolution matches the video setting or the video driver used (see Section 1). 3. Check that the utility is not selecting a refresh rate/resolution that is not supported by the monitor. 4. Check that the driver used matches the capabilities of the built-in video controller and DRAM.

Table Section 4-6 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 VGA connector in the rear is attached to the system board. 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 system or video board. 8. Replace monitor.
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 jewelers screwdriver into the emergency eject hole and turn counterclockwise 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 4-6 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.

Beep Codes

One beep indicates that the system has completed its power-on self-test. If a long beep or a series of long beeps occur, power off the computer and try again. If the long beeps persists, see Table Section 4-8 for the diagnostic beep codes.

The beep codes are announced on the speaker only if a fatal failure is detected. For instance, three long beeps indicates a failure in the first 64 K of RAM.

Table Section 4-8 Diagnostic Beep Codes

Message	Beeps	Description of Failure
Refresh Failure	1	The memory refresh circuit on the system board is faulty.
Parity Error	2	Parity error in the first 64 KB of memory .
Base 64 KB Memory Failure	3	Memory failure in the first 64 KB.
Timer Not Operational	4	Memory failure in the 64 KB of memory or timer 1 on the system board is not functioning.
Processor Error	5	The CPU on the system board generated an error.
8042 – Gate A20 Failure	6	The keyboard controller (8042) may be bad. The BIOS cannot switch to protect mode.

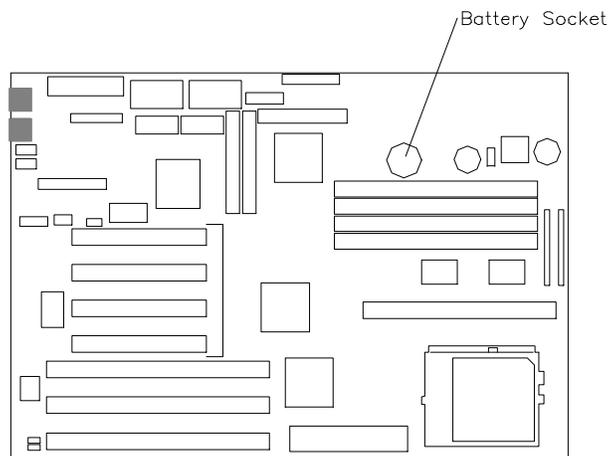
Table Section 4-8 Diagnostic Beep Codes

Message	Beeps	Description of Failure
Processor Exception Interrupt Error	7	The CPU generated an exception interrupt.
Display Memory Read/Write Error	8	The system graphics is either missing or its memory is faulty. This is not a fatal error.
ROM Checksum Error	9	ROM checksum value does not match the value encoded in the BIOS.
CMOS Shutdown Register Read/Write Error	10	The shutdown register for CMOS RAM failed.
Cache Error/External Cache Bad	11	The external cache is faulty.

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 4-4 Battery Socket Location**

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

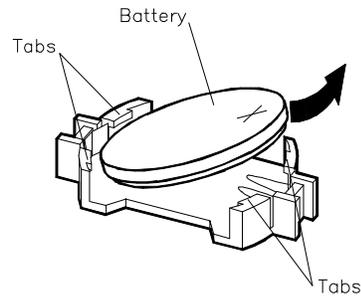


Figure Section 4-5 Battery Removal

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

Repair

DISASSEMBLY AND REASSEMBLY

This section contains step-by-step disassembly procedures for the system unit. 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 for the systems are included at the end of 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 and procedures 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.

Table Section 5-1 PowerMate P Series System Unit Disassembly Sequence

Sequence	Part	See Page
1	Side panel	5-2
2	Expansion board(s)	5-4
3	SIMM sticks	5-5
4	Front panel assembly	5-6
5	Blank panel and metal cover plate	5-7
6	3 1/2-inch drive bracket	5-8
7	Card guide/fan bracket	5-8
8	Speaker assembly	5-9
9	3 1/2-inch diskette drive	5-9
10	3 1/2-inch hard disk drive	5-11
11	5 1/4-inch device	5-12
12	Power supply	5-14
13	System board	5-15

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 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.

Side Panel Removal

Remove the system unit side panel as follows.

WARNING: Before removing the system unit side panel, 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 device (such as a printer) connected from the rear of the system.

CAUTION: Electrostatic discharge can damage computer components. Discharge static electricity by touching a metal object before you remove the system unit side panel.

3. Remove the two side panel screws from the rear of the system unit (see Figure Section 5-1). If you have installed a padlock on the system, unlock the padlock and remove it.
4. From the rear of the system, position one hand on the protruding handle and the other hand under the side panel and slide the panel toward the rear about one inch.
5. Lift the side panel away from the system unit.

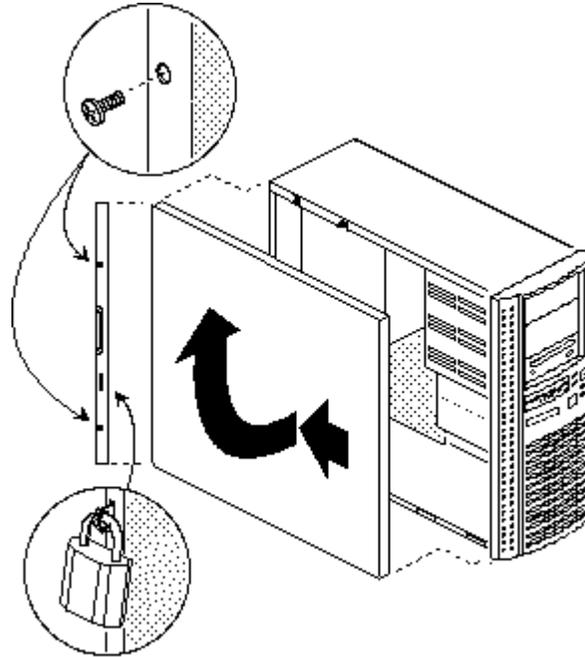


Figure Section 5-1 Side Panel Removal

Expansion Board Removal

Remove the sound/fax/modem board and any other installed expansion board(s) per the following steps.

1. Remove the system unit side panel (see “Side Panel Removal” in this section).
2. If you have any cables connected to the board that you need to remove, label the connectors before you remove them.
3. Remove the screw that secures the board to the support bracket (see Figure Section 5-2).
4. Pull the board out of the connector. Gently rock the board from side-to-side to release it from its connector.

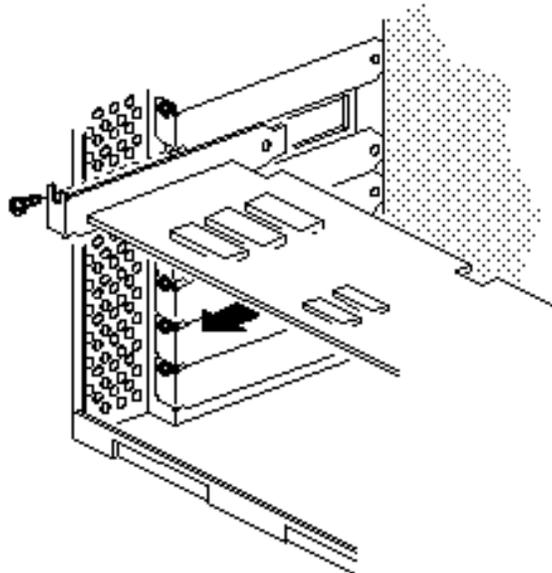


Figure Section 5-2 Expansion Board Removal

SIMM Removal

Remove any optional SIMM sticks from the system board as follows.

1. Remove the side panel and any full size expansion boards as previously described.
2. Open the clips at each end of the SIMM connector (see Figure Section 5-4). Tilt the SIMM forward, so that the SIMM can be removed from the socket.
3. Remove the SIMM stick from the system board. Repeat steps 2 and 3 for each SIMM being removed.

NOTE: For information on installing SIMM sticks is in Section 3, "Options".

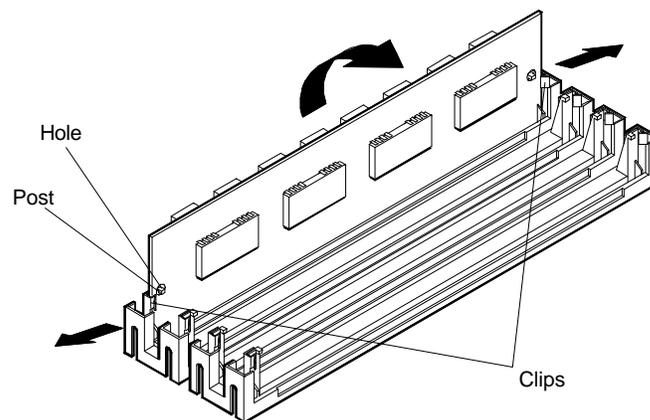


Figure Section 5-4 SIMM Socket

Front Panel Assembly Removal

Remove the front panel from the system unit as follows.

1. Remove the system unit side panel (see “Side Panel Removal”).
2. Remove the front panel screw securing the panel to the system unit.
3. Release the two front panel tabs on the lower left side of the front panel.

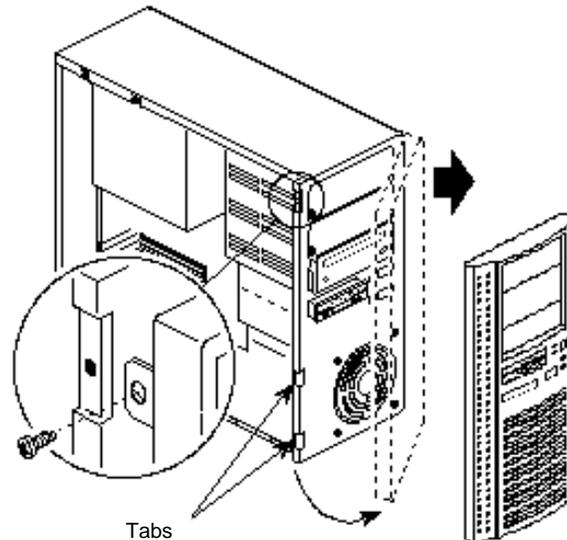


Figure Section 5-6 Removing the Front Panel

4. Disconnect the LED and IR cables on the front panel from the system board.
5. Pull the left side out enough to clear the power, reset, and suspend buttons. When the buttons have been cleared, slide the right side of the front panel out from the system unit.

Blank Panel and Metal Cover Plate Removal

Remove the blank panels and the metal cover plates from the chassis as follows.

1. 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 5-7).

Store the blank panel for possible later reinstallation.

2. Press in on the tab and remove the metal slot cover from the selected slot on the front of the system.

Store the slot cover in case you choose to use it in the future.

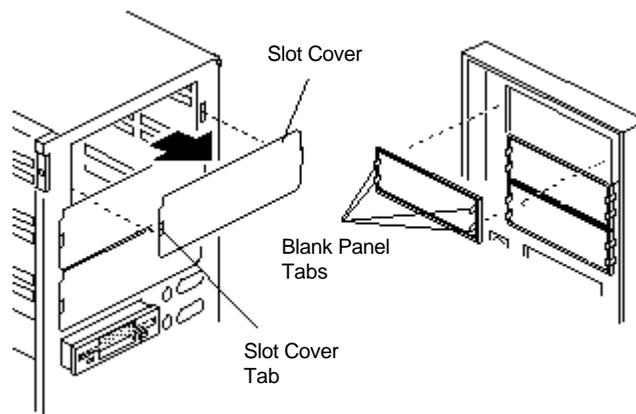


Figure Section 5-7 Removing the Blank Panels

3 1/2-Inch Drive Bracket Removal

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

1. Remove the side panel as previously described.
2. Label and disconnect the cables attached to the diskette drive and any hard disk drive installed in the 3 1/2-inch bracket.
3. Remove the screw securing the drive bracket to the 5 1/4-inch device cage and slide the bracket toward the rear of the system (see Figure Section 5-9).

Card Guide/Fan Bracket Removal

The card guide/fan bracket assembly consists of three parts: the plastic card guide, the internal fan, and a metal bracket. These parts are removed as one assembly from the system unit chassis per the following steps.

1. Remove the side panel as previously described.
2. Remove the 3 1/2-inch bracket as previously described.
3. Remove the screw securing the card guide/fan bracket assembly to the chassis (see Figure Section 5-9).
4. Tilt the bracket to the left to free the metal tabs; then lift the assembly out of the chassis.

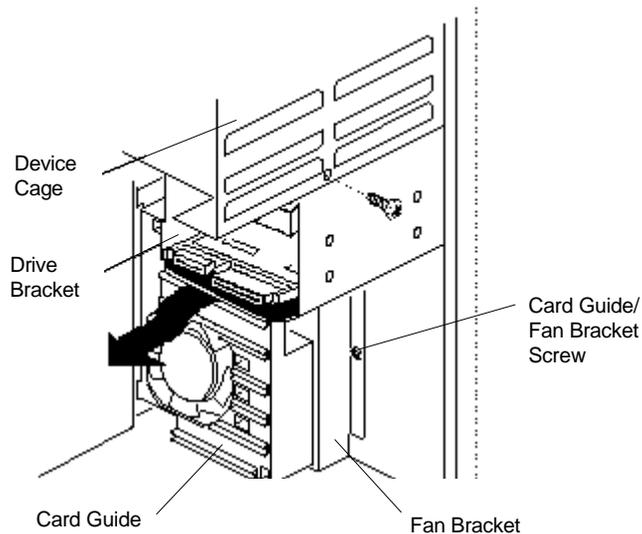


Figure Section 5-9 Removing the 3 1/2-Inch Drive Bracket

Speaker Assembly Removal

Remove the speaker per Figure Section 5-11 and the following steps.

1. Remove the side panel as previously described.
2. Remove the board edge guide/fan assembly as previously described.
3. Unplug the speaker from its connector on the system board (see Appendix A for connector assignments).
4. Slide the speaker out from the four speaker tabs.

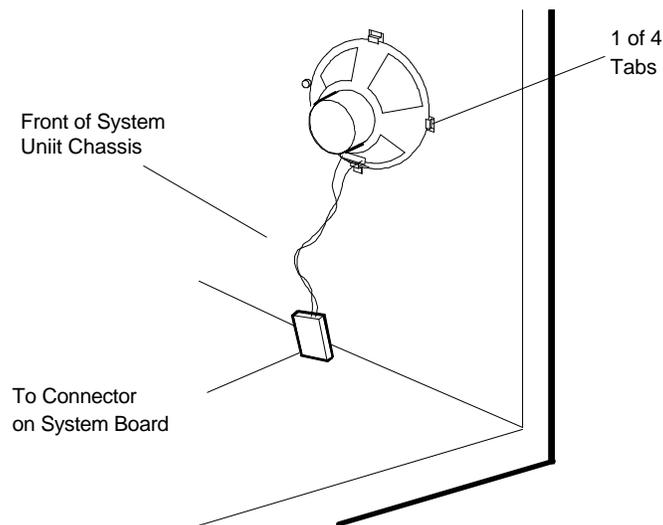


Figure Section 5-11 Speaker Tabs

5. Remove the speaker from the system unit.

3 1/2-inch Diskette Drive Removal

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

1. Remove the side panel as previously described (see “Side Panel Removal”).
2. Unplug the diskette drive power cable and signal cable from the diskette drive (see Figure Section 5-13).

NOTE: When reinstalling the diskette drive, note that all power cables are keyed to fit only in the correct position. The red edge of the diskette drive signal cable is positioned as shown.

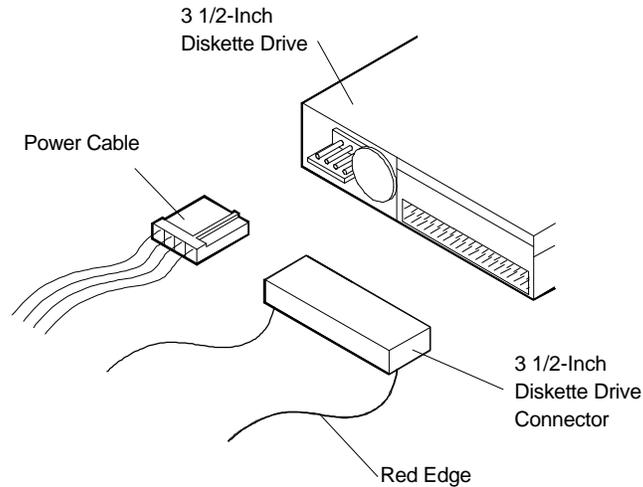


Figure Section 5-13 3 1/2-Inch Diskette Drive Cables

3. Remove the 3 1/2-inch drive bracket as previously described (see “3 1/2-Inch Device Bracket Removal”).
4. Remove the four screws, two on each side, from the 3 1/2-inch drive bracket (see Figure Section 5-15).
5. Slide the 3 1/2-inch diskette drive out of the bracket.

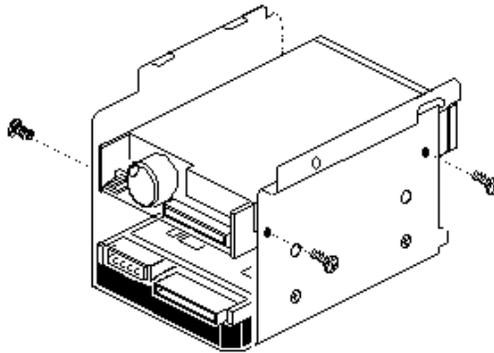


Figure Section 5-15 Diskette Drive Bracket Screws

3 1/2-inch Hard Disk Drive Removal

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

1. Remove the side panel as previously described.
2. Unplug the hard disk drive power and signal cables from the hard disk drive (see Figure Section 5-17).

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

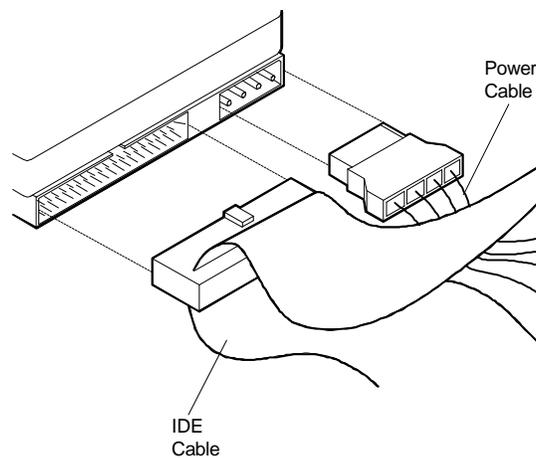


Figure Section 5-17 3 1/2-Inch Hard Disk Drive Cables

3. Remove the 3 1/2-inch drive bracket as previously described.
4. Remove the four screws securing the 3 1/2-inch drive to the bracket. Slide the 3 1/2-inch drive out of the bracket (see Figure Section 5-19).

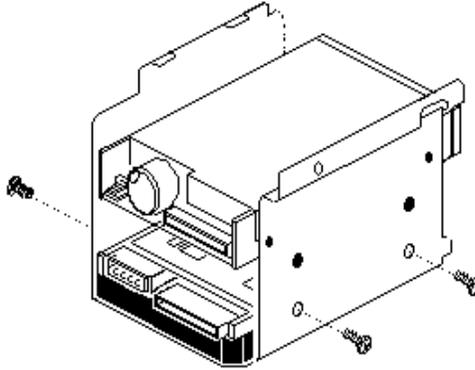


Figure Section 5-19 Removing the 3 1/2-Inch Drive

5 1/4-Inch Device Removal

Remove a 5 1/4-inch device (CD-ROM reader or other device) from the 5 1/4-inch device cage as follows.

1. Remove the side panel and front panel as previously described.

NOTE: The 5 1/4-inch devices are installed with drive rails.

2. Disconnect the device signal and power cables from the inside of the system unit. (If removing a CD-ROM reader also disconnect the audio cable.)
 3. Remove the 5 1/4-inch device by releasing the guide rail tabs and slide the device out from the front of the system unit.
-

4. Align the rails with guides in the selected slot. Push the device into the slot until the rails lock in place.

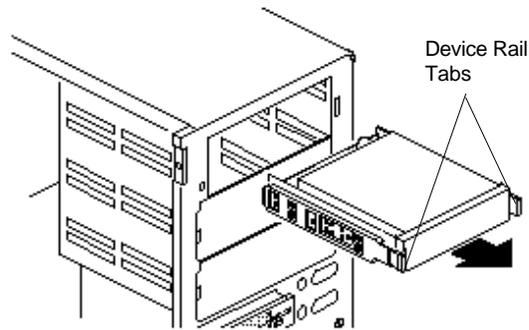


Figure Section 5-21 Inserting the Device

5. Remove the rails and ground clips from the sides of the device by removing the four screws shown in Figure Section 5-22.

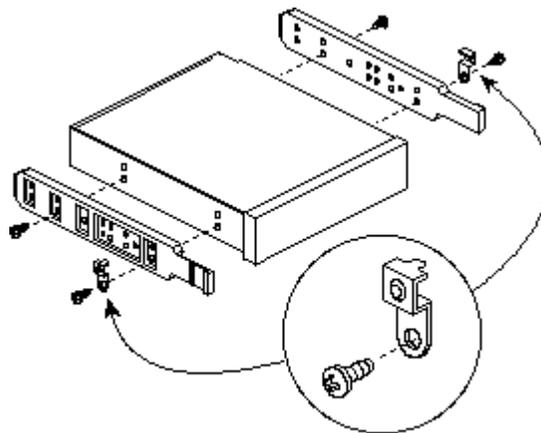


Figure Section 5-22 Removing the Device Rails

Power Supply Removal

Remove the power supply as follows.

1. Remove the side panel as previously described (see “Side Panel Removal”).
2. Remove the internal drive cage as previously described.
3. Unplug the two power cables attached to the system board's connectors. See Appendix A for connector locations.
4. Unplug the power cables from all installed devices.
5. Cut any tie wraps that may be securing the power cables to the system unit chassis or drive brackets.
6. Remove the four screws securing the power supply to the system unit chassis (see Figure Section 5-24).

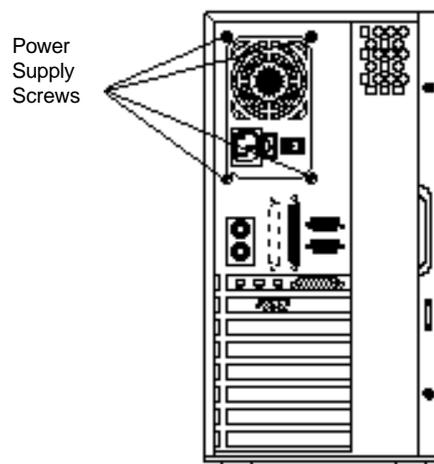


Figure Section 5-24 Power Supply Screws

7. Pivot the left side of the power supply toward you to free it from the metal tabs on the right side. Remove the power supply from the system unit.
-

System Board Removal

Remove the system board per the following steps.

1. Remove the following components as previously described:
 - side panel
 - expansion slot boards
 - internal device cage
 - 3 1/2-inch drive bracket
 - SIMMs
2. Remove and label all cables connected to the system board. Appendix A provides the connector identifiers and pin assignments for each connector.
3. Remove the eight screws that hold the system board to the system unit chassis. Remove the system board from the system unit (see Figure Section 5-26).

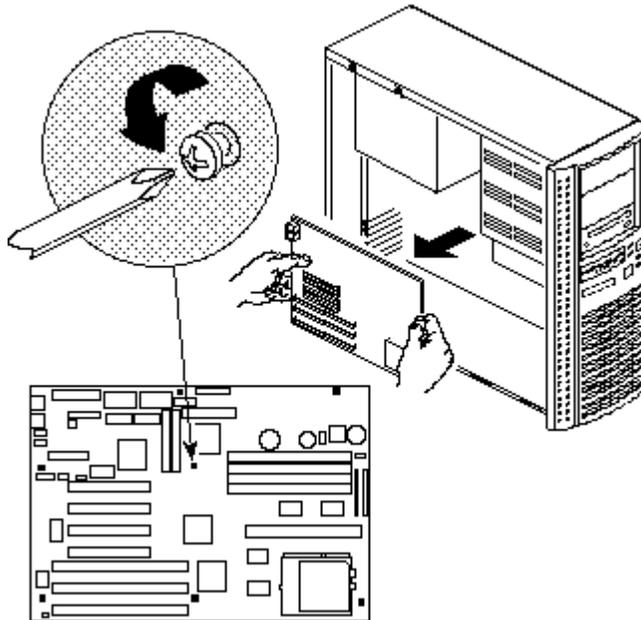


Figure Section 5-26 System Board Removal

Illustrated Parts Breakdown

This subsection contains the illustrated parts breakdown (IPB) and NEC part numbers for the PowerMate P Series computer. Table Section 5-2 lists the field-replaceable parts for the computer. Figure Section 5-28 is the illustrated parts breakdown.

NOTE: In the U.S., call 1(800) 632-4525 to order NEC spare parts. To order options in the U.S., call the local NEC sales office. See Table 5-1 in Section 5 for NEC telephone numbers.

Table Section 5-2 PowerMate P Series Field-Replaceable Parts List*

Item	Description	Part Number
1	Front Panel Bezel (with lamps and power button)	158-050910-000
2	IR Card with Cable	158-050909-000
3	IR to 5 Connector Cable	158-050911-000
4	Speaker Assembly	158-050945-000
5	Card Guide/Fan Bracket (metal)	158-030849-000
6	Card Guide/Fan Cover (plastic)	158-030850-000
7	Fan Assembly	158-050944-000
8	8-MB SIMM, 32-bits	158-082553-070
9A	Pentium 120/60 CPU with heatsink (VR voltage)	158-050924-009
9B	Pentium 133/66 CPU with heatsink (VR voltage)	158-050924-001
10	Heatsink Clip	158-060368-000
11	Battery	158-056137-000
12A	System Board with Audio (multimedia)	158-050886-001A
12B	System Board without Audio (nonmultimedia)	158-050886-000A
13	Side Panel	158-050916-000
14	Power Supply (200W)	158-050888-000
15	Video Riser Card	158-050917-000
16	Audio Riser Card	158-050923-000
17	Diskette Drive Signal Cable	158-050920-000
18	Microphone	158-050878-000
19	Serial COM Cable, Internal (2)	158-050918-000

*This data was prepared September 1995. For an up-to-date listing of spare parts, please call FastFacts (800) 366-0476 and order document number 42181365.

Table Section 5-2 PowerMate P Series Field-Replaceable Parts List*

Item	Description	Part Number
20	Hard Disk Drive IDE Signal Cable	158-050921-000
21	Parallel Cable, Internal	158-050919-000
22	CD-ROM IDE Signal Cable	158-050562-004
23	External Speaker Assembly	158-050877-000
24	Top Cover	158-050916-000
25	Audio Cable	158-050922-000
26	Device Guide Rails	158-030835-000
27	4X IDE CD-ROM Reader	158-050915-000
28	3 1/2-Inch x 1-Inch, 1.2 GB Hard Disk	158-050395-343
29	3 1/2-Inch x 1-Inch, 1.44-MB Diskette Drive	158-050912-000
30	3 1/2-Inch Drive Bracket	158-030824-000
31	5 1/4-Inch Blank Panel Cover (plastic)	158-030833-000
32A	Logo (120/60 CPU)	158-030804-000
32B	Logo (133/66 CPU)	158-030804-001
33	NEC Mouse (PS/2-compatible)	158-050789-000
34	Keyboard	158-050890-000
35	Power Cord	808-857649-101A

Figure Section 5-28 PowerMate P Series Illustrated Parts Breakdown*

* This data was prepared September 1995. For an up-to-date listing of spare parts, please call FastFacts (800) 366-0476 and order document number 42181365.

Table Section 5-4 PowerMate P Series Memory Options

Description	Part Number
4-MB SIMM Upgrade Kit (1 MB x 32-bit)*	158-053798-001
8-MB SIMM Upgrade Kit (2 MB x 32-bit)*	158-053798-002
16-MB SIMM Upgrade Kit (4 MB x 32-bit)*	158-053798-003
32-MB SIMM Upgrade Kit (8 MB x 32-bit)*	158-053798-004

* All SIMM kits have tin edge connectors.

Table Section 5-5 lists PowerMate P Series documentation and packaging.

Table Section 5-5 PowerMate P Series Documentation and Packaging*

Description	Part Number
<i>PowerMate P Series User's Guide</i>	819-181295-000
<i>PowerMate P Series Quick Setup/Roadmap</i>	819-181296-000
<i>PowerMate P Series Service and Reference Manual</i>	819-181365-000
Shipping Carton	158-040513-001
Shipping Carton Inserts (4)	158-040519-004

* This data was prepared September 1995. For an up-to-date listing of spare parts, please call FastFacts (800) 366-0476 and order document number 42181365.

Appendix A

Connector Pin Assignments

This appendix describes the system board connector pin assignments. Table A-1 list the system board connectors and provides the page number where the pin assignments defined.

Table Appendix A-1 System Board Connectors

Description	Page Number
Parallel Interface Connector	A-2
Serial Interface Connector (COM1/COM2)	A-3
Power Supply Connector	A-4
Diskette Drive Connector	A-5
IDE Interface Connectors	A-6
Turbo Connector	A-7
Hard Disk LED Connector	A-8
Power LED Connector	A-9
Reset Button Connector	A-10
Suspend Button Connector	A-11
Infrared (IRDA) Connector	A-12
Fan Connector	A-13
Speaker Connector	A-14
Audio Riser I/O Connector	A-15
Wavetable Connector	A-16
CD-ROM Audio Interface Connector	A-17
ISA Expansion Board Connectors	A-17
PCI Expansion Board Connectors	A-19

PARALLEL INTERFACE CONNECTOR

The following figure shows the parallel interface connector on the system board. Table Appendix A-2 provides the pin assignments.

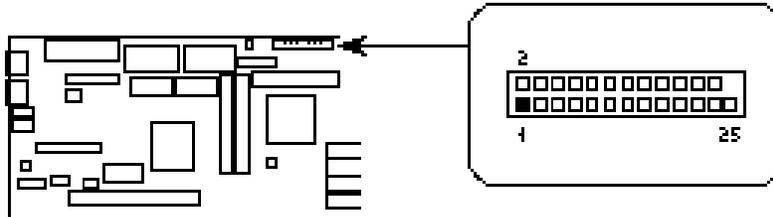


Figure Appendix A-1 Parallel Interface Connector

Table Appendix A-2 Parallel Interface Pin Assignments

Pin	Signal Name	Pin	Signal Name
1	Strobe-	14	Ground
2	Auto Feed-	15	Data Bit 6
3	Data Bit 0	16	Ground
4	ERROR-	17	Data Bit 7
5	Data Bit 1	18	Ground
6	INIT-	19	ACK-
7	Data Bit 2	20	Ground
8	SLCT IN-	21	BUSY
9	Data Bit 3	22	Ground
10	Ground	23	PE (Paper End)
11	Data Bit 4	24	Ground
12	Ground	25	SLCT
13	Data Bit 5	26	N.C.

SERIAL INTERFACE CONNECTORS

The following figure shows the serial interface connector on the system board. Table Appendix A-4 provides the pin assignments.

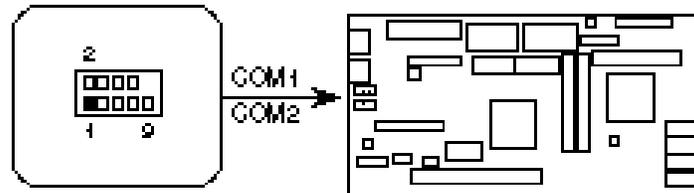


Figure Appendix A-2 Serial Interface Connectors

Table Appendix A-4 Serial Interface Pin Assignments

Pin	Signal Name
1	DCD
2	DSR
3	Serial In-
4	RTS
5	Serial Out-
6	CTS
7	DTR
8	RI
9	GND
10	N.C.

POWER SUPPLY CONNECTOR

The following figure shows the power connector on the system board. Table Appendix A-6 provides the pin assignments.

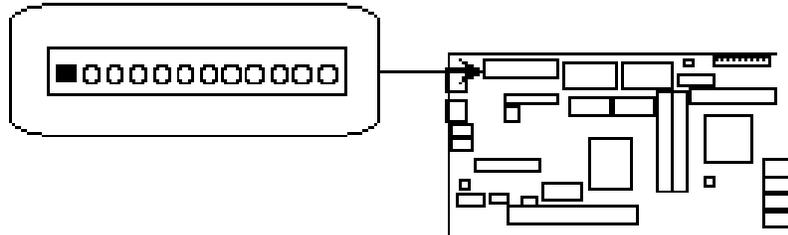


Figure Appendix A-3 Power Connector

Table Appendix A-6 Power Connector Pin Assignments

Pin	Signal Name
1	PWRGD
2	+5 V
3	+12 V
4	-12 V
5	GND
6	GND
7	GND
8	GND
9	-5 V
10	+5 V
11	+5 V
12	+5 V

DISKETTE DRIVE CONNECTOR

The following figure shows the diskette drive connector on the system board. Table Appendix A-8 provides the pin assignments.

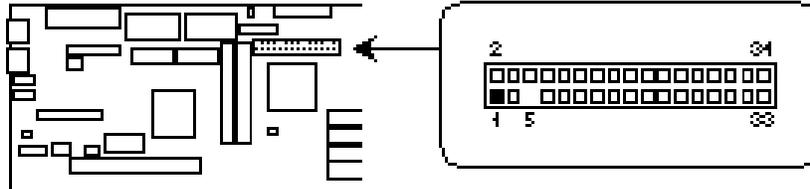


Figure Appendix A-4 Diskette Drive Interface Connector

Table Appendix A-8 Diskette Drive Pin Assignments

Pin	Signal Name	Pin	Signal Name
1	Ground	2	FDHDIN
3	Ground	4	Reserved
5	Key	6	FDEDIN
7	Ground	8	Index-
9	Ground	10	Motor Enable A-
11	Ground	12	Drive Select B-
13	Ground	14	Drive Select A-
15	Ground	16	Motor Enable B-
17	Ground	18	DIR-
19	Ground	20	STEP-
21	Ground	22	Write Data-
23	Ground	24	Write Gate-
25	Ground	26	Track 00-
27	Ground	28	Write Protect-
29	Ground	30	Read Data-
31	Ground	32	Side 1 Select-
33	Ground	34	Diskette

IDE CONNECTORS

The following figure shows the IDE interface connector on the system board. Table Appendix A-10 provides the pin assignments.

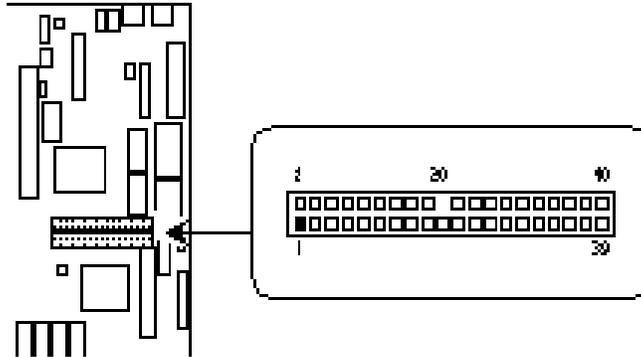


Figure Appendix A-5 IDE Interface Connector

Table Appendix A-10 IDE Interface Pin Assignments

Pin	Signal Name	Pin	Signal Name
1	Reset IDE	2	Ground
3	Host Data 7	4	Host Data 8
5	Host Data 6	6	Host Data 9
7	Host Data 5	8	Host Data 10
9	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	Ground	20	Key
21	DRQ3	22	Ground
23	I/O Write-	24	Ground
25	I/O Read-	26	Ground
27	IOCHRDY	28	BALE
29	DACK3-	30	Ground

Table Appendix A-10 IDE Interface Pin Assignments

Pin	Signal Name	Pin	Signal Name
31	IRQ14	32	IOCS16-
33	Addr 1	34	Ground
35	Addr 0	36	Addr 2
37	Chip Select 0-	38	Chip Select 1-
39	Activity	40	Ground

TURBO CONNECTOR

The following figure shows the turbo connector on the system board. Table Appendix A-12 provides the pin assignments.

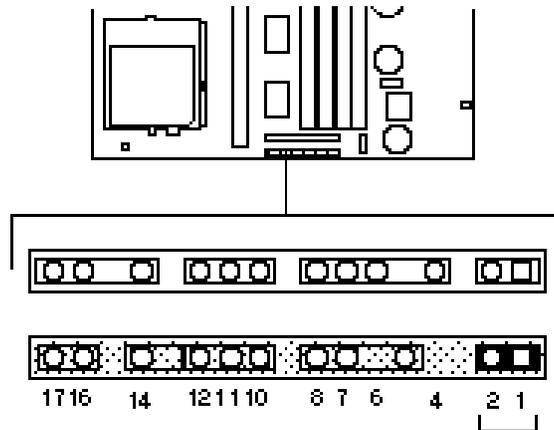


Figure Appendix A-6 Turbo Connector

Table Appendix A-12 Turbo Connector Pin Assignments

Pin	Signal Name
1	PULL_UP_330
2	LED_TURBO-

HARD DRIVE LED CONNECTOR

The following figure shows the hard disk LED connector on the system board. Table Appendix A-14 provides the pin assignments.

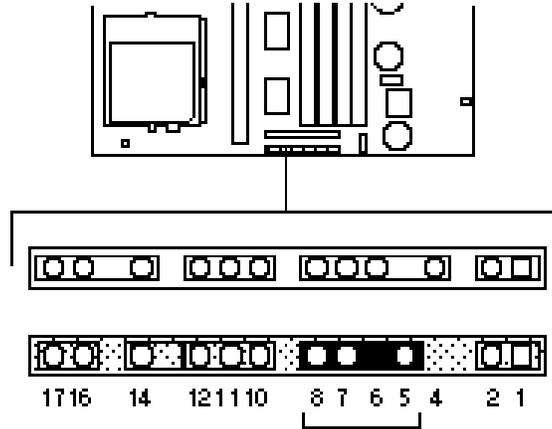


Figure Appendix A-7 Hard Disk LED Connector

Table Appendix A-14 Hard Disk LED Pin Assignments

Pin	Signal Name
5	PULL_UP_330
6	Key
7	HD ACTIVE
8	PULL_UP_330

POWER LED CONNECTOR

The following figure shows the power LED connector on the system board. Table Appendix A-16 provides the pin assignments.

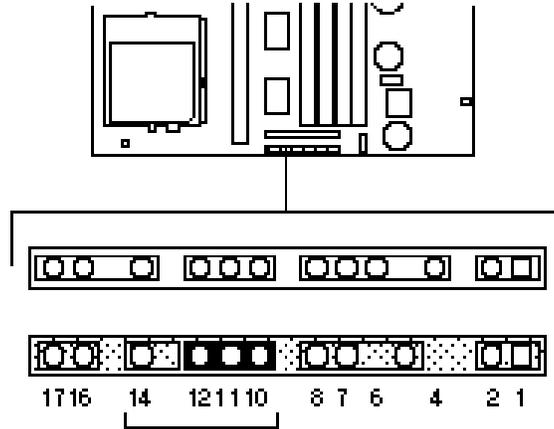


Figure Appendix A-8 Power LED Connector

Table Appendix A-16 Power LED Pin Assignments

Pin	Signal Name
10	Ground
11	KEY LOCK
12	Ground
13	Key
14	LED_PWR

RESET BUTTON CONNECTOR

The following figure shows the reset button connector on the system board. Table Appendix A-18 provides the pin assignments.

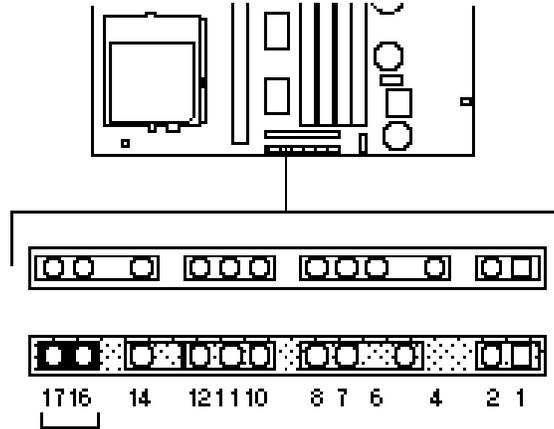


Figure Appendix A-9 Reset Button Connector

Table Appendix A-18 Reset Pin Assignments

Pin	Signal Name
16	Ground
17	RESET

SUSPEND BUTTON CONNECTOR

The following figure show the suspend button connector on the system board. Table Appendix A-20 provides the pin assignments.

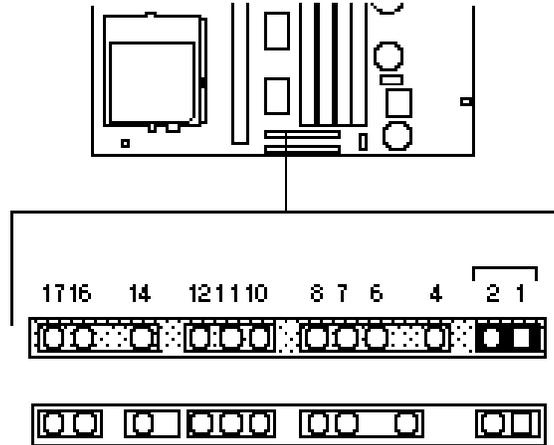


Figure Appendix A-10 Suspend Button Connector

Table Appendix A-20 Suspend Pin Assignments

Pin	Signal Name
1	+ 5 V
2	Comatose

INFRARED CONNECTOR

The following figure shows the infrared (IR) connector on the system board. Table Appendix A-22 provides the pin assignments.

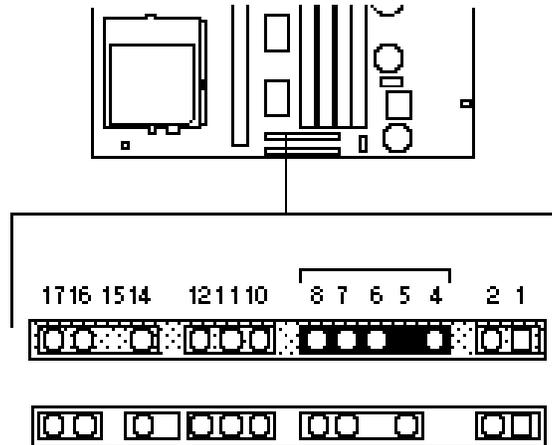


Figure Appendix A-11 Infrared Connector

Table Appendix A-22 Infrared Pin Assignments

Pin	Signal Name
4	+5 V
5	Key
6	IR_RX
7	Ground
8	IR_TX

FAN CONNECTOR

The following figure shows the fan connector on the system board. Table Appendix A-24 provides the pin assignments.

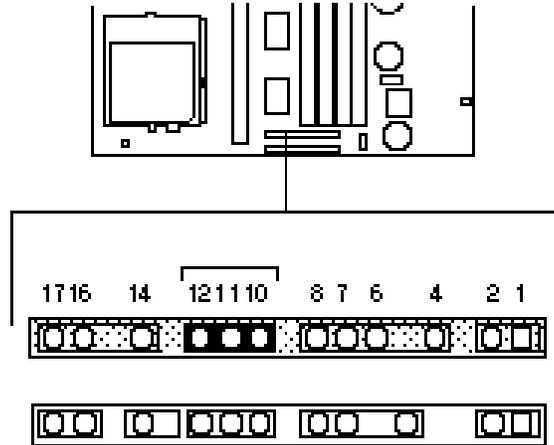


Figure Appendix A-12 Fan Connector

Table Appendix A-24 Fan Pin Assignments

Pin	Signal Name
10	Ground
11	+12 V (fused)
12	Ground

SPEAKER CONNECTOR

The following figure shows the speaker connector on the system board. Table Appendix A-26 provides the pin assignments.

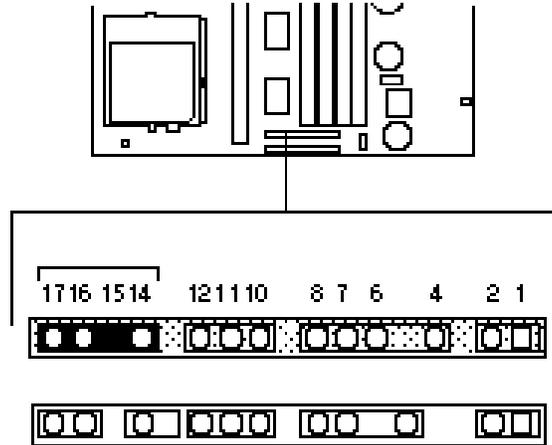


Figure Appendix A-13 Speaker Connector

Table Appendix A-26 Speaker Pin Assignments

Pin	Signal Name
14	SPKR_DAT
15	Key
16	SPKR_DAT connect
17	Ground

AUDIO RISER I/O CONNECTOR

The following figure shows the audio I/O riser connector on the system board (multimedia systems only). Table Appendix A-28 provides the pin assignments.

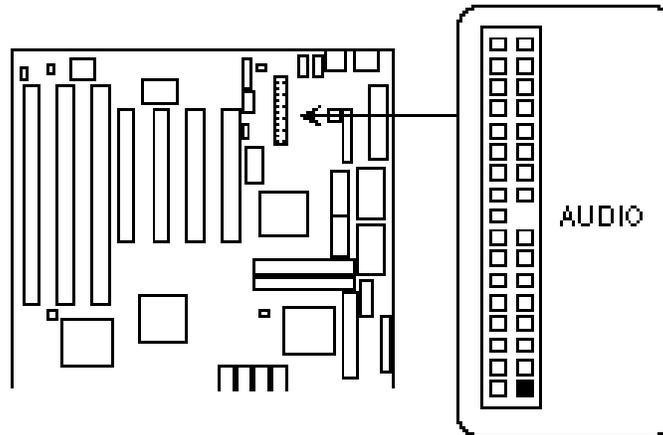


Figure Appendix A-14 Audio Riser I/O Connector

Table Appendix A-28 Audio Riser I/O Pin Assignments

Pin	Signal	Pin	Signal
1	+5 V	2	+5 V
3	JoyStick But0	4	JoyStick But2
5	JoyStick X1	6	JoyStick X2
7	Ground	8	MIDI Out
9	Ground	10	JoyStick Y2
11	JoyStick Y1	12	JoyStick But3
13	JoyStick But1	14	MIDI In
15	+5 V	16	Key
17	Key	18	Key
19	Line Out Right	20	Ground
21	Right Speaker	22	Ground
23	Left Speaker	24	Key
25	Line Out Left	26	Ground
27	Line In Right	28	-12 V
29	Line In Left	30	Ground
31	Mic In	32	+12 V
33	Ground	34	Ground

WAVETABLE CONNECTOR

The following figure shows the wavetable connector on the system board. Table Appendix A-30 provides the pin assignments.

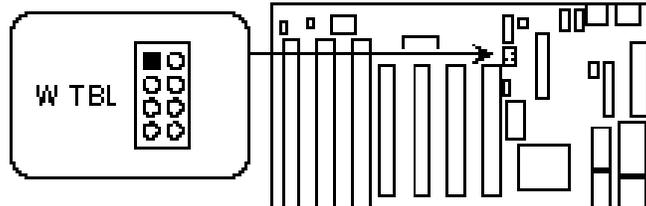


Figure Appendix A-15 Wavetable Connector

Table Appendix A-30 Wavetable Pin Assignments

Pin	Signal Name
1	Wave Right
2	Ground
3	Wave Left
4	Ground
5	Key
6	Ground
7	MIDI_Write
8	Ground

CD-ROM AUDIO CONNECTOR

The following figure shows the CD-ROM audio interface connector on the system board. Table Appendix A-32 provides the pin assignments.

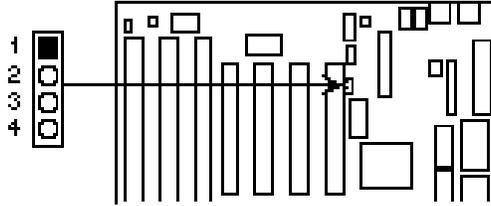


Figure Appendix A-16 CD-ROM Audio Interface Connector

Table Appendix A-32 CD-ROM Audio Interface Pin Assignments

Pin	Signal Name
1	CD-Right
2	Ground
3	CD-Left
4	Ground

ISA CONNECTORS

The following figure shows the ISA expansion board connectors on the system board. Table Appendix A-34 provides the pin assignments.

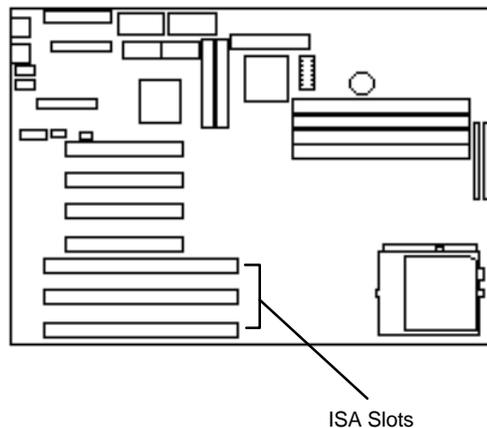


Figure Appendix A-17 ISA Expansion Board Connectors

Table Appendix A-34 ISA Bus Pin Assignments

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
B1	GND	A1	IOCHK-	B26	DACK2-	A26	SA5
B2	RSTDRV	A2	SD7	B27	TC	A27	SA4
B3	Vcc	A3	SD6	B28	BALE	A28	SA3
B4	IRQ9	A4	SD5	B29	Vcc	A29	SA2
B5	-5 V	A5	SD4	B30	OSC	A30	SA1
B6	DRQ2	A6	SD3	B31	GND	A31	SA0
B7	-12 V	A7	SD2	KEY		KEY	
B8	0WS-	A8	SD1	D1	MEMCS16-	C1	SBHE-
B9	+12 V	A9	SD0	D2	IOCS16-	C2	LA23
B10	GND	A10	IOCHRDY	D3	IRQ10	C3	LA22
B11	SMEMW-	A11	AEN	D4	IRQ11	C4	LA21
B12	SMEMR-	A12	SA19	D5	IRQ12	C5	LA20
B13	IOW-	A13	SA18	D6	IRQ15	C6	LA19
B14	IOR-	A14	SA17	D7	IRQ14	C7	LA18
B15	DACK3-	A15	SA16	D8	DACK0-	C8	LA17
B16	DRQ3	A16	SA15	D9	DRQ0	C9	MEMR-
B17	DACK1-	A17	SA14	D10	DACK5-	C10	MEMW-
B18	DRQ1	A18	SA13	D11	DRQ5	C11	SD8
B19	REFRESH-	A19	SA12	D12	DACK6-	C12	SD9
B20	SYSCLK	A20	SA11	D13	DRQ6	C13	SD10
B21	IRQ7	A21	SA10	D14	DACK7-	C14	SD11
B22	IRQ6	A22	SA9	D15	DRQ7	C15	SD12
B23	IRQ5	A23	SA8	D16	Vcc	C16	SD13
B24	IRQ4	A24	SA7	D17	Master-	C17	SD14
B25	IRQ3	A25	SA6	D18	GND	C18	SD15

PCI CONNECTORS

The following figure shows the PCI expansion board connectors on the system board. Table Appendix A-36 provides the pin assignments.

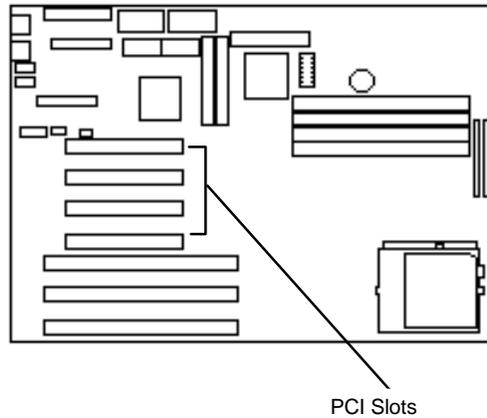


Figure Appendix A-18 PCI Expansion Board Connectors

Table Appendix A-36 PCI Bus Pin Assignments

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	GND	B1	-12 V	A32	AD16	B32	AD17
A2	+12 V	B2	No Connect	A33	3.3 V	B33	CBE2-
A3	No Connect	B3	GND	A34	FRAME-	B34	GND
A4	No Connect	B4	No Connect	A35	GND	B35	IRDY-
A5	Vcc	B5	Vcc	A36	TRDY-	B36	3.3 V
A6	PCIINT3-	B6	Vcc	A37	GND	B37	DEVSEL-
A7	PCIINT1-	B7	PCIINT2-	A38	STOP-	B38	GND
A8	Vcc	B8	PCIINT4-	A39	3.3 V	B39	PLOCK-
A9	Reserved	B9	No Connect	A40	SDONE	B40	PERR-
A10	Vcc	B10	Reserved	A41	SBO-	B41	3.3 V
A11	Reserved	B11	No Connect	A42	GND	B42	SERR-
A12	GND	B12	GND	A43	PAR	B43	3.3 V
A13	GND	B13	GND	A44	AD15	B44	CBE1-

Table Appendix A-36 PCI Bus Pin Assignments

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A14	Reserved	B14	Reserved	A45	3.3 V	B45	AD14
A15	SPCIRST-	B15	GND	A46	AD13	B46	GND
A16	Vcc	B16	PCLKE	A47	AD11	B47	AD12
A17	AGNT-	B17	GND	A48	GND	B48	AD10
A18	GND	B18	REQA-	A49	AD9	B49	GND
A19	Reserved	B19	Vcc	A50	KEY	B50	KEY
A20	AD30	B20	AD31	A51	KEY	B51	KEY
A21	3.3 V	B21	AD29	A52	CBEO-	B52	AD8
A22	AD28	B22	GND	A53	3.3 V	B53	AD7
A23	AD26	B23	AD27	A54	AD6	B54	3.3 V
A24	GND	B24	AD25	A55	AD4	B55	AD5
A25	AD24	B25	3.3 V	A56	GND	B56	AD3
A26	AD22 (IDSEL)	B26	CBE3-	A57	AD2	B57	GND
A27	3.3 V	B27	AD23	A58	AD0	B58	AD1
A28	AD22	B28	GND	A59	Vcc	B59	Vcc
A29	AD20	B29	AD21	A60	SREQ64-	B60	SACK64-
A30	GND	B30	AD19	A61	Vcc	B61	Vcc
A31	AD18	B31	3.3 V	A62	Vcc	B62	Vcc

Appendix B

System Board Switches

Switches are set correctly at the factory for your configuration. Conditions that require changing the switch settings are as follows:

- You are upgrading your processor.
You need to set switches for the new processor speed and processor voltage.
- You forgot your password and cannot boot your system.
You need to set a switch to clear your current password.
- You changed your CMOS settings in setup and want the default settings.
You need to set a switch to clear your current setting and set the factory defaults.

CAUTION: Do not change any jumper settings on the system board. They are for manufacturing purposes only.

The Figure Appendix B-1 shows the switch locations on the system board. Explanations follow the figure.

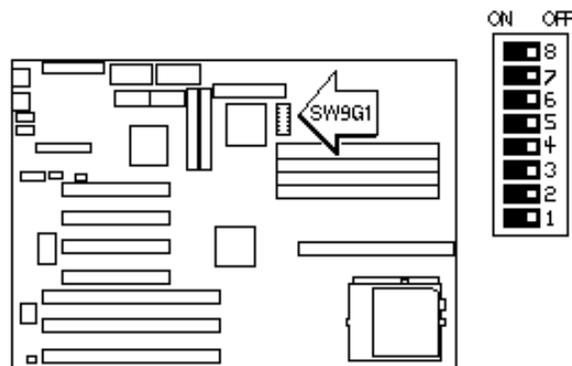


Figure Appendix B-1 System Board Switch Location

Table Appendix B-1 System Board Switch Settings

Switch	Function	Settings
1	ISA bus clock speed: sets the ISA bus to a slower or faster setting.	OFF = 7.5 MHz (120 MHz) 8.25 MHz (133 MHz) (default) ON = 10 MHz (120 MHz) 11 MHz (133 MHz)
2	CPU voltage regulator: some upgrade processors may require changing this setting.	OFF = VR (3.3 - 3.465 V) ON = VRE (3.465 - 3.63 V)
3	Clear password.	OFF = Normal mode (default) ON = Clear password
4	Resets CMOS settings to the default CMOS values.	OFF = Normal mode (default) ON = Reset CMOS settings
5	Enables/disables access to Setup.	OFF = Setup access (default) ON = Setup access disabled
6	Internal processor clock.	OFF = 3:2 speed ON = 2:1 (default)
7, 8	External processor clock speed.	7 8 50 MHz ON OFF 60 MHz OFF OFF (120 MHz) 66 MHz OFF ON (133 MHz)

CHANGING SWITCH SETTINGS

To change the switch settings, follow these steps.

CAUTION: Switches are set correctly at the factory for your configuration. Only change (or check) the appropriate switch setting if you are upgrading your processor. Otherwise, keep the switches at their factory settings.

1. Power off and unplug the system and any external options.

WARNING: The system power must be off before changing switch settings.

2. Remove the system unit side panel (see “Removing the Side Panel” in Section 3).
3. Locate the switch bank on the system board (see Figure Appendix B-1).
4. Change the switch setting to the appropriate position.

CAUTION: Switch SW2 should only be changed to the VRE setting if your upgrade CPU documentation indicates that the required voltage must be between 3.465 V and 3.63 V. Changing the processor voltage switch could damage the processor.

5. Replace the system unit side panel (see Replacing the Side Panel in Section 3).

CLEARING YOUR PASSWORD

If you forgot your password, use the following procedure to clear your current password and to set a new one.

1. Turn off and unplug the system and any external options.
 2. Remove the system unit side panel (see “Removing the Side Panel” in Section 3).
 3. Locate the SW3 (Password Clear switch) on the system board (see Figure Appendix B-1).
 4. Set SW3 (Password Clear switch) to the ON position.
 5. Connect system power cable and monitor cable.
 6. Power on your computer. Let the system completely boot.
 7. Power off and unplug the system and monitor cable.
 8. Reset SW3 (Password Clear switch) to the OFF position.
 9. Replace the system unit side panel (see “Replacing the Side Panel” in Section 3).
 10. Run Setup to set a new password (see “The Security Menu” in Section 2).
-

CLEARING CMOS

Use the following procedure to clear CMOS to the default factory settings.

CAUTION: Clearing CMOS changes your setup configuration including hard disk settings.

1. Turn off and unplug the system and any external options.
 2. Remove the system unit side panel (see “Removing the Side Panel” in Section 3).
 3. Locate the SW4 (Reset CMOS switch) on the system board (see Figure Appendix B-1).
 4. Set SW4 (Reset CMOS switch) to the ON position.
 5. Connect system power cable and monitor cable.
 6. Power on your computer. Let the system completely boot.
 7. Power off and unplug the system and monitor cable.
 8. Reset SW4 (Reset CMOS switch) to the OFF position.
 9. Replace the system unit side panel (see “Replacing the Side Panel” in Section 3).
 10. Run Setup to reconfigure your system (see “Setup Utility” in Section 2).
-

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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 equipment is a Class B digital apparatus which complies with the Radio Interference Regulations, C.R.C., c.1374.

Cet appareil numérique de la classe B est conforme au Règlement sur le brouillage radioélectrique, C.R.C., ch.1374.

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

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

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