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Preface

This service and reference manual contains the technical information necessary to set up and maintain the NEC Versa[®] 6220/30/60 notebook computers.

The manual also provides hardware and interface information for users who need an overview of the system design. The manual is written for NEC-trained customer engineers, system analysts, service center personnel, and dealers.

The manual is organized as follows:

Section 1 — Technical Information, provides an overview of the hardware and interface components. System specifications are listed including computer dimensions, weight, environment, safety compliance, power consumption, and system memory specifications.

Section 2 — Setup and Operation, takes the authorized service technician or dealer from unpacking to setup and operation. The section includes a description of operating controls, setting parameters and accessing the NECCSD bulletin board system (BBS).

Section 3 — Troubleshooting, lists troubleshooting procedures as well as helpful servicing hints.

Section 4 — Field Service Guidelines, provides disassembly and assembly procedures, and an exploded-view diagram of the NEC Versa system with part numbers.

Appendix A — Connector Locations and Pin Assignments, provides a list of the main board internal connector pin assignments and a list of external pin assignments.

Appendix B — Video Modes, lists NEC Versa supported video modes.

An **Index** is included for convenience.

Abbreviations

| | | | |
|--------|--|-------|--|
| A | ampere | DMAC | DMA controller |
| AC | alternating current | DOS | disk operating system |
| AT | advanced technology (IBM PC) | DRAM | dynamic RAM |
| BBS | Bulletin Board System | DTE | data terminal equipment |
| BCD | binary-coded decimal | ECC | error checking and correction |
| BCU | BIOS Customized Utility | ECP | extended capabilities port |
| BIOS | basic input/output system | EDO | enhanced data out |
| bit | binary digit | EDS | error detecting system |
| bpi | bits per inch | EGA | Enhanced Graphics Adapter |
| bps | bits per second | EMS | Expanded Memory Specification |
| BUD | BIOS Upgrade Diskette | EPP | enhanced parallel port |
| C | Celsius or centigrade | EPROM | erasable and programmable ROM |
| Cache | high-speed buffer storage | EVGA | Enhanced Video Graphics Array |
| CAM | constantly addressable memory | F | Fahrenheit |
| CAS | column address strobe | FAX | facsimile transmission |
| CD-ROM | compact disk ROM | FCC | Federal Communications Commission |
| CGA | Color Graphics Adapter | FG | frame ground |
| CGB | Color Graphics Board | FM | frequency modulation |
| CH | channel | Fn | Function |
| clk | clock | FRU | field-replaceable unit |
| cm | centimeter | GB | gigabyte |
| CMOS | complementary metal oxide semiconductor | GND | ground |
| COM | communication | HDD | hard disk drive |
| CONT | contrast | HEX | hexadecimal |
| CPGA | ceramic pin grid array | HGA | Hercules Graphics Adapter |
| CPU | central processing unit | Hz | hertz |
| CRT | cathode-ray tube | IC | integrated circuit |
| DAC | digital-to-analog converter | ID | identification |
| DACK | DMA acknowledge | IDE | intelligent device electronics |
| DC | direct current | IDTR | interrupt descriptor table register |
| DIMM | dual-inline memory module | IMR | Interrupt Mask register |
| DIP | dual in-line package | | |
| DLAB | Divisor Latch Address bit | | |
| DMA | direct memory access | | |

| | | | |
|------|------------------------------------|--------|-----------------------------------|
| in. | inch | NMI | Non-maskable Interrupt |
| INTA | interrupt acknowledge | ns | nanosecond |
| IPB | illustrated parts breakdown | NSRC | National Service Response Center |
| IR | infrared | PAL | programmable array logic |
| IRR | Interrupt Request register | PC | personal computer |
| ISA | Industry Standard Architecture | PCB | printed circuit board |
| ISR | In Service register | PCI | peripheral component interconnect |
| I/O | input/output | PFP | plastic flat package |
| IPC | integrated peripheral controller | PIO | Programmed Input/Output |
| ips | inches per second | pixel | picture element |
| IRQ | interrupt request | PJQFP | plastic J-lead quad flat pack |
| K | kilo (1024) | PLCC | plastic lead chip carrier |
| k | kilo (1000) | PLL | phase lock loop |
| KB | kilobyte | p-p | peak-to-peak |
| kg | kilogram | PPI | programmable peripheral interface |
| kHz | kilohertz | PROM | programmable ROM |
| kV | kilovolt | QFP | quad flat pack |
| lb | pound | RAM | random-access memory |
| LBA | logical block addressing | RAMDAC | RAM digital-to-analog |
| LDTR | local descriptor table register | RAS | row address strobe |
| LED | light-emitting diode | RGB | red green blue |
| LSB | least-significant bit | RGBI | red green blue intensity |
| LSI | large-scale integration | ROM | read-only memory |
| M | mega | rpm | revolutions per minute |
| mA | milliamps | R | read |
| max | maximum | RTC | real-time clock |
| MB | megabyte | R/W | read/write |
| MDA | Monochrome Display Adapter | S | slave |
| MFM | modified frequency modulation | SCSI | Small Computer System Interface |
| Mhz | megahertz | SDLC | Synchronous Data Link Control |
| mm | millimeter | SG | signal ground |
| ms | millisecond | SIMM | single inline memory module |
| MSB | most-significant bit | SIR | serial infrared |
| NASC | National Authorized Service Center | | |
| NC | not connected | | |
| NDP | numeric data processor | | |

| | |
|----------------|--|
| SOIC | small outline integrated circuit |
| SQFP | silver quad flat package |
| SVGA | Super Video Graphics Array |
| SW | switch |
| TCP | Thin chip package |
| TQFP | Thin-quad flat package |
| TSC | Technical Support Center |
| TTL | transistor/transistor logic |
| tpi | tracks per inch |
| UART | universal asynchronous receiver/transmitter |
| V | volt |
| Vdc | volts, direct current |
| VESA | Video Electronics Standards Association |
| VFO | variable frequency oscillator |
| VGA | Video Graphics Array |
| VLSI | very large-scale integration |
| VRAM | virtual RAM |
| W | watt |
| μf | microfarad |
| μPD | microprocessor |
| μs | microsecond |
| Ω | ohm |

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Section 1

Technical Information

The NEC Versa 6220/30/60 notebook computer is lightweight, compact, and fully IBM compatible.



This service manual covers only the NEC Versa 6220/30/60 notebooks. All figures in this manual reflect this series of notebooks.



Figure 1-1 NEC Versa 6220/30/60 Series Notebook

This section of the manual provides system configuration information, including an overview of hardware and interface components. See the following table for a system-specific breakdown of the hardware.

Table 1-1 Model Configurations

| Feature | NEC Versa 6220 | NEC Versa 6230 | NEC Versa 6260 |
|-----------------|---|---|---|
| CPU | Intel Pentium® with MMX technology P55CLM/200 MHz | Intel Pentium® with MMX technology P55CLM/233 MHz | Intel Pentium® with MMX technology P55CLM/266 MHz |
| On-Board DRAM | 32-MB | 32-MB | 32-MB |
| Video Memory | 2-MB | 2-MB | 2-MB |
| Hard Disk Drive | 3.0 GB 12.5 mm high | 5.4 GB 17mm high | 5.4 GB 17mm high |
| CD-ROM Reader | 20X CD-ROM Reader | 20X CD-ROM Reader | 20X CD-ROM Reader |
| Color LCD | 13.3" Extended Graphics Array (XGA),TFT Color Display | 13.3" Extended Graphics Array (XGA),TFT Color Display | 13.3" Extended Graphics Array (XGA),TFT Color Display |

HARDWARE OVERVIEW—FRONT

Take a moment to become familiar with the location and function of controls located on the front of the system.

Liquid Crystal Display (LCD)

The LCD operates with the NeoMagic NMG4 controller. The controller supports XGA, uses a 64-bit accelerator with a Peripheral Component Interconnect (PCI) interface. The LCD also supports VESA timing.

The NEC Versa 6220/30/60 LCD features the following:

- 13.3-inch Extended Graphics Array (XGA) TFT high-resolution active matrix XGA color display
- 0.264 mm dot pitch
- 18-bit digital interface
- 1024 x 768 resolution
- 64K colors.

Additional LCD panel features:

- Power LED that indicates the current power status. This LED is visible with the LCD panel opened or closed.
- Slide switch that adjusts screen brightness.



Figure 1-2 LCD Panel

Another video feature includes a CRT port on the system's rear panel that allows the user to connect an optional monochrome or color external display to the system. The computer can support the LCD and external display simultaneously.

Power-saving features for controlling the LCD's backlighting include the ROM-based hot key combination Fn F5, and Auto Setup power management settings. See Section 2, Setup and Operation, for information on using these settings. In addition, the automatic LCD status feature conserves the backlight. When the LCD is closed the backlight shuts off automatically, saving battery power.

Power Button

Slide the Power button to the right to power on and power off the computer. The Power button is a “smart” switch, meaning that it recognizes when the system is in Suspend mode. If in Suspend mode, you cannot power off until you press the Suspend button again to bring the system out of Suspend mode.

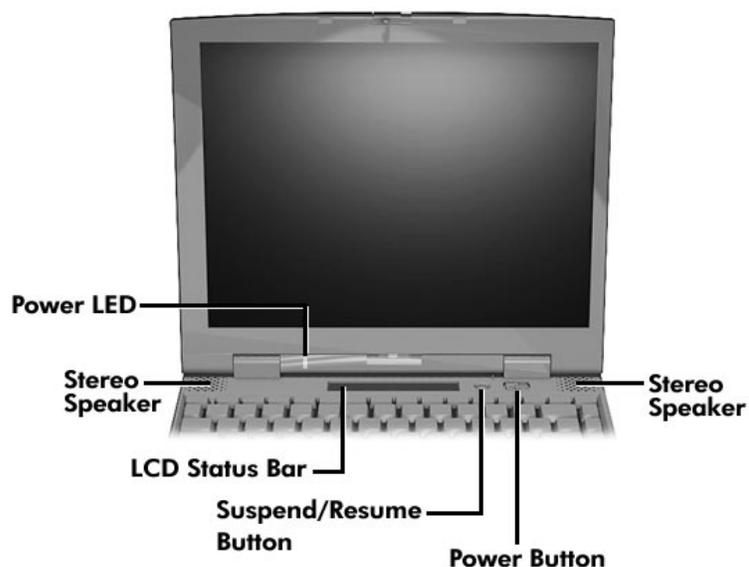


Figure 1-3 LCD Status Bar and Button Locations

LCD Status Bar and Power Indicator

The LCD status bar is situated right below the LCD screen. It provides an easy way to detect system status. Different graphic icons appear on the LCD bar indicating that a device is accessed, an operation performed, or a power mode activated. The graphic icons displayed on the LCD bar resemble either their physical characteristics or their primary function. See the LCD Status Bar figure shown next, and the descriptions that follow for the specific meaning of each icon.

The power indicator is located just above and to the left of the status bar. The power indicator lights green when computer power is on.

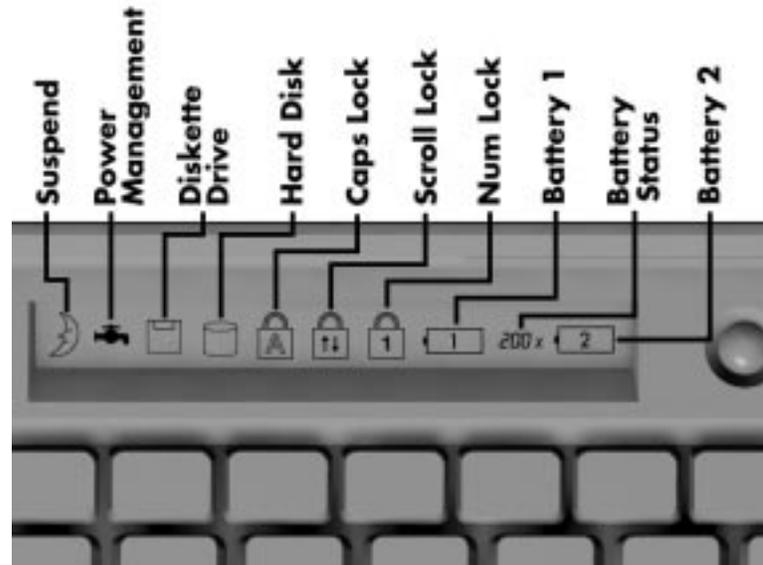


Figure 1-4 System Status Bar

Status Icons

The following list defines the status icons displayed in the system status bar.

- Suspend — appears when the system is in Suspend mode. Suspend mode conserves system power by shutting down devices in the system while retaining data and system status.
- Power Management — shows the current power management mode in use, including Off, Custom, High Performance or Longest Life.
- Diskette Drive — appears when the NEC Versa writes data to or retrieves data from a diskette.
- Hard Disk — shows when the NEC Versa writes data to or retrieves data from the hard disk.
- Caps Lock — appears when Caps Lock is in effect.
- Scroll Lock — shows that Scroll Lock is in effect.
- Num Lock — appears when Num Lock is in effect. Num Lock lets the user enter numbers for calculations via the numeric keypad.
- Battery Status — displays the percentage of battery power available.
 - Battery 1 appears when you have the main battery installed in the battery bay.
 - Battery 2 appears when you have an optional battery installed in the VersaBay II.

Keyboard

The built-in, 85-key keyboard (U.S.) or 79-key keyboard (UK and Germany) uses the standard QWERTY format. The keyboard provides 12 function keys and 7 cursor control keys, with an Fn key for ROM-based key functions. The numeric keypad is embedded in the standard key layout.

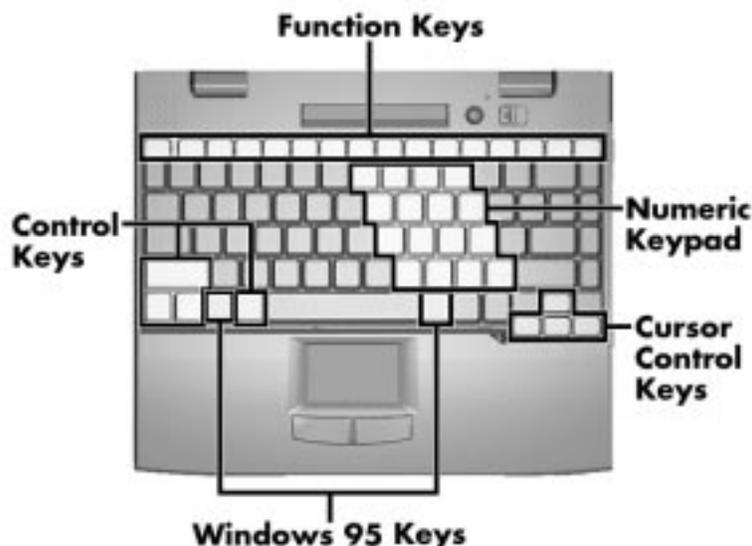


Figure 1-5 Keyboard Layout

NEC VersaGlide

The NEC VersaGlide is a built-in mechanism that functions as the system's mouse. It controls the on-screen pointer (cursor). To use the VersaGlide, move your finger across the NEC VersaGlide pad, and the cursor follows. The buttons below the NEC VersaGlide allow the user to select or deselect menu items. Tap and double-tap are supported on the VersaGlide pad.

The PS/2 Microsoft mouse is the system's default pointing device until the user selects the NEC Setup icon. When the user selects the NEC Setup icon, the NEC VersaGlide is installed as the system pointing device. If an external mouse is installed, the NEC VersaGlide is deactivated. A serial mouse is not supported.



Figure 1-6 VersaGlide Location

Diskette Drive and the NEC VersaBay II

A standard 1.44-MB diskette drive or SuperDisk LS-120 drive comes installed in the VersaBay II slot on the front of the computer. The VersaBay II expansion slot lets the user replace the standard diskette drive with the 20X CD-ROM reader that also ships with the system. In addition to the CD-ROM reader, the VersaBay II accepts NEC options including a second battery pack, or an additional hard disk.



Figure 1-7 NEC VersaBay II Location

Infrared (IR) Assembly

The IR assembly consists of a small board with two infrared LEDs, connected to the Graph board at connector P10. The board allows the NEC Versa computer to communicate with other infrared-ready computers. For example, the infrared port allows the user to transfer files between the NEC Versa and an IR-equipped computer, or print to an IR-equipped printer without using cables.

HARDWARE OVERVIEW—RIGHT SIDE

Review the following section for a description of the hardware on the right side of the NEC Versa.

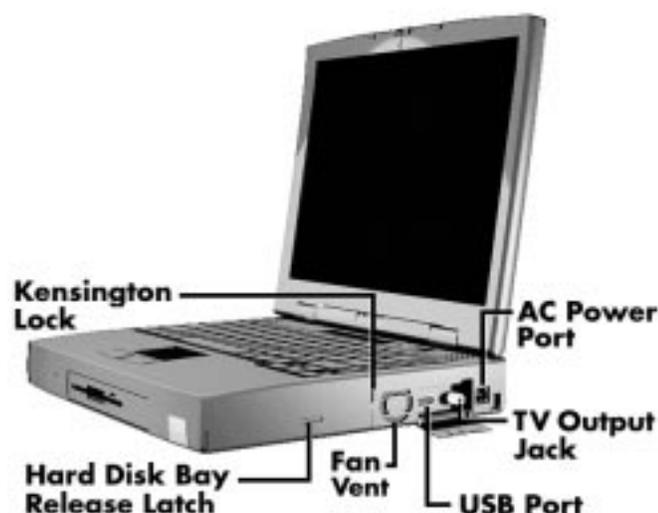


Figure 1-8 Right Side Features

- Kensington Lock — Gives the user the option to add an optional Kensington Lock.
- Hard Disk Drive Bay Cover Release Latch — The hard disk drive bay contains the removable hard disk drive.

To access the hard disk drive, power off the system, turn the system over, remove the hard disk drive bay cover screw and lift up the hard disk drive bay cover release latch while pushing the cover away from the system.

- Fan Vents — Allow your system to cool properly and maintain a safe operating temperature.

 **CAUTION**

Always keep the fan vent clear to allow proper system cooling.

- USB Port — The Universal Serial Bus (USB) port allows you to connect up to 127 USB-equipped peripheral devices to your NEC Versa.
- TV Out Jack — Lets you use your television set as an external monitor. This port supports both NTSC and PAL signals.



The TV Out port does not support the SECAM signal used in some countries. For proper display, set the video mode to 640 x 480.

- AC Power Port — Use the power jack to attach the NEC Versa to a DC power source, such as the AC adapter or the optional DC car adapter.

HARDWARE OVERVIEW — LEFT SIDE

Review the following section for a description of the hardware on the left side of the NEC Versa.



Figure 1-9 Left Side Features

- PC card slots — provides two slots for inserting two Type II PC cards or one Type III PC card.
- Battery bay and battery bay cover release latch — Contains an eight-cell Lithium Ion (Li-Ion) battery that lets you run your system on DC power.
- Audio ports and a volume control knob. The audio ports include:
 - Volume Control — allows you to control the speaker volume.
 - Headphones — lets you connect external headphones or speakers to your NEC Versa. Plugging in headphones disables the built-in system speakers.
 - Line-Out — lets the NEC Versa act as an input source for another audio system. Connect this port to a Line-In port on another audio system to play or record.
 - Line-In — lets you use another audio system, like a home stereo, as an input source. Use a cable to connect to the Line-Out port on the other audio system to record or play.
 - Microphone (MIC) — allows you to connect an external microphone for monophonic recording or amplification through the unit. Plugging in an external microphone disables the built-in microphone.

HARDWARE OVERVIEW — REAR SIDE

Review the following sections for descriptions of the hardware on the rear of the NEC Versa.

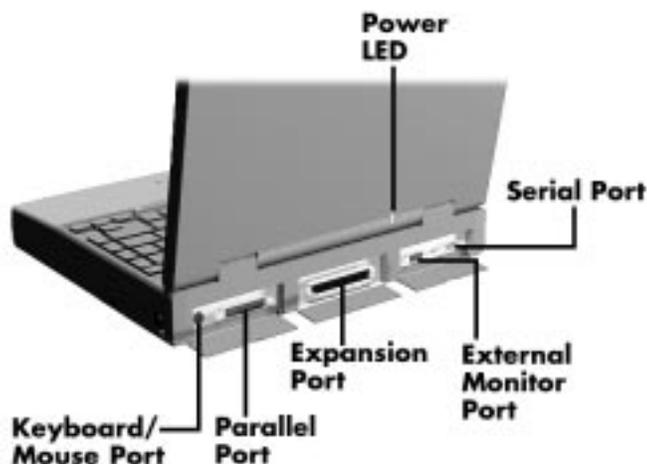


Figure 1-10 Rear Features

- **Keyboard/Mouse Port** — Use the standard PS/2 port to connect an external PS/2-style mouse or a PS/2-style keyboard to the system. With an optional Y-cable adapter, you can connect both a mouse and a keyboard at the same time.
- **Parallel Port** — Use this port to connect a parallel printer or other parallel device. The port is an Enhanced Capabilities Port (ECP). The ECP standard provides you with a greater processing speed than the conventional parallel port. It also supports Enhanced Parallel Port (EPP) bi-directional and uni-directional protocols.
- **Expansion Port** — This port (also called the Docking port) provides a connection for NEC Versa 6220/30/60 options including the NEC Docking Station 6000 Plus, the NEC PortBar 6000, the NEC MiniDock 6000, and the NEC Floppy Disk Drive (FDD) Connector.

CAUTION

Only dock the NEC Versa 6220/30/60 Series notebooks on the NEC Docking Station 6000 Plus or the NEC MiniDock 6000. The cover of the docking station is specially designed to allow for proper system cooling.

- External Monitor (Video) Port — Use this 15-pin port to attach an external monitor to your NEC Versa. You can run the LCD display and the external monitor simultaneously or run either alone.
- Serial Port — Use this port to connect an external modem or other serial device.

HARDWARE OVERVIEW—INTERNAL COMPONENTS

Review the following sections for a description of the system's internal hardware.

Battery Pack

The system uses a rechargeable Lithium-Ion (Li-Ion) battery as its transient power source. The battery pack installs in the compartment next to the VersaBay II on the bottom of the NEC Versa.

Hard Disk Drive

A standard 2.5-inch 3.0-GB 12.5 mm or 5.4-GB 17 mm hard disk drive ships with the system.

Diskette Drive

The interchangeable 3.5-inch 1.44 MB diskette drive installs in the front of the system in the VersaBay II slot.

20X CD-ROM Reader

A 20X CD-ROM reader ships with the NEC Versa 6220/30/60 notebooks. The interchangeable twenty-speed CD-ROM reader features the latest in CD-ROM technology. It installs in the front of the system in the VersaBay II slot.

CPU Board

The CPU board is a rectangular-shaped board located between the graph board and I/O board. The CPU board is part of a subassembly, which includes a heat sink, fan and the CPU board.

Sound Board

The sound board provides the NEC Versa system with its audio capabilities via line-in/line-out jacks, and headphone/microphone jacks. It is situated on top of the main board. The sound board integrates the following features:

- ESS Technology Plug and Play support
 - ES1869

- Integrated Music Synthesis, ESFM™ and Stereo Digital to Analog Converter (DAC) FM Synthesizer
- 16 bit Stereo CODEC
- 4.0KHz to 44.1KHz Sampling Rate
- 7 Channel Mixer.

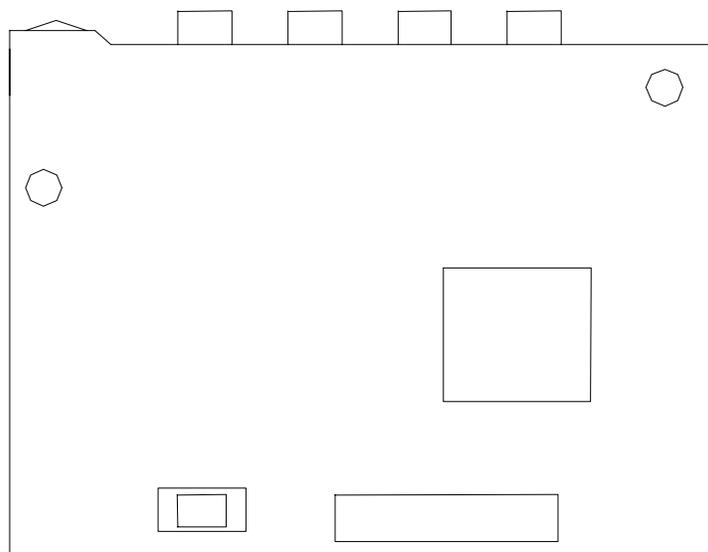


Figure 1-11 Sound Board Layout

Graph Board

The system Graph board (G8YJP) houses a variety of connectors and controls, including the DIMM connectors. These are identified in the diagram shown in Appendix A.

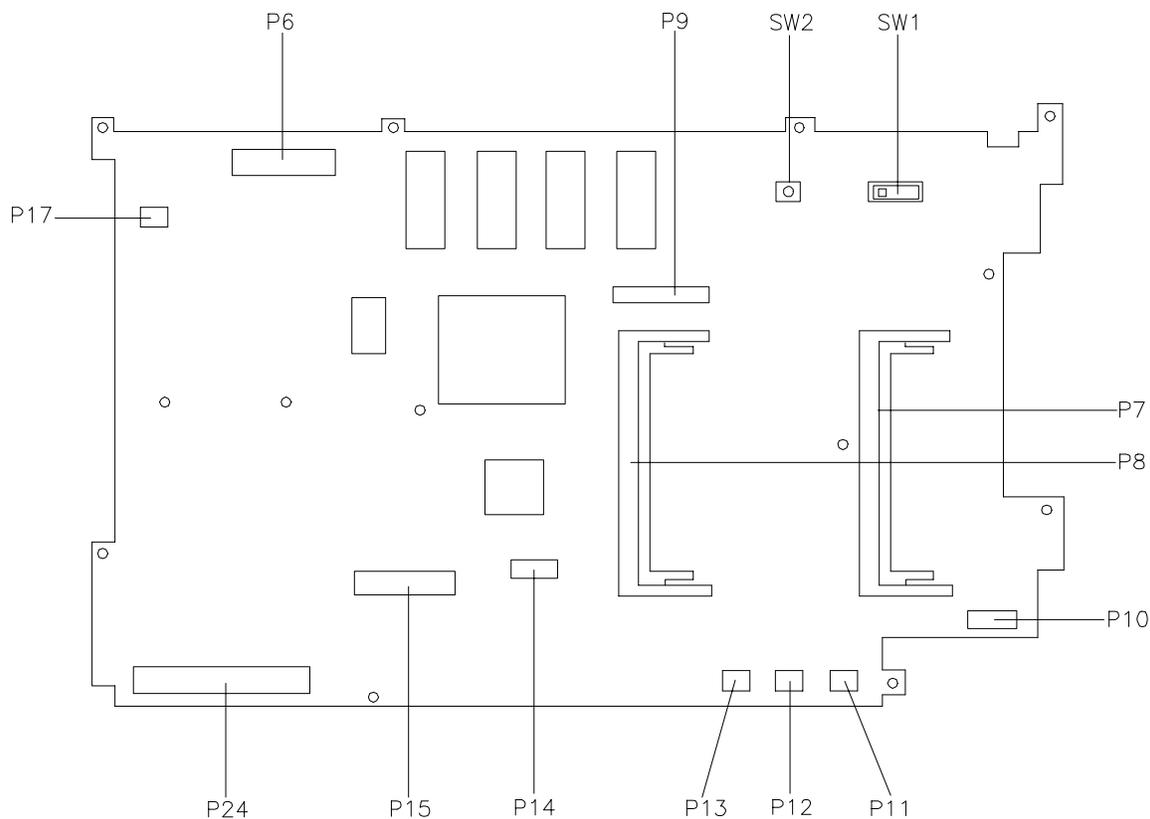


Figure 1-12 Graph Board Layout

I/O Board

The system I/O board (G8YAQ) contains peripheral subsystems including serial, parallel and video ports, and charger. It is located underneath the main board. Refer to Appendix A for a list of connectors.

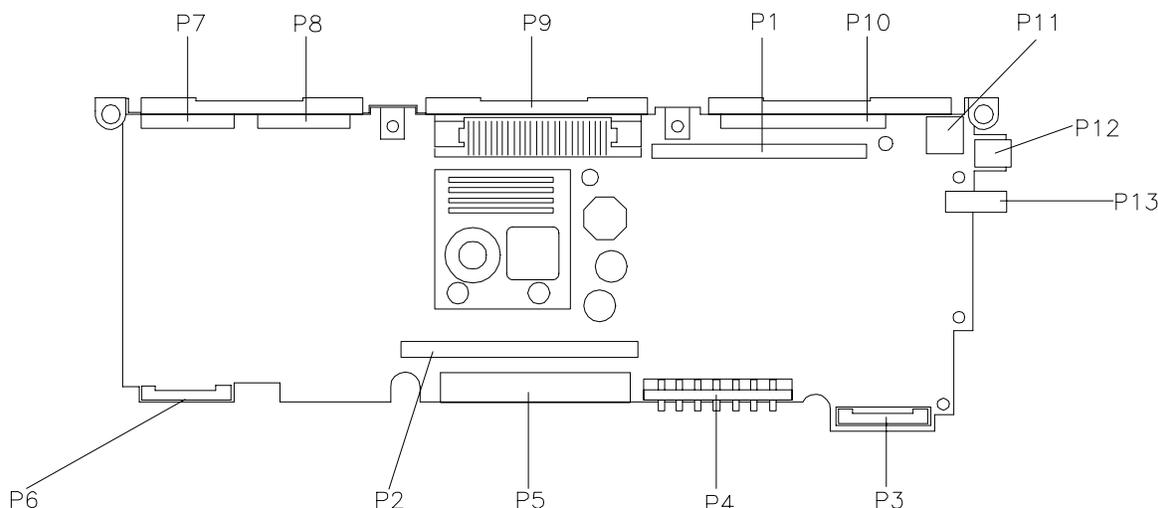


Figure 1-13 I/O Board Layout

CMOS Battery

The lithium battery (3 Volts, 280 mAh capacity) is attached to P13 on the Graph board. It provides battery backup and prevents data loss in the system's complementary metal oxide semiconductor (CMOS) RAM. This memory area contains information on the system's configuration like date, time, drives, and memory. The CMOS battery lasts approximately three years.

Bridge Battery

The bridge battery saves the memory contents and system status for up to 5 minutes while in Suspend mode. It is connected to the Graph board via connector P11. The AC adapter maintains voltage in the bridge battery when the system is powered on or off. The bridge battery stores 7.2 Volts, 70 mAH.

SYSTEM MEMORY

The Graph board provides 32 MB (3.3 V SO-DIMM) of standard RAM.

Optional SO-DIMMs with a value of 16-, 32-, or 64-MB can be added to increase system memory up to a maximum of 128-MB (70 ns 3.3V EDO access). In addition, 256-KB of read-only memory (ROM), 1 x 28F020, enables the system BIOS to be flashed.

The system provides 2 MB of video RAM (50-ns HyperPage mode, self-refresh).

The following Cache RAM is provided:

- L1: 32 KB (Internal Pentium)
- L2: 512 KB write back (External).

Memory Map

The system supports system and video memory shadowing, both controlled through complementary metal oxide semiconductor (CMOS settings). The system supports BIOS as a cacheable area with write protection. Table 1-2 lists the system's memory map.

Table 1-2 Memory Map

| Memory Space | Size | Function |
|-------------------|-----------|---|
| 000000-0002FFh | 768 bytes | BIOS Interrupt Vector Table |
| 000300-0003FFh | 256 bytes | BIOS Stack Area |
| 000400-0004FFh | 256 bytes | BIOS Data Area |
| 000500-09FFFFh | 639 KB | Application Memory (used by the Operating System, device drivers, TSRs, and all DOS applications) |
| 0A0000-0AFFFFh | 64 KB | Video Buffer (EGA and VGA) |
| 0B0000-0B7FFFh | 32 KB | Video buffer (monochrome, CGA color, VGA monochrome) |
| 0B8000-0BFFFFh | 32 KB | Video Buffer (CGA, EGA color, and VGA color) |
| 0C0000-0CBFFFh | 48 KB | Video ROM (EGA and VGA) |
| 0CC000-0CFFFFh | 16 KB | Unused, (Reserved for Adapter ROMs and other devices requiring ROMs) |
| 0D0000-0DFFFFh | 64 KB | Used by Adapter ROMs (i.e., network controllers, hard disk controllers, SCSI host adapters) |
| 0E0000-0EFFFFh | 64 KB | Used by System ROM adapters (i.e., network controllers with boot capability) |
| 0F0000-0FFFFFFh | 64 KB | System AMIBIOS (includes Setup and hard disk drive utilities) |
| 100000-1FFFFFFFh | 32 MB | Built-in Extended Memory |
| 2000000-5FFFFFFFh | 64 MB | Extended Memory |

SYSTEM VIDEO

The system's LCD operates using the NeoMagic NMG4 VGA Controller. Video signals travel from the controller through the system's 15-pin D-SUB connector using 5 volts.

System video integrates a PCI-bus interface. The system ships with 2 MB Video RAM (VRAM). It supports video modes up to 1024 x 768 with 64K colors in LCD mode.

See Appendix B for a list of Video modes.

PARALLEL INTERFACE

The system's parallel interface integrates National Semiconductor's PC87338 chip with a 25-pin D-subconnector. The port is located on the system's rear panel.

The modes of operation available for a PC87338 chip are:

- compatibility mode
- nibble mode
- byte mode
- Extended Capabilities Port (ECP)
- Enhanced Parallel Port (EPP).

The user selects between four parallel interface modes using Auto Setup. These include unidirectional, bidirectional, extended or enhanced. Unidirectional mode sends data output from the standard ISA port only. Bidirectional mode sends data using the standard ISA port or PS/2 technology. Enhanced mode enables high speed data transmission to occur using either the unidirectional or bidirectional modes.

The default parallel port address is 378h and the interrupt level is IRQ07. Pin locations for the parallel interface are listed in Appendix A.

SERIAL INTERFACE

The RS-232C serial port is a 9-pin connector on the system's rear panel. The serial port consists of a 16550A and 16450 compatible serial port controller with a programmable baud rate up to 115,200 bps. The serial port connects an RS-232C device or an external modem. The default serial port address is 3F8h and the interrupt level is IRQ04.

NEC VERSA CHIP SET

Refer to Table 1-3 for a quick summary of chip types used in the system. See the Abbreviations section at the beginning of this manual for a translation of chip technologies.

Table 1-3 NEC Versa Series Chip Types and Technologies

| Chip | Manufacture | Description | Technology |
|----------------------|------------------------|--|-------------------|
| Intel Pentium P55CLM | Intel | 200, 233 or 266 MHz CPU | 320-pin TCP |
| 82430TX (MTXC) | Intel | M-Triton System Controller | 208-pin SQFP |
| 82371TX (PIIX4) | Intel | M-PCI IDE ISA Xcelerator | 176-pin TQFP |
| N28F020-150 | Intel | 256k x 8 Flash ROM | 32-pin PLCC |
| NMG4 | NeoMagic | VGA Controller | 208-pin FQFP |
| PC97338 | National Semiconductor | Diskette Controller, IDE, Parallel Interface | 100-pin TQFP |
| M38813E | Mitsubishi | Keyboard Controller | 64-pin TQFP |
| PC1131 | Texas Instruments | PC Card Controller | 208-pin QFP |
| ES1869 | ESS Technologies | Sound Controller | 100-pin PQFP |

Intel Pentium P55CLM Microprocessor

The 200, 233 or 266 MHz Intel Pentium microprocessors with MMX technology used in the NEC Versa 6220/30/60 computer is built on Intel's advanced 2.5V BiCMOS silicon technology. The CPU has on-chip dual-processing, a local multiprocessor interrupt controller, and power management features. NEC adopted the chip specifically for its pipelined Floating Point Unit (FPU), and local interrupt management.

M-Triton System Controllers

NEC implements Intel's Mobile Triton technology (MTXC 83439TX) for the NEC Versa 6220/30/60 notebook's subsystems including the DRAM controller, Second Level Cache Controller and PCI Bus interface. The Mobile Triton PCI set features include:

- 3.3V EDO DIMM (70-ns) support
- direct mapped organization write-back policy
- fully synchronous 33 MHz PCI bus interface.

256K X Flash ROM

The N28F020 flash ROM is a 32-pin, plastic lead chip carrier (PLCC). The chip allows easy updates to the system's BIOS if needed. More specifically, the ROM is flashed electronically, installing the latest BIOS revisions to the system. It is possible to reprogram the BIOS up to 100,000 times. See Section 2, Setup and Operation, for BIOS update procedures.

The N28F020 provides the system upgrade capability as well as the following:

- 256 KB memory
- Quick-Pulse Programming Algorithm
- 150 nanoseconds (ns) maximum access time
- ETOX Nonvolatile flash technology
- CMOS low power consumption

ROM BIOS

The system uses a Flash ROM known as the system's ROM BIOS to store machine language programs. The BIOS size is 256 KB, consisting of the system utility (for PC cards, Auto Setup), system BIOS, video BIOS, and power management.

The BIOS programs execute the power-on self-test (POST), initialize CPU controllers, and interact with the LCD indicator panel, diskette drive, hard drive, communication devices and peripherals. The system BIOS also contains Auto Setup and provides VGA controller support. The ROM BIOS is copied into RAM (shadowing) for optimum performance.

The ROM BIOS contains both the system and video BIOS. The system BIOS is located in the upper portion of the device; video BIOS is located in the lower portion. System BIOS is located between F0000h-FFFFFh.

The BIOS often changes after the product release to provide enhanced features or bug fixes. To acquire the latest BIOS release, the ROM is flashed electronically, allowing the BIOS update to occur without removing the ROM. See Section 2, Setup and Operation, for BIOS upgrade procedures.

VGA Controller

The NeoMagic NMG4 is a PCI 64-bit Graphics Accelerator. The integrated programmable linear address feature accelerates the graphics user interface (GUI) performance. The controller also supports Hardware Multimedia and VESA interface standards. The controller provides advanced power management that helps to minimize power usage in the following modes:

- normal operation
 - Standby (sleep) mode
 - panel off power saving modes.
-

Parallel Interface

The PC87338VJG chip is a 100-pin Thin Quad Flat Plastic (TQFP) chip. The controller changes 8-bit parallel data into serial data and writes the data to the diskette. Conversely, the serial data is transmitted from the diskette into parallel data, where it remains until the read operation takes place.

Additional PC87338VJG chip operations include:

- ISA compatibility
- low-power CMOS with enhanced power-down mode

Keyboard Controller

The keyboard controller (M38813E) supports a PS/2-style keyboard, mouse and password security feature. Refer to Appendix A for keyboard interface connector pin assignments.

When data is written to the output buffer, the controller generates an interrupt, and requests the CPU to receive the data. The controller automatically adds an even parity bit to the data sent and waits for a response. The device must acknowledge that the data was successfully received by sending a response to the controller for each byte of data received.

PC CardBus Controller

The Texas Instruments PC1131 controller interfaces with the PCI bus, PC CardBus socket and configuration registers to provide:

- compliant with PCI 2.1 and 1995 PC card standards
- CardBus slots with hot insertion and removal
- independent Read and Write buffers for each direction
- burst transfers to maximize data throughput on the PCI CardBus bus.

Sound Integrated Circuit

The ESS Technologies chip set ES1869 provides dynamic audio circuitry with the following:

- Audio digital processor
- Plug and Play support
- High-performance 16-bit Stereo Codec
- Full-duplex operation for simultaneous record and playback
- Analog joystick quad timer and digital joystick support.

Interrupt Controllers

Using interrupts, it is possible to change the system's code sequence. To change the sequence, reassign the interrupt-levels. Fifteen interrupts can be used with a cascade connection of two 82C59 interrupt controllers.

Interrupt-level assignments 0 through 15 are listed in Table 1-4, in order of decreasing priority.

Table 1-4 Interrupt Controllers

| Controller (Master/Slave) | Priority | Name | Device |
|--------------------------------------|-----------------|-------------|------------------------------------|
| Master | 0 | IRQ00 | Counter 0/Timer 1 |
| Master | 1 | IRQ01 | Keyboard |
| Master | 2 | IRQ02 | Programmable Controller |
| Slave | 3 | IRQ08 | Real-time Clock |
| Slave | 4 | IRQ09 | Infrared Port |
| Slave | 5 | IRQ10 | USB Port |
| Slave | 6 | IRQ11 | PC Card Bus controller |
| Slave | 7 | IRQ12 | PS/2 Mouse |
| Slave | 8 | IRQ13 | Math Coprocessor (built into CPU) |
| Slave | 9 | IRQ14 | Hard Disk Controller 1 |
| Slave | 10 | IRQ15 | IDE DS/MD6000 or PC Card in MD6000 |
| Master | 11 | IRQ03 | Not used, available |
| Master | 12 | IRQ04 | Serial Port |
| Master | 13 | IRQ05 | Sound |
| Master | 14 | IRQ06 | Diskette Drive Controller |
| Master | 15 | IRQ07 | Parallel Port |

POWER MANAGEMENT OVERVIEW

Power Management in the NEC Versa lets you conserve energy, save battery power, extend the life of your LCD panel, and protect against data loss due to low battery power.

Set some features to function automatically or activate them manually with the keyboard or a button. It is wise to keep Power Management features enabled, even when using AC power.

The system ships with many power-saving features already enabled. See the following table.

Table 1-5 Automatic Power-Saving Features

| Device | Default Timeout | Comment |
|-----------|-----------------|---|
| Video | 2 minutes | Video turns off after there is no keyboard or VersaGlide input for the specified timeout. |
| Hard Disk | 2 minutes | Hard disk motor stops when hard disk is not accessed for specified timeout. |
| Standby | 4 minutes | System enters Standby mode after total system inactivity. |

You can change the timeout period for any of the devices using Setup. See Section 2 for Setup utility procedures.

Use the **FnF7** key combination to set the power management level. The faucet icon changes when the power management setting changes. You can toggle between Highest Performance, Longest Battery Life, Custom Power Management, and Off. Default values change depending on the type of power management you use.



Some power management features are not available when connected to a docking station. For example, the Suspend and Save to File features do not work. The system enters Standby mode if Suspend or Save to File is activated.

System Power Management

NEC Versa system power management consists of the following operation modes. These modes are:

- **Active Mode** — In active mode, the system uses no power management. It operates with the default clock speed. The system continues to run at this speed unless overwritten by the power management features.
- **Standby Mode** — The system switches automatically to Standby mode. This eliminates unnecessary power consumption when you operate the system on battery power or AC. Standby mode shuts down the LCD panel, providing privacy as well as power savings.
- **Suspend Mode** — Suspend mode causes the CPU to power down, local devices to shut down, and register values to be stored in RAM. System RAM is put into a slow refresh state. A half moon icon in the LCD Status Bar indicates that Suspend mode is in effect.

The system resumes Active mode when you press the Suspend button, or the system is set to resume at a certain time of day. Suspend mode lets you save power without first saving the working data.

Press the Suspend button to enter Suspend mode when you need to be away from the system for a short period of time and want to return to where you left off.

In addition, to quickly activate the Save to File feature, press the Fn and Suspend buttons simultaneously. This shuts down the system, and saves the current working data to a file.

Local Power Management

Use Auto Setup to select one of four power management settings for local devices. These include Longest Battery Life, High Performance, Custom Setup, and Power Management Off. The power management levels are also available during AC operation. The NEC Versa computer ships with Longest Battery Life as the default power management setting. See Section 2 for specific procedures on using Auto Setup to select the power management settings.

When set to Longest Battery Life, CMOS will set local device timeout values, a local standby timeout value, and a suspend timeout value to ensure the longest battery life. The Highest Performance setting selects CMOS values that will provide minimal energy savings and a shorter battery life. The custom settings enable end-users to set the timeout values of their choice. The Power Management Off selection terminates all power management timers.

Local device timers in the system control power consumption in the LCD and Hard Disk Drive. Table 1-6 shows NEC Versa Series Maximum Performance default power management timers.

Table 1-6 Maximum Performance Default Settings

| Power Management Mode | Automatic Suspend | Hard Disk Timer | Video Timeout |
|------------------------------|--------------------------|------------------------|----------------------|
| Longest Battery Life | 10 minutes | 2 minutes | 2 minutes |
| High Performance | 30 minutes | 10 minutes | 10 minutes |
| Custom | 10 minutes | 2 minutes | 2 minutes |

PLUG AND PLAY

The NEC Versa features Plug and Play functionality. Plug and Play is the ability of the BIOS and/or operating system to dynamically assign system resources to a newly installed device without user intervention.

For example, you can suspend the system, add an external keyboard, mouse, or monitor, and when you resume working, the NEC Versa recognizes the devices that have been connected to it. Similarly, you can remove external devices in Suspend mode and the NEC Versa detects the status when resumed.



The system must be turned off when installing the CD-ROM reader, diskette drive or hard disk drive in the VersaBay II. Installing these devices in Suspend mode may cause damage to the system.

SPECIFICATIONS

Table 1-7 provides a complete list of NEC Versa Series system specifications.

Table 1-7 Specifications

| Item | Specification |
|------------------------------|--|
| Chassis Configuration | |
| Size | Width: 11.58 in. (297 mm) |
| | Depth: 9.78 in. (251 mm) |
| | Height: 2.28 in. (58.5 mm) |
| | Weight: 7.49 lb (3.42 kg), Exact weight depends on options |
| Keyboard | PS/2 compatible, 85-key (both U.S. and International) with QWERTY-key layout (International keyboards are country-specific) |
| Device Slots | Two PC Card slots that support up to two optional cards-oriented one on top of the other |
| | One 3 1/2-inch x 0.75-inch high slot, front access, for standard 1.44 diskette drive, optical diskette drive 120 MB, 20X CD-ROM reader optional hard disk drive or Li-Ion battery. |
| Power | 100 to 240 Volts AC at 50 or 60 Hz |
| | Output Voltage — 18.5 V DC, 2.45 A (45.5 W) |
| Battery Pack | Weight — .85 lb (.38 Kg) |
| | Voltage — 14.4 V |
| | Capacity — 2600 mAH |
| | Battery Life — Approximately 2 to 4 hours (depending on model and power management settings) |
| | Recharging Time — Approximately 2 hours when the system is on or off |
| | Bridge Battery — Backs up memory contents up to 5 minutes in Suspend mode |
| Front Panel Controls | Power Button |
| | Suspend Button |
| | Brightness Control |
| LEDs | Power LED |
| | Battery Status LCDs |

Table 1-7 Specifications (cont'd)

| Item | Specification |
|------------------------------|--|
| System Board | |
| CPU | Intel Pentium 200, 233 or 266 MHz with 16 KB L1 cache and built-in numeric coprocessor |
| Clock Speed | 200, 233, or 266 MHz |
| CPU Bus Speed | 66 MHz |
| Flash ROM | 256 KB: 28F020 |
| Connector Support | Parallel — 1 port, 25-pin D-sub Serial — 1 port, 9-pin D-sub Infrared — 1 on front of system VGA — 1 port, 15-pin high-density D-sub External Keyboard/External Mouse — 1 port, PS/2, 6-pin MiniDin; exclusionary use or both supported with optional Y-adapter Expansion — 1 port, for optional NEC Docking Station 6000 Plus, optional PortBar 6000, or optional FDD Connector Kit. Mono MIC IN — 1 port, 3-pin, Mini Pin Jack Stereo Headphones — 1 port, 3-pin, Mini Pin Jack, .5 watts per channel Stereo Line-In — 1 port, 3-pin, Mini Pin Jack Stereo Line-Out — 1 port, 3-pin, Mini Pin Jack TV Out — 1 port; RCA Jack USB Port — 1 port, 4 pin DC In — 1 port, for AC adapter cable |
| Memory | |
| System Memory | 32 MB high-speed EDO access, 70 ns |
| Optional | Two DIMM sockets (for base and expansion memory) under the keyboard, available for one additional SO-DIMM. Expandable in 16-MB, 32-MB, 64-MB increments Maximum 128-MB (by swapping base RAM to 64-MB and adding a 64-MB expansion DIMM) |
| Video RAM | 2 MB |
| Video Interface (VGA) | |
| LCD | 13.3-inch high-resolution active matrix thin Film Transistor (TFT) Extended Graphics Array (XGA) color display, 1024 x 768 pixels, 0.264 mm dot pitch, 64K colors |

Table 1-7 Specifications (cont'd)

| Item | Specification |
|--------------------------------|---|
| Internal Device Support | |
| Diskette Drive | User-removable 3 1/2-inch, 1.44-MB, installs in VersaBay II slot |
| Hard Disk Drives | IDE interface (built-in), System ships with a 3.0 or 5.1-GB hard disk drive |
| 20X CD-ROM Reader | User-removable twenty-speed (20X) CD-ROM reader, installs in VersaBay II slot |
| External Device Support | |
| CRT | Displays up to 1280 x 1024 resolution x 256 colors |
| Mouse | PS/2-compatible mouse |
| Keyboard | Built-in 85 key keyboard with 12 programmable function keys, embedded numeric keypad and special function control keys, dedicated screen control keys, and inverted "T" cursor keys / IBM enhanced 101/102-key compatible keyboard |
| Software | |
| Standard | Windows® for Workgroups Version 3.11, Window 95 or Windows NT Adobe Acrobat Reader AT&T WorldNet CompuTrace™ Security Software Intel's LANDesk Client Manager Microsoft Internet Explorer MindPath™ Presentation FX McAfee VirusScan™ McAfee WebScan™ Official Airline Guide (OAG®) Prodigy Internet Service Sampler Netscape Navigator Dial-Up Edition LapLink® File Transfer Software CompuServe® America Online® MediaMatics Arcade™ MPEG Player Xing MPEG Player™ |

Table 1-7 Specifications (cont'd)

| Item | Specification |
|----------------------------------|---|
| Recommended Environment | |
| Operation | Temperature: 41° to 95°F (5° to 35°C) Relative Humidity: 20% to 80% (No condensation) |
| Storage | Temperature: -4° to 104°F (-20° to 40°C) Relative Humidity: 20% to 80% (No condensation) |
| Administrative Compliance | |
| | U.S.: FCC, UL Canada: CSA, DOC Germany: VDE, TUV, CE Australia: AS for AC adapter only |
| Other Compliance | PC97 Compliance Energy Star VESA & PnP VESA PnP ISA |

Section 2

Setup and Operation

This section provides setup and operation information for the NEC Versa Series system (including cabling, power-on verification and using the Setup utility, from this point on referred to as “Setup” only).

UNPACKING THE SYSTEM

Find an area away from devices that generate strong magnetic fields (electric motors, transformers, etc.). Place the shipping carton on a sturdy surface and carefully unpack the system. The carton contents include the system, CD-ROM reader, AC adapter, AC power cord, battery, software CDs, and user documentation.

HARDWARE SETUP

When connecting power and signal cables, do the following. Note that the Power switch turns on or off. Slide the switch right to turn it on, slide the switch again to turn it off.



Always plug the AC adapter cord into an easily accessible outlet.

1. Connect the AC adapter cable to the power port on right side of the NEC Versa.

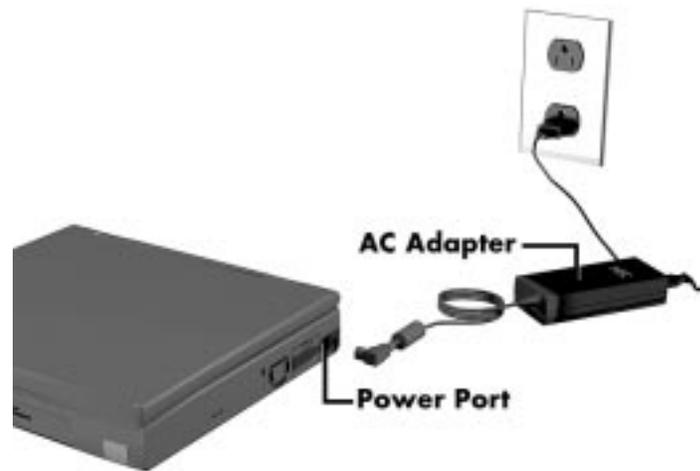


Figure 2-1 Connecting the AC Adapter

2. Plug one end of the AC power cable into the AC adapter and the other end into a properly grounded 120- or 240-volt wall outlet.



Do not cover or place objects on the AC adapter. This allows heat to dissipate properly.

3. Ensure that all connections are properly seated and secure.



CAUTION

This equipment uses an ungrounded power cable. Replace the cord if it becomes damaged. U.S. and Canadian replacement cords must be UL-approved (CSA certified in Canada) type SPT-2, 18 AWG, 2-conductor cord with a permanently attached NEMA type 5-15P plug at one end, and a permanently attached connector body on the other. Cord length may not exceed 15 feet. Outside the U.S. and Canada the cord must be rated for at least 250VAC at 10 amps, and must indicate international safety agency approval. The plug must be a type appropriate for the country where it is used.

Obtain replacement cords at an authorized service center. The replacement must be of the same type and voltage rating as the original cord.

4. Slide the Power button to the right to power on the computer.



Figure 2-2 Powering on the System



If operating the system on DC power, verify that the system has a charged battery pack installed.

Cable Connections

Figure 2-3 shows the rear external connectors for the system. Where appropriate, secure cables by tightening the cable holding screws.

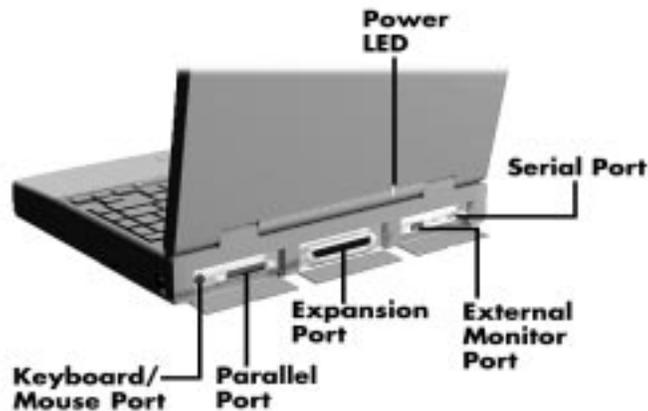


Figure 2-3 Power and I/O Connector Locations

Table 2-1 describes the connectors on the system. For pin assignments, see Appendix A.

Table 2-1 I/O Connector Descriptions

| I/O Connector | Function |
|-----------------------------|--|
| USB Port (right side) | Connects to a 4-pin USB device. |
| TV Output Jack (right side) | Connects to a RCA jack. |
| AC Power Port (right side) | Connects to a AC adapter. |
| Keyboard/Mouse Port | Connects to a PS/2-style mouse, or a 101-key, external PS/2-style keyboard. |
| Parallel Port | Connects to a 25-pin parallel device. |
| Expansion Connector | Provides a 75-pin connector to attach the optional NEC Docking Station 6000 Plus, MiniDock 6000 or PortBar 6000. |
| Monitor Port | Connects to a 15-pin external CRT. |
| Serial Port | Connects to an RS-232C device. |
| Audio Ports (left side) | Connects to 4 mini pin jacks. |

POWER SOURCES

The NEC Versa can be powered using three different sources, as follows:

- the AC adapter connected to an electrical wall outlet (using AC power)
- the battery pack or an optional second battery pack
- the optional DC adapter connected to a car cigarette lighter.

The following sections summarize the power sources.

Using the AC Adapter

Use the AC adapter and power cable that came with the NEC Versa to run the computer on alternating current (AC) power, or to recharge the battery pack. Use the AC adapter whenever a wall outlet is nearby.

WARNING

Do not attempt to disassemble the AC adapter. The AC adapter has no user-replaceable or serviceable parts inside. Dangerous voltage in the AC adapter can cause serious personal injury or death. The AC adapter is intended for use with a computer. Both must meet EN60950 standards.

Keep the adapter connected whenever possible. The AC adapter charges the battery whether or not you are using the NEC Versa.

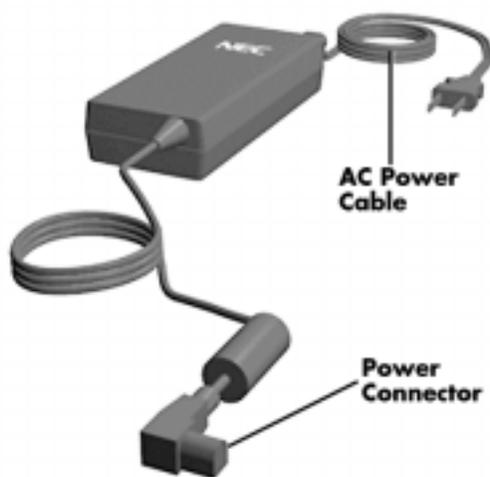


Figure 2-4 NEC Versa AC Adapter

See the “Hardware Setup” earlier in this section for steps on connecting the AC adapter.

Using the Main Battery Pack

The NEC Versa comes with a rechargeable Lithium Ion (Li-Ion) battery pack. Battery power lasts for approximately two to four hours with power management features enabled. The battery pack is easy to install and remove.

Checking Battery Power Levels

The NEC Versa system integrates two tools to help the user keep track of the main (and an optional) battery's power level. These include the battery icon located in the tray on the taskbar, and the PowerGauge utility for Windows for Workgroups and Windows 95 and PowerProfiler for Windows NT.

Using the status bar icons (and percentages) to determine battery status is easy. For example, if one battery pack is installed, one battery icon appears. If two batteries are installed, two battery packs appear. A blinking battery icon indicates that the battery is charging. A fast blinking battery icon occurs:

- when installing a new battery
- during unknown battery status
- when there is a problem with the battery.

Similarly, read the percentages that appear next to the battery icons to find out exactly how much battery power is available. The battery percentage icon blinks under the following conditions:

- when battery power is low, the number icon blinks.
- if battery power is extremely low, the number icon blinks rapidly.
- if the battery has been in storage for a long period of time.

To access the PowerGauge utility in Windows for Workgroups systems, select the PowerGauge Utility icon from the NEC Utilities program group. To access in Windows 95 or Windows NT systems, right click the PowerGauge icon located in the tray on the taskbar. It also starts automatically at power on.

What to Do When Battery Power Gets Low

When battery power is very low, the power LED flashes amber. When battery power gets low, do either of the following:

- Press the Suspend button to put the system in Suspend mode, remove the battery pack, and replace it with a fully charged Li-Ion battery.
- Leave the battery pack in the system and connect your NEC Versa to the AC adapter and a wall outlet. If you connect the system to AC power and continue to use it, the battery recharges in approximately 2 hours. If you connect the system to AC power and do not use it, the battery recharges in about 2 hours.

Customers can also buy an optional NEC Versa battery charger to quickly charge the battery. See the online *Versa Tools Catalog* for more information.

Returning the Battery to Full Operation

To return the battery to its normal state, try the following:

- remove and then reinstall the battery.
- reinstall the battery in the NEC Versa, discharge the battery, then fully recharge the battery (to 100%) if the battery in use was in storage for an extended period of time.

When to Change the Battery

The following symptoms indicate that battery life is nearing an end. Replace batteries that display these symptoms.

- Shorter work times.
- Discoloration, warping.
- Hot to the touch.
- Strange odor.

Battery Handling

Keep the following in mind when removing or replacing a battery.

- Use Li-Ion batteries only in the NEC Versa computer for which they are designed.
- Turn off power to the system after use. Keeping system power on can degrade battery performance and shorten battery life.
- Clean the battery terminals with a dry cloth when they get dirty.
- Keep the battery out of the reach of children.

 **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.

- Keep the battery away from heat sources including direct sunlight, open fires, microwave ovens, and high-voltage containers. Temperatures over 60°C (140°F) may cause damage.
 - Do not drop or impact the battery.
 - Do not disassemble the battery.
 - Do not solder the battery.
 - Do not puncture the battery.
 - Do not use a battery that appears damaged or deformed, has any rust on its casing, is discolored, overheats, or emits a foul odor.
 - Keep the battery dry and away from water.
 - Keep metal objects away from battery terminals. Metal objects in contact with the terminals can cause a short circuit and damage.
 - If the battery leaks onto skin or clothing, wash the area immediately. Battery fluid can cause a skin rash and damage fabric.
 - If battery fluid gets in eyes, DO NOT rub; rinse with clear water immediately and see a doctor.
 - Make sure the battery is properly installed in the battery bay.
-

Replacing the Battery Pack

Replace the battery pack installed in your NEC Versa system as follows.



Use Li-Ion batteries in the NEC Versa computer for which they are designed. Also, installing another manufacturer's battery, or using a combination of very old and new batteries can deteriorate battery and equipment performance.

1. Save your files, exit Windows, and press the Suspend button or turn off system power.
2. Close the LCD and turn the system over.
3. Release the battery cover latch and slide the battery bay cover away from the system.



Figure 2-5 Removing the Cover

4. Place a finger in the notch on the battery and lift the battery out of the system. (The notch has an arrow next to it.)

 **CAUTION**

Always lift the battery out of the system by the notch. Failure to do so can damage the battery terminals.



Figure 2-6 Removing the Battery

5. Insert the new battery as follows:

- Locate the alignment groove on the end of the battery opposite the terminals.
- Locate the alignment tab inside the battery bay at the end opposite the terminals.
- Fit the battery alignment groove over the tab inside the bay.
- Lower the battery into the battery compartment, pressing gently to secure the terminal connections.

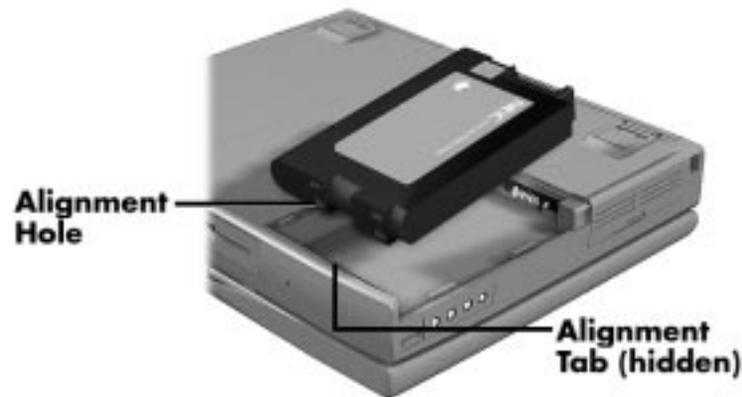


Figure 2-7 *Inserting the Battery Pack*

6. Replace the battery bay cover as follows:

- Align the tabs on the bay cover with the grooves on the system chassis.
- Lower the cover onto the bay and slide it into place.



Figure 2-8 *Replacing the Cover*

7. Turn the system over.

Battery Precautions

To prevent accidental battery ignition, rupture, or explosion, adhere to the following:

 **WARNING**

To avoid personal injury and property damage, read these battery precautions on handling, charging, and disposing of Li-Ion batteries.

- Keep the battery away from heat sources including direct sunlight, open fires, microwave ovens, and high-voltage containers. Temperatures over 140° F (60°C) may cause damage.
- Do not drop or impact the battery.
- Do not disassemble the battery.
- Do not solder the battery.
- Do not puncture the battery.
- Do not use a battery that appears damaged or deformed, has any rust on its casing, is discolored, overheats, or emits a foul odor.
- Keep the battery dry and away from water.
- Keep metal objects away from battery terminals. Metal objects in contact with the terminals can cause a short circuit and damage.

If the battery leaks:

- If the battery leaks onto skin or clothing, wash the area immediately with clean water. Battery fluid can cause a skin rash and damage fabric.
- If battery fluid gets into eyes, DO NOT rub; rinse with clear water immediately and consult a doctor.
- Take extra precautions to keep a leaking battery away from fire. There is a danger of ignition or explosion.

Recharging Battery Precautions

Adhere to the following precautions when recharging the Li-Ion battery.

- Read the instructions that came with the battery charger before charging the battery.
- Use only the NEC battery charger designed for your NEC Versa battery type. Different NEC Versa models require different batteries and battery chargers.

- Charge the battery for the specified charge time only.
- During charging, keep the environmental temperature between 32°F and 104°F (0°C to 40°C).

NEC VersaBay II Battery and Adapter Kit

The NEC VersaBay II Battery and Adapter Kit provides a second lithium ion (Li-Ion) battery and adapter to use in your NEC Versa 6220/30/60 notebook computer. Inserting a second fully charged battery increases battery life approximately 4 to 5 hours.

See the online *Versa Tools Catalog* in the NEC Versa Help Center, for more information.

Extending Battery Life

While on the road, it is important to be aware of the simple things you can do to extend the life of the system's main battery. One way is to keep the LCD backlight setting to Standard instead of Full. You can toggle between these two settings by pressing the function keys, **Fn+F5**. Or, slide the brightness control to a dimmer level.

Using the DC Car Adapter

Another way to power the NEC Versa is via car battery power using the optional DC car adapter. Connect the system to the optional DC car adapter as follows.

1. Disconnect the AC adapter from the system if connected.
2. Plug the appropriate end of the car DC adapter into the power port on the system.
3. Connect the plug of the DC car adapter to a car cigarette lighter.

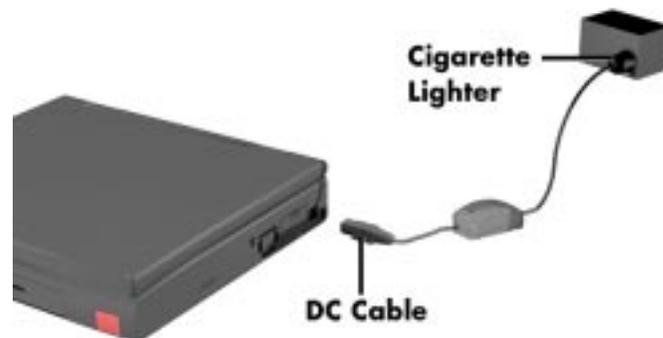


Figure 2-9 Connecting the Car DC Adapter

OPERATING CONTROLS

The following section describes system controls, the LEDs, and function keys.

Refer to Figure 2-10 to locate system controls and switches. Table 2-2 describes the controls.

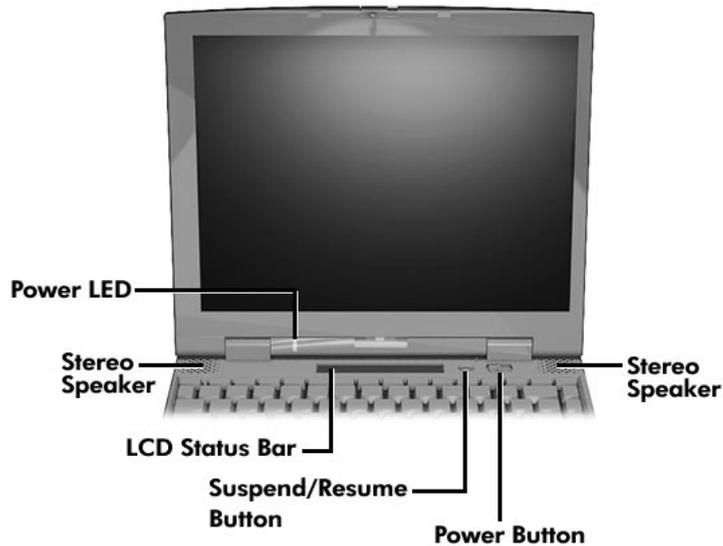


Figure 2-10 Keyboard Panel LEDs and Controls

Table 2-2 Controls and Switch Functions

| Control | Function |
|-----------------------|--|
| LCD Status Bar | The status bar provides an easy way to detect system status. Different graphic icons appear on the LCD bar indicating that a device is accessed, an operation performed, or a power mode is activated. |
| Power LED | Lights green when the computer is powered on and blinks green in the suspend mode. Lights amber and blinks at low battery levels. |
| Suspend/Resume Button | Press the button for Suspend mode, press again to resume active mode. |
| Power Button | Turns the system on when pushed to the right. Turns the system off when pushed to the right again. |

LCD Status Bar

The NEC Versa status bar is located in the upper center of the keyboard panel. Figure 2-11 shows the status bar.

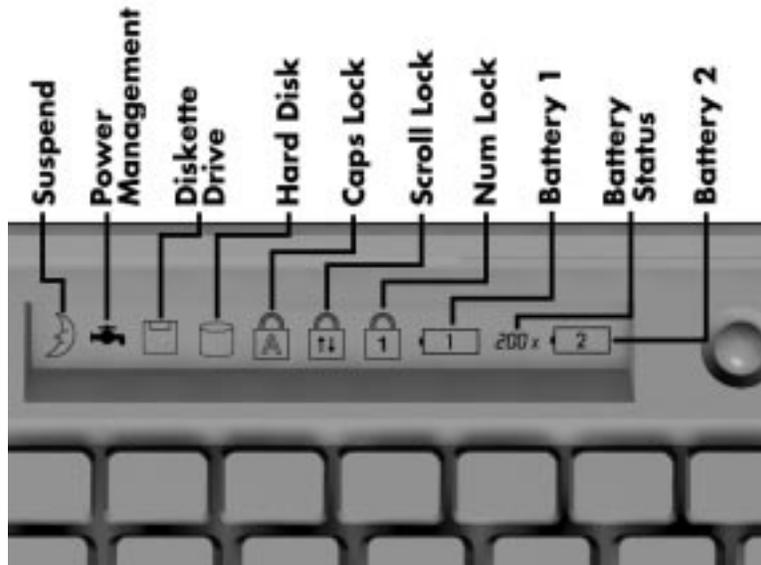


Figure 2-11 Status Bar Location

Status Icons

The NEC Versa uses ten icons to let the user determine system status, as follows.

- Suspend — appears when the system is in Suspend mode.
- Power Management — shows current power management mode.
- Diskette Drive — appears when the NEC Versa writes data to, or retrieves data from a diskette.
- Hard Disk — shows when the NEC Versa writes data to, or retrieves data from the hard disk drive.
- Caps Lock — appears when Caps Lock is used.
- Scroll Lock — indicates that Scroll Lock is used.

- Num Lock — indicates that Num Lock is in effect.
- Battery Status — displays the percentage of battery power available.
 - Battery 1 appears when you have one or more batteries installed.
 - Battery 2 appears when you have an optional battery installed in the VersaBay II.

Function Keys (Fn Keys)

Function keys set specific system parameters and are built into the ROM. When using these keys, simultaneously press **Fn** and the corresponding function key. See Table 2-3 for a list of ROM-based hot keys. ROM-based hot keys change system parameters temporarily. Hot Key functions operate until the system is turned off or reset.

Table 2-3 Fn Key Operations

| Key | Function |
|--------------|--|
| Fn F2 | Highlight, toggles the contrast between standard and full. |
| Fn F3 | LCD/CRT, toggles between LCD, CRT, TV out and simultaneous modes (LCD and CRT). |
| Fn F4 | Standby On/Off |
| Fn F5 | Backlight, toggles the backlight between standard and full. |
| Fn F6 | Speaker Volume, toggles speaker volume between high, medium, low, and off. |
| Fn F7 | Power Management (P/M), sets P/M levels to highest performance, longest battery life, custom values, or off. |
| Fn F8 | Expand 640 X 480 applications to fill the panel. |
| Fn F12 | Scroll/Lock On/Off |
| Fn Suspend | Save-To-File On Demand |
| Fn Left Ctrl | Simulates pressing the right control key for support of IBM 327x connections. |

Smart Power Switch

Provides an automatic feature that prevents you from accidentally powering off the NEC Versa, and losing your data while your system is in Suspend mode. The smart power switch senses that the system is in Suspend mode and prevents you from directly powering off the system when you press the Power button.

To power off the system from Suspend mode,

1. Press the Suspend/Resume button to make the system active.

2. Press the Power button to turn off the system.

Setting Switches

A six-position dip switch is located underneath the keyboard. (Dip switch instructions and location for accessing the switches follows this section.) The following lists identifies each switch setting and its function.

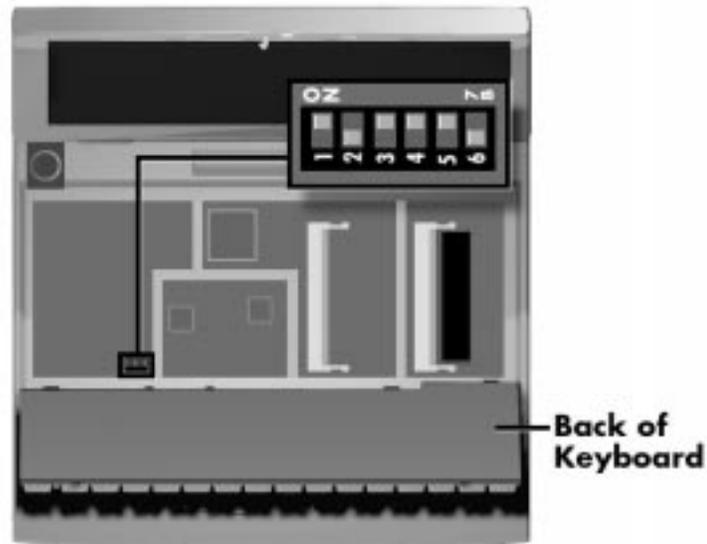


Figure 2-12 Dip Switch Location

NOTE Switches 3, 4, and 6 are reserved for NEC factory use only. Switch 5 is not used.

- Switch 1, BIOS Flash Protection Switch — The default setting is “ON.” Change the setting to “OFF” when you update your system’s basic input/output system (or BIOS) flash memory. See “Updating the System BIOS,” to complete this procedure.
- Switch 2, Password Override Switch — The default setting is “OFF.” For example, if you forget your password and cannot access the data on your NEC Versa, change the setting to “ON” and your current password dissolves.

To enter a new password, reset the switch to “OFF,” and follow the instructions in Chapter 3, “Using Setup,” to set up a new password. You may want to keep this password in a special place so that you don’t forget it again!

- Switch 3 — Reserved for factory use.
- Switch 4 — Reserved for factory use.
- Switch 5 — Not used.
- Switch 6 — Reserved for factory use.

Updating the System BIOS

Use the following steps to update your NEC Versa 6220/30/60 system BIOS with the BIOS Update Diskette (BUD). Specifically, the BIOS is the code transmitted onto your system's microprocessor, or central processing unit (CPU).



You only need to update the BIOS if NEC makes significant improvements or fixes to the current system BIOS. Your authorized NEC dealer or Technical Support Services representative can help you determine this.

If you are informed that the default BIOS needs an upgrade, to receive a copy of the BUD contact the NECCSD Diskette Fulfillment Center at (800) 842-6446, or NECCSD Customer Service and Technical Support at (800) 632-4525, Fax (978) 635-4100.

You should only use the BIOS upgrade diskette for your specific model.



If you purchased and are using this computer outside the U.S. or Canada, please contact a local NEC office or dealer in your country.

Updating the BIOS involves the following procedures:

- removing the speaker caps
- lifting and moving the keyboard out of the way
- setting the switch
- reassembling the unit and updating the BIOS
- resetting the switch.

Changing Switch Settings

Use the following steps to change switch settings.

1. Make sure the system is powered off and that no peripheral devices are attached.
2. Locate and remove the two Phillips-head screws on the bottom of the Versa 6220/30/60 that secure the speaker caps. Put the screws in a safe place for reassembly.

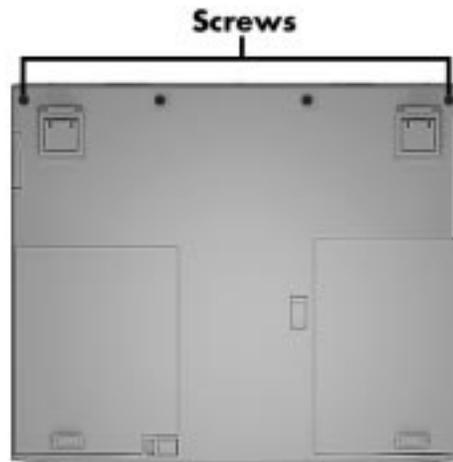


Figure 2-13 Locating the Speaker Cap Screws

3. Turn the NEC Versa notebook over and open the LCD panel.

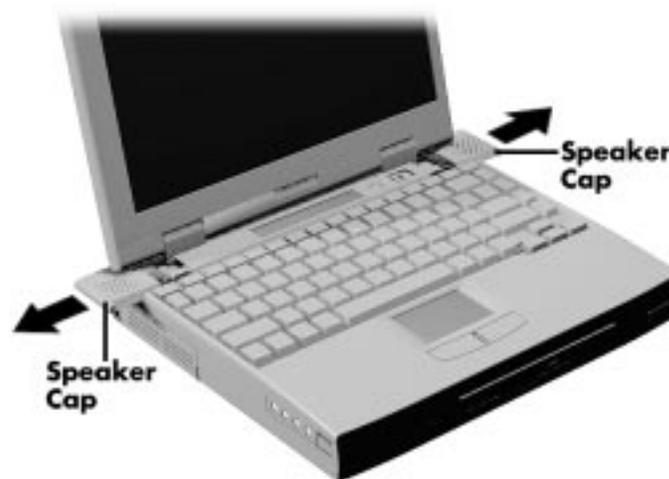


Figure 2-14 Removing the Speaker Caps

4. Locate the two speaker caps, slide each one towards the outside edge of the system, and remove them.
5. Gently lift up the edge of the keyboard nearest the LCD and slide the keyboard towards the LCD screen to release the tabs that secure it.

 **CAUTION**

Be careful not to disconnect the keyboard or keyboard cable entirely from the system.



Figure 2-15 Lifting the Keyboard



Figure 2-16 Positioning the Keyboard

6. Carefully turn over the keyboard and place it face down on the VersaGlide. Be careful not to twist or disconnect the keyboard cable.
7. Locate the dip switch block. Using a fine tipped object, change the Dip Switch 1 setting to Off. (For other functions, set the appropriate switch to the required setting. See "Setting Switches" for switch functions and settings.)

! **CAUTION**

Never use a lead pencil, ball point pen or ink pen to change switch settings.

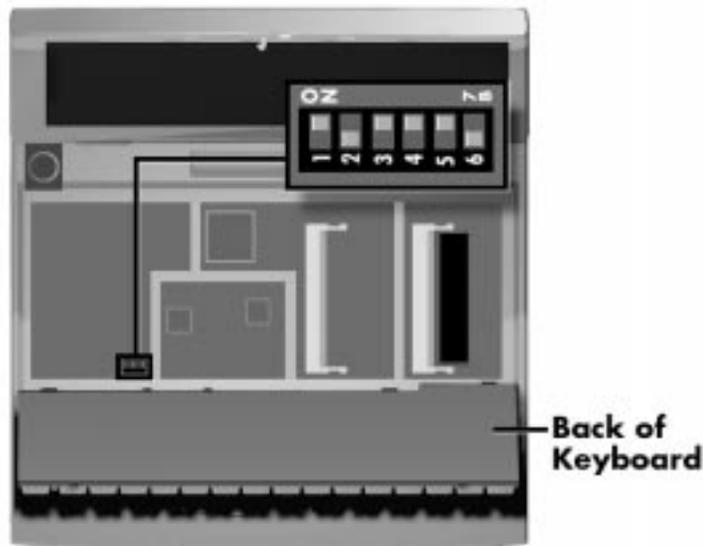


Figure 2-17 Dip Switches



The system memory expansion slots are also located underneath the keyboard. Therefore, if you need to install DIMM modules, you might want to do so while the system is already disassembled.

8. Reassemble the system as follows:
 - Lift up the keyboard and align the tabs on the front of it with the grooves in the system.
 - Reseat the keyboard in its original position.

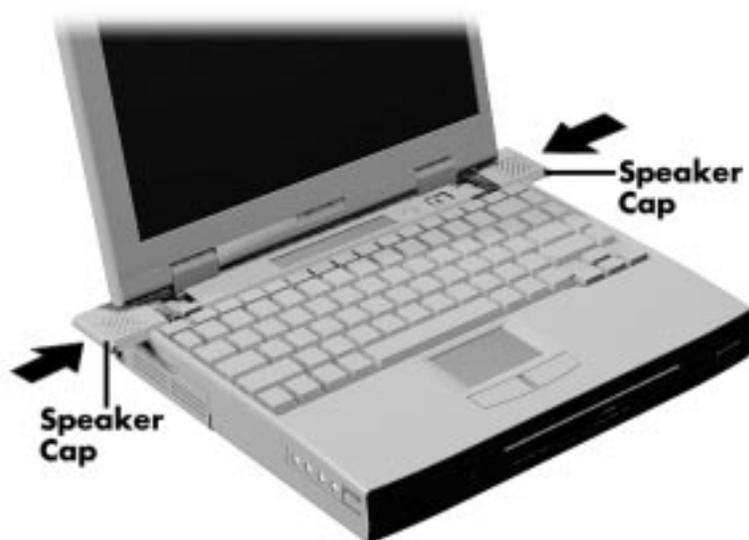


Figure 2-18 Reassembling the System

- Slide the speaker caps back onto the system.
 - Close the LCD panel and turn the system upside down.
 - Replace the speaker cap screws.
9. Your system is now ready for the BIOS update. Continue to the next section to update the BIOS.

Performing the BIOS Update

Use the following procedure to perform the actual BIOS update.

1. Make sure that the computer is operating under AC power, and that the power is off. Insert the BIOS Update diskette into diskette drive A.
2. Power on the computer with the diskette in drive A. The computer boots and automatically loads the utility. A message similar to the following appears:

WARNING: The BIOS Update Procedure
is about to begin, press ENTER to continue.
To abort, remove the diskette and reset the unit.

3. Press **Enter** to continue.

The utility checks the currently installed BIOS version and the diskette's BIOS version. The Main Menu appears.

4. Use the arrow keys to highlight the “Display BIOS Version” option on the Main Menu. Use this option to check the currently installed BIOS version and the version of the new replacement BIOS.

Press any key to return to the Main Menu.

5. Highlight the “Install New BIOS” option and press **Enter**.
6. Press **Y** and then press **Enter**. The utility updates the BIOS.

Power off your computer and remove the diskette. Now power on your computer, you will now have the latest NEC Versa 6220/30/60 computer BIOS revision level.

7. When the update is complete, follow the instructions in the previous section and reset dip switch 1 back to the ON position.
8. Press **F1** to enter Setup and restore the default parameter settings.

POWER-ON SELF-TEST (POST)

Each time the system is powered on, the system checks the working status of components through an automatic power-on self-test (POST). The test checks the system configuration for any discrepancies. One beep means that POST is successful. If any problems in data transfer or hardware exist, an error message appears.

If the message is a CMOS settings wrong message, press **F2** to enter the Setup utility. Use the Arrow Keys to review the settings and make any necessary corrections, then use the arrow keys to select “Save Settings and Exit.”

If no error messages appear but the system still malfunctions, check the items in the following list.

- The power switch for each peripheral is on.
- All cables and power cords are tightly connected.
- The electrical outlet is working.
- The brightness and contrast controls for the display are adjusted properly.
- All options have been properly installed.



If system parameters (date, time, options, etc.) were not entered for the present configuration, enter them when you complete the setup procedures (see “System Parameters” in this section).

POST Errors

Error messages will appear during POST when configuration information does not match the settings stored in memory. Error messages will also appear if the system loses the configuration information due to hardware failure.

Refer to Table 2-4 for a description of POST error messages.

Table 2-4 POST Error Messages

| Message | What To Do |
|---------------------------------------|--|
| Address Line Short | Error in the address decoding circuitry on the system board. Contact your NECCSD service representative for service work. |
| C: Drive Error | Hard disk drive C: does not respond. Check that C: hard disk type in Setup is correct. |
| C: Drive Failure | Hard disk drive C: does not respond. You may need to replace the hard disk drive. |
| Cache Memory Bad, Do Not Enable Cache | Cache memory is defective. It must be replaced. Contact your NECCSD service representative for service work. |
| CH-2 Timer Error | Most ISA computers include two timers. There is an error in timer 2. Contact your NECCSD service representative for service work. |
| CMOS Battery State Low | CMOS RAM is powered by a battery. The battery power is low. Contact your NECCSD service representative to replace the CMOS battery. |
| 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 to reset the value. |
| CMOS System Options Not Set | The values stored in CMOS RAM are either corrupt or nonexistent. Run Setup to reset the value. |
| CMOS Time and Date Not Set | Run Setup to set the time and date. |
| Diskette Boot Failure | The boot diskette in floppy drive A: is corrupt. It cannot be used to boot the computer. Use another boot disk and follow the on-screen instructions. |
| DMA error | Error in the DMA controller. Contact your NECCSD service representative for service. |
| DMA#1 Error | Error in the first DMA channel. Contact your NECCSD service representative for service. |

Table 2-4 POST Error Messages (cont'd)

| Message | What To Do |
|---------------------------------|---|
| DMA #2 Error | Error in the second DMA channel. Contact your NECCSD service representative for service. |
| FDD Controller Failure | The BIOS cannot communicate with the floppy disk controller. Contact your NECCSD service representative to check all appropriate connections. |
| HDD Controller Failure | The BIOS cannot communicate with the hard disk drive controller. Contact your NECCSD service representative to check all appropriate connections. |
| INTR #1 Error | Interrupt channel 1 failed POST. Contact your NECCSD service representative for service. |
| INTR #2 Error | Interrupt channel 2 failed POST. Contact your NECCSD service representative for service. |
| Invalid Boot Diskette | The BIOS can read the diskette in drive A:, but cannot boot the computer. Use another boot diskette. |
| Keyboard is Locked Unlock It | The keyboard lock on the computer is engaged. The computer must be unlocked to continue. |
| KB\interface error | There is an error in the keyboard connector. Contact your NECCSD service representative for service. |
| Off Board parity Error | Parity error in memory module installed in an expansion slot. Contact your NECCSD service representative to be sure that the memory module is installed correctly. The error format is: OFF BOARD PARITY ERROR ADDR(HEX) = (XXXX) XXXX is the hex address where the error occurred. |
| On Board Parity Error | Parity error in system board memory. Contact your NECCSD service representative for service. |
| Parity Error ???? | Parity error in system memory at an unknown address. Contact your NECCSD service representative for service. |

Fatal errors that occur during POST are communicated through a series of beeps that are repeated continuously. All beep code errors, except beep code 8, are fatal errors and do not allow the system to continue to boot.

If beep codes occur during POST, check the items in the Problem Checklist (at the start of this chapter), verify that all the hardware is set up properly and securely connected, and try rebooting. If you still get a beep code, go to the section "If You Need Assistance" at the end of this chapter.

Beep Codes are listed in the table that follows.

Table 2-5 Beep Codes

| Number Of Beeps | Error | Description |
|------------------------|---|---|
| 1 | Refresh Failure | The memory refresh circuitry on the motherboard is faulty. |
| 2 | Parity Error | Parity error in the first 64 KB of memory. |
| 3 | Base 64 KB Memory Failure | Memory failure in the first 64 KB. |
| 4 | Timer Not Operational | Memory failure in the first 64 KB of memory or Timer 1 on the motherboard is not functioning. |
| 5 | Processor Error | The CPU on the motherboard generated an error. |
| 6 | 8042 – Gate A20 Failure | The keyboard controller (8042) may be bad. The BIOS cannot switch to protected mode. |
| 7 | Processor Exception Interrupt Error | The CPU generated an exception interrupt. |
| 8 | Display Memory Read/Write Error | The system memory is faulty. (This is not a fatal error.) |
| 9 | ROM Checksum Error | The ROM checksum value does not match the value encoded in the BIOS. |
| 10 | CMOS Shutdown Register Read/Write Error | The shutdown register for CMOS RAM failed. |
| 11 | Cache Error/External Cache Bad | The external cache is faulty. |

SETUP UTILITY

The Setup utility is a ROM-based program. It is functional when enabled (factory default). Setup automatically detects current system parameters during the power-on self-test (POST), described in the previous section. It also provides the following functions:

- sets date and time
- signals any hardware discrepancies during POST via error messages
- verifies that any optional memory that you installed was installed correctly
- integrates user-defined security features.

Accessing Setup

To access Setup, press **F2** at the power-on prompt.

With an Error at POST

You will need to use the Setup utility if the system detects an error during POST. It prompts you with double beep sound and a message: Press **F1** to resume. If you press **F1**, the system enters Setup automatically.

With No Errors at POST

To enter Setup when no error message is displayed during POST, press **F2** when the prompt appears.

Setup Utility Main Menu

After you press **F2**, the system displays the Setup Main Menu screen, similar to the following.

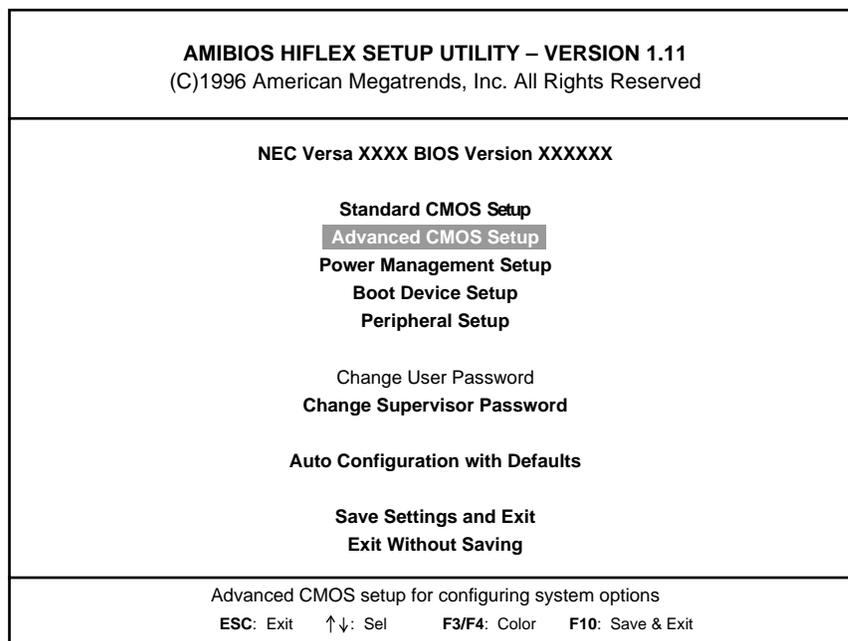


Figure 2-19 Setup Main Menu

Use the up and down arrow keys (located on the lower right corner of the keyboard) to toggle through the Setup menu items.

How to Use Setup

The following sections describe how to use Setup, including these topics:

- Looking at screens
- Using keys
- Checking and setting system parameters.

Looking at Screens

Setup screens have three areas as shown next.

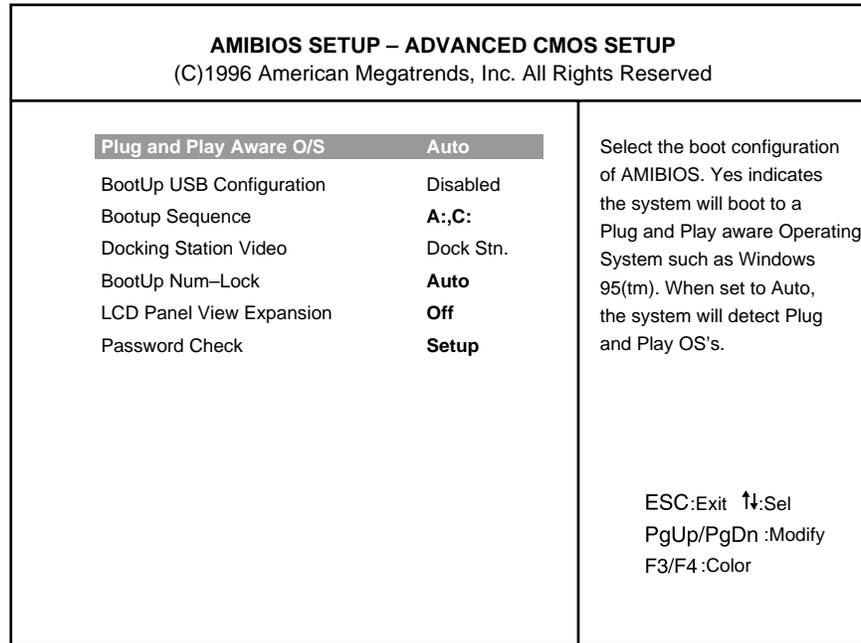


Figure 2-20 Advanced CMOS Setup Menu

- **Parameters**
The left part of the screen. This area lists parameters and their current settings.
- **Available Options**
The right part of the screen. This area lists and explains alternate settings.
- **Key Legend**
The bottom right corner of the screen. These lines display the keys that move the cursor and select parameters.

Using Keys

The following table lists Setup keys and their functions.

Table 2-6 Setup Key Functions

| Key | What It Does |
|------------|--|
| ↑ ↓ | Moves the cursor between the displayed parameters. |
| PgUp/PgDn | Modifies the current parameter settings. |
| Tab | For some parameter settings, moves the cursor between the subfields. For example, for System Time, Tab moves the cursor from hour to minute to second. |
| Esc | In the Main Menu screen, press Esc to display the "Quit without saving" prompt. Also, press Esc to exit Setup menus, and return to the Main Menu. |
| F3/F4 | Changes the screen color. |

Checking/Setting System Parameters

See the following table for a list of parameters, their factory default settings, and alternate settings. A description of each setting follows the table.

To reset all parameters to the default settings, select Auto Configuration with Defaults from the Setup Main Menu and press **Y**.

Table 2-7 Setup Parameters

| Parameter | Default Setting | Alternate Setting(s) |
|---------------------------------|-----------------|---|
| Standard CMOS Setup | | |
| Date | mm/dd/yyyy | |
| Time | hh/mm/ss | |
| Diskette Drive A | 1.44 MB, 3 1/2 | Not installed, 1.2 MB 5 1/4 |
| Diskette Drive B* | 1.44 MB, 3 1/2 | Not installed, 1.2 MB 5 1/4 |
| Internal Hard Drive | Enabled | Disabled |
| Internal Master | Auto | User Defined/CD-ROM/LS-120/ Pre-defined types/Not Installed |
| LBA Mode | On | Off |
| Blk Mode | On | Off |
| PIO Mode | Auto | 0, 1, 2, 3, 4, 5 |
| 32-bit Mode | On | Off |
| Internal Slave | Auto | User Defined/CD-ROM/LS-120 Pre-defined types/ Not Installed Off |
| LBA Mode | On | Off |
| Blk Mode | On | Off |
| PIO Mode | Auto | 0, 1, 2, 3, 4, 5 |
| 32-bit Mode | On | Off |
| Docking Station Hard Drives* | Enabled | Disabled |
| DS Master* | Auto | Not installed/User Defined CD-ROM/LS-120 |
| DS Slave* | Auto | (automatically detected) |
| System Memory | 32 MB | 48, 64, 96, 128 MB |
| Advanced CMOS Setup | | |
| Plug and Play Aware O/S | Auto | No, Yes |
| BootUp USB Configuration | Disabled | Enabled |
| BootUp Num-Lock | Auto | On, Off |
| LCD Panel View Expansion | Off | On |
| Password Check | Setup | Always |
| PS/2 Port Hot Swap | Enabled | Disabled |
| Internal Mouse | Enabled | Disabled |

* Visible or available only when notebook is docked.

** Can only be modified when power management is set to Custom.

*** Default options when sound setup is set to User Defined.

**** If the docking station joystick is set to Auto, use I/O Address 201.

Table 2-7 Setup Parameters (cont'd)

| Parameter | Default Setting | Alternate Setting(s) |
|-------------------------------|-----------------|--|
| Power Management Setup | | |
| ACPI Aware O/S | No | Yes |
| Power Management Under AC | Off | On |
| Power Savings Level | Longest Life | High Perform/Custom /Off |
| Hard Disk Timeout** | 2 min. | 5/30/45 sec; 1/2/4/6/8/10/15 min.; Off |
| Video Timeout** | 2 min. | 30/45 sec.; 1/2/4/6/8/10/15 min.; Off |
| Peripheral Timeout** | On | Off |
| Audio Device Timeout** | On | Off |
| Standby Timeout** | 4 min. | Off/1/2/4/6/8/10/15 min. |
| Auto Suspend Timeout** | 10 min. | Off/5/10/15/20/25/30 min. |
| Suspend Option | Suspend | STF |
| Auto Save to File | Enabled | Disabled |
| Panel Backlight | Auto | Full/Standard |
| Suspend Warning Tone | On | Off |
| Modem Ring Resume | On | Off |
| | Off | On |
| Wake Up Alarm | | |
| Resume Alarm Time | Off | On Set time in 5 min. increments when wake up is set to On. |
| Boot Device Setup | | |
| Boot DS IDE* | No | Yes |
| 1st Boot Device | LS-120 | Floppy/CD-ROM/SCSI/Network Disabled/IDE-0/1/2/3 |
| 2nd Boot Device | CD-ROM | Floppy/LS-120/Disabled/IDE-0 |
| 3rd boot Device | Floppy | LS-120/CD-ROM/Disabled/IDE-0 |
| 4th Boot Device | IDE-0 | Floppy/CD-ROM/LS-120/Disabled |
| Try Other Boot Devices | Yes | No |
| Docking Station Video* | Dock Stn. | Portable |

* Visible or available only when notebook is docked.

** Can only be modified when power management is set to Custom.

*** Default options when sound setup is set to User Defined.

**** If the docking station joystick is set to Auto, use I/O Address 201.

Table 2-7 Setup Parameters (cont'd)

| Parameter | Default Setting | Alternate Setting(s) |
|------------------------------------|-----------------|--|
| Peripheral Setup | | |
| Serial Port | Auto | Disabled COM1/IRQ4 COM2/IRQ3 COM3/IRQ4 COM4/IRQ3 |
| Parallel Port | Auto | Disabled LPT1/LPT2 |
| Parallel Mode | ECP | Uni-Directional/Bi-Directional/EPP |
| IR Serial Port | Auto | Disabled COM3/IRQ9 COM2/IRQ3, COM4/IRQ3 |
| TV Mode | NTSC | PAL |
| Sound | Auto | Disabled/220h/240/260/280 |
| Sound IRQ | N/A | IRQ5 ^{***} /7/9/10/11 |
| SB-compatible DMA | N/A | DMA #0/DMA #1 ^{***} |
| Full Duplex Mode | N/A | DMA #0/DMA #3 ^{***} |
| DMA | | |
| Docking Station MIDI (MPU-401)* | Auto | 300h/310h/320h/330h/Disabled **** |
| Docking Station Joystick* | Auto | Disabled |

* Visible or available only when notebook is docked.

** Can only be modified when power management is set to Custom.

*** Default options when sound setup is set to User Defined.

**** If the docking station joystick is set to Auto, use I/O Address 201.

BIOS Setup Menus

Read the following descriptions for explanations of items that appear in the BIOS Setup menus, as listed in the preceding table. See the item-specific help that appears on the Setup screen for more details.

Standard CMOS Setup

When you select the Standard CMOS Setup screen you will see system Time and system Date parameters, as well as drive parameters.

- **Date** — Set your NEC Versa's calendar month, day and year. The calendar clock is year 2000-compliant. These settings remain in memory even after you turn off system power.

To set the date use the **Tab** or arrow keys to move from field to field. Use the **PgUp** or **PgDn** key to change the numbers within each field.

- **Time** — Set the time, enter the current hour, minute, and second in *hr/min/sec*, 24-hour format.

To set the time use the **Tab** or arrow keys to move from field to field. Use the **PgUp** or **PgDn** key to change the numbers within each field.

- Diskette Drives — Lets you designate the drive type for your diskette drives.
- Internal Hard Drive — Allows you to enable or disable the internal hard disk drive in your system. You can also define internal master and slave drives, while also specifying the LBA, Blk and PIO modes.
- Docking Station Hard Drives — Enable and disable the hard drives installed in a docking station. (These options are only available when the NEC Versa is docked.)
- System Memory — Displays the amount of system memory installed.

Advanced CMOS Setup

Advanced CMOS settings let you define the following functions.

- Plug and Play Aware O/S — Selects whether or not the system boots to a Plug and Play operating system.
- BootUp USB Configuration — Selects whether or not the system boots to a USB supported operating system.
- BootUp Num-Lock — Specifies whether NumLock is On or Off at system startup.
- LCD Panel View Expansion — Specifies whether the panel view is reduced/off or expanded/on.
- Password Check — Specifies whether the system prompts you to enter a password when entering BIOS setup, booting the system, and resuming from suspend.
- PS/2 Port Hot Swap — Specifies whether or not you can swap a PS/2 device during system operation.
- Internal Mouse — Specifies whether or not you can use both the internal and the external mouse.

Power Management Setup

Your NEC Versa uses the Advanced Configuration and Power Interface (ACPI) which enables the operating system to manage the power given to each attached device and to turn off a device when not in use. In addition, ACPI enables manufacturers to develop computers that automatically power up with a touch to the keyboard.

The Power Management Setup menu lets you balance high performance and energy conservation using parameters including the following.

- ACPI Aware O/S — Specifies whether to enable ACPI when a Windows system supports ACPI.

- **Power Management Under AC** — Specifies whether to enable power management features when AC power is in use. When AC power is connected to your NEC Versa system, power management is usually disabled. If you enable this parameter, the system automatically activates the power management profile you set, even when AC power is used.
 - **Power Savings Level** — Lets you choose one of four levels of power management.
 - **High Perform** provides the greatest system performance with only minimal power conservation.
 - **Longest Life** provides the maximum amount of power savings.
 - **Off** disables power management and all device timeouts.
 - **Custom** lets you define your own power management configuration by selecting values for specific device timeouts. Custom lets you set the following timeouts.
 - **Hard Disk Time-out** — Allows you to select the amount of time before your hard disk shuts down.
 - **Video Time-out** — Allows you to select the amount of time before your video shuts down.
 - **Audio Device Time-out** — Selects the amount of time before your audio device shuts down.
 - **Standby Time-out** — Allows you to select the system standby timeout period.
 - **Auto Suspend Time-out** — Defines how much time elapses before the system automatically enters Suspend Mode.
 - **Suspend Option** — Allows you to specify either Suspend or Save to File (STF) as the default power management mode. In Suspend, after a specified time of system inactivity, your NEC Versa goes into Suspend or STF, based on the selection. All your data is automatically recovered from where you left off when you Resume.
 - **Automatic STF** — After 30 minutes in Suspend mode the current file is automatically saved to a special file on the hard disk and the system shuts down. To resume, you must press the power button. The system reads the saved file and sets up your system accordingly.
 - If **Auto Save to File** is set to Off and HDPREPEZ or AMI STF (depending on model) is present, pressing the **Fn-Suspend** key combination puts the system into Save to File mode.
 - **Panel Backlight** — Lets you select the LCD screen backlight intensity.
-

- Suspend Warning Tone — Specifies whether the system warning tone sounds when Suspend mode starts. It is best to keep this option enabled.
- Modem Ring Resume — Lets you choose whether the system resumes automatically from suspend mode when an external modem receives a ring signal.
- Wake Up from Suspend Alarm/Resume Alarm Time — Lets you set a resume time from Suspend mode.

Boot Device Setup

- Boot From Docking Station IDE — Specifies the docking station hard drive as the boot drive.
- Boot Devices — Specifies the sequence of boot devices and whether or not the system attempts to boot from a device other than those specified.
- Docking Station Video — Selects whether or not the Docking Station video card is enabled at system boot.

Peripheral Setup

The Peripherals Setup menu displays the connection locations between the system and the Input/Output (I/O) ports. This menu also lets you specify different port assignments as needed.



If you disable a device in Peripheral Setup, you cannot enable or assign it using the Windows 95 device manager. The device is not listed in the Windows 95 device list. To control the device using the Windows 95 device manager, select any setting other than “Disable” in Peripheral Setup.

- Serial Port — Allows you to disable the port or change its address assignment.
 - Parallel Port/Parallel Mode — Lets you disable or reassign the parallel port and select a parallel port mode.
 - IR Serial Port — Allows you to disable or reassign the IR Serial port.
 - TV Mode — Specifies the signal type used by the TV being connected to the TV Out port.
 - Sound/Sound IRQ/SB-Compatible DMA/Full-Duplex Mode DMA/Docking Station MIDI — Allows the system BIOS to assign a conflict-free resource to the sound devices.
 - Docking Station Joystick — Enables or disables the docking station joystick.
-

Other BIOS Setup Options

BIOS Setup offers other options, including the following:

- Change User Password — Allows you establish a user password once a Supervisor password is set.
- Change Supervisor Password — Allows you to establish password protection for entering the BIOS setup utility, booting the system, and resuming from suspend.
- Auto Configuration with Defaults — Loads default settings.
- Save Settings and Exit — Accepts changes made to current settings, saves to CMOS, and exits BIOS Setup.
- Exit Without Saving — Reverts to previously selected settings and exits Setup.

Password Protection

Your NEC Versa supports a password for system security on several levels. Once you set a password, you must enter it before you can enter BIOS Setup, access the system at startup, or resume from suspend, depending on your configuration selection.

You are not prompted to enter a password until you set a supervisor password. Your system is not protected until you set a user password.



You must set the supervisor password before the BIOS Setup utility allows you to set a user password.

Using BIOS Setup to Set Power Management

Power Management Setup allows you to use the factory-defined power savings level (Longest Life), or choose between High Perform, Custom, or Off. Each provides a special value to your current work effort. These power management levels were designed with you in mind. For example, you can use them under the following circumstances:

- Longest Life — Provides best battery life and good performance. Use while traveling long distances.
 - High Perform — Provides best performance and good battery life. Use while on the road or traveling short distances.
 - Custom — Lets you decide! Set power management levels according to your own needs and present environment.
 - Off — Works well in an office environment while powering your NEC Versa with AC power.
-

Using the Save to File (STF) Feature

STF protects the integrity of your working files. For example, if you are called away from your NEC Versa and Suspend mode is selected with auto Save to File active, your system automatically goes into Suspend mode. After 30 minutes, if you don't return, your working environment is saved to a special file on your hard disk.

To configure your NEC Versa's STF feature:

1. Access the BIOS setup utility.
2. Select Power Management from the Setup Main Menu.
3. Move the cursor down and highlight Suspend Mode.
4. Press the PgUp key and select STF.
5. Save the settings and exit BIOS Setup.

There are two ways to invoke the NEC Versa's STF feature, one automatic and one manual.

- After 30 minutes of inactivity, your NEC Versa automatically invokes STF, provided you have configured STF in the BIOS Setup utility.
- You can manually invoke STF by pressing Fn Suspend simultaneously, before you leave your NEC Versa.



When the status bar reads that there is only 4% power remaining in the system, the NEC Versa automatically performs a Save to File.

STF Benefits

Using STF can benefit you in the following ways.

- When in STF, there is minimum battery drain.
- Preserves the life of your NEC Versa.

Saves you time. When you return from that urgent call or meeting, you don't have to re-boot, just press the Suspend/Resume button to resume system.

Section 3

Troubleshooting

This section focuses on providing you with some information on basic troubleshooting as well as how to translate some system error messages.

QUICK TROUBLE SHOOTING

This section summarizes problems that may develop during system operation and lists suggested corrective actions.

Problem Checklist

First check the items in the following list. If these items don't help, see the table that follows the list.

- Sets date and time
- Power is on to the computer.
- The electrical outlet to which your AC adapter is connected is working. Test the outlet by plugging in a lamp or other electrical device.
- All cables are tightly connected.
- The display setting is configured correctly.
- The display brightness control is adjusted properly.
- If using battery power, check that the battery pack is properly inserted and fully charged.

Table 3-1 Troubleshooting

| Problem | What To Do |
|--|--|
| The system does not power on. | <p>If you are operating the system with battery power, check that the battery pack is correctly inserted. Attach the AC adapter to recharge the battery.</p> <p>If you have the AC adapter attached, check that the electrical outlet you are using works.</p> |
| LCD screen is dark and blank. | <p>Power-saving mode has shut off the backlight. Press a keyboard key or the Suspend button.</p> <p>The built-in LCD may not be selected. Press Fn F3 once or twice.</p> <p>Screen brightness needs adjustment. Adjust the control.</p> <p>The system entered Suspend mode due to low battery power. (Check the Status bar for a half-moon icon.) Plug in the AC adapter or replace the battery pack, and then press the Suspend button to resume operation.</p> |
| Battery power does not last long. | <p>Use power-saving modes.</p> <p>Fully charge and discharge the battery several times to recondition it.</p> <p>Replace the battery.</p> |
| Information on the LCD screen is difficult to see. | <p>Adjust the brightness control.</p> |
| An optional component does not work. | <p>Make sure the component is securely installed or connected. Verify that the system parameter for the I/O port configuration is set correctly in Setup.</p> |
| The Suspend/Resume button does not work. | <p>A disk drive might be busy. Wait until the disk drive stops and try again.</p> <p>If system does not resume, it may have auto suspended on a low battery. Attach the AC Adapter and try again.</p> <p>If the system does not resume, check that Auto Play is disabled. See "Changing the Auto Play Setting" in Chapter 4 for details.</p> <p>The NEC Versa may be connected to a docking station. Some power management functions do not work when the NEC Versa is docked.</p> |

Start-up Problems

The system displays an invalid configuration error message at power on when there are the following conditions:

- the current configuration information doesn't match configuration information stored in Auto Setup, such as when an internal option is added.
- the system loses configuration information.

If either condition is true, the system displays an “invalid configuration information” message.

To continue start-up procedures, press **F2** and run the Setup utility to set current system parameters.

If an error message appears before the operating system starts, look up the error message in the following table. Follow the instructions. If you see other error messages, the hardware might need repair.



When the NEC Versa detects an error related to display devices, it cannot display on either the LCD or a CRT. The system warns you by beeping.

POST Error Messages

The NEC Versa 6220/30/60 notebook computer has a built-in checking program that automatically tests its components when you turn the system power on. This diagnostic test is called the Power-On Self-Test (POST). If the system finds a problem during the POST, the system displays an error message or emits a series of beep signals. If this happens, follow the instructions in the POST Error Messages table or the Beep Code table, as appropriate.

Table 3-2 POST Error Messages

| Message | What To Do |
|--|--|
| Address Line Short | Error in the address decoding circuitry on the system board. Contact your NECCSD service representative for service work. |
| C: Drive Error | Hard disk drive C: does not respond. Check that C: hard disk type in Setup is correct. |
| C: Drive Failure | Hard disk drive C: does not respond. You may need to replace the hard disk drive. |
| Cache Memory Bad, Do Not Enable Cache | Cache memory is defective. It must be replaced. Contact your NECCSD service representative for service work. |
| CH-2 Timer Error | Most ISA computers include two timers. There is an error in timer 2. Contact your NECCSD service representative for service work. |
| CMOS Battery State Low | CMOS RAM is powered by a battery. The battery power is low. Contact your NECCSD service representative to replace the CMOS battery. |
| 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 to reset the value. |
| CMOS System Options Not Set | The values stored in CMOS RAM are either corrupt or nonexistent. Run Setup to reset the value. |
| CMOS Display Type Mismatch | The amount of memory on the system board is different than the amount in CMOS RAM. Run Setup to reset the value. |
| CMOS Time and Date Not Set | Run Setup to set the time and date. |
| Diskette Boot Failure | The boot diskette in floppy drive A: is corrupt. It cannot be used to boot the computer. Use another boot disk and follow the on-screen instructions. |
| DMA error | Error in the DMA controller. Contact your NECCSD service representative to replace the CMOS battery. |
| DMA#1 Error | Error in the first DMA channel. Contact your NECCSD service representative for service. |
| DMA #2 Error | Error in the second DMA channel. Contact your NECCSD service representative for service. |

Table 3-2 POST Error Messages (cont'd)

| Message | What To Do |
|------------------------------|--|
| FDD Controller Failure | The BIOS cannot communicate with the floppy disk controller. Contact your NECCSD service representative to check all appropriate connections. |
| HDD Controller Failure | The BIOS cannot communicate with the hard disk drive controller. Contact your NECCSD service representative to check all appropriate connections. |
| INTR #1 Error | Interrupt channel 1 failed POST. Contact your NECCSD service representative for service. |
| INTR #2 Error | Interrupt channel 2 failed POST. Contact your NECCSD service representative for service. |
| Invalid Boot Diskette | The BIOS can read the diskette in drive A:, but cannot boot the computer. Use another boot diskette. |
| Keyboard is Locked Unlock It | The keyboard lock on the computer is engaged. The computer must be unlocked to continue. |
| Keyboard Error | There is a timing problem with the keyboard. Set the <i>Keyboard</i> option in Setup to <i>Not Installed</i> to skip the keyboard POST routines. |
| KB\interface error | There is an error in the keyboard connector. Contact your NECCSD service representative for service. |
| Off Board parity Error | Parity error installed in an expansion slot. Contact your NECCSD service representative to be sure that the memory module is installed correctly. The error format is: OFF BOARD PARITY ERROR ADDR(HEX) = (XXXX) XXXX is the hex address where the error occurred. |
| On Board Parity Error | Parity error in system board memory. Contact your NECCSD service representative for service. |
| Parity Error ???? | Parity error in system memory at an unknown address. Contact your NECCSD service representative for service. |

Fatal errors that occur during POST are communicated through a series of beeps. All beep code errors, except beep code 8, are fatal errors and do not allow the system to continue to boot.

If beep codes occur during POST, check the items in the Problem Checklist (at the start of this chapter), verify that all the hardware is set up properly and securely connected, and try rebooting. If you still get a beep code, go to the section "If You Need Assistance" at the end of this chapter.

Beep Codes are listed in the table that follows.

Table 3-3 Beep Codes

| Number of Beeps | Error | Description |
|------------------------|---|--|
| 1 | Refresh Failure | The memory refresh circuitry on the motherboard is faulty. |
| 2 | Parity Error | Parity error in the first 64 KB of memory. |
| 3 | Base 64 KB Memory Failure | Memory failure in the first 64 KB. |
| 4 | Timer Not Operational | Memory failure in the first 64 KB of memory or Timer 1 on the motherboard is not functioning. |
| 5 | Processor Error | The CPU on the motherboard generated an error. |
| 6 | Gate A20 Failure | The keyboard controller may be bad. The BIOS cannot switch to protected mode. |
| 7 | Processor Exception Interrupt Error | The CPU generated an exception interrupt. |
| 8 | Display Memory Read/Write Error | The system video adapter is either missing or its memory is faulty. (This is not a fatal error.) |
| 9 | ROM Checksum Error | The ROM checksum value does not match the value encoded in the BIOS. |
| 10 | CMOS Shutdown Register Read/Write Error | The shutdown register for CMOS RAM failed. |
| 11 | Cache Error/External Cache Bad | The external cache is faulty. |

HELPFUL QUESTIONS

Here are some helpful questions to ask when troubleshooting the notebook:

- Is there any external power source connected to the computer?
- Is the battery fully charged?
- Is the computer turned on and the Power LED activated?
- Are the LCD display controls set to the minimum level?
- Is the LCD display switched to the external monitor?
- Are all cables and devices connected properly and securely?
- Are all needed device drivers installed properly?
- Have you checked the AUTOEXEC.BAT and CONFIG.SYS files for errors?
- Is the Suspend Mode activated on the LCD Status Bar? Press any key or press the Power switch to power on the system.

Section 4

Field Service Guidelines

This section contains preventive and corrective maintenance procedures for the NEC Versa 6220/30/60 notebook computers.

The first part of the section describes cleaning procedures and preferred handling procedures for sensitive components (for example disk drives, batteries).

The second part of the section identifies all field replaceable parts with the remainder of the section containing the removal and replacement procedures for the field replaceable parts.

PREVENTIVE MAINTENANCE

Preventive maintenance is limited to cleaning the plastic case, the keyboard, and the display screen and cleaning the diskette drive heads as required.



Remove the battery and disconnect the AC adapter before performing any maintenance. Voltage is present inside the system unit and LCD even after the system is turned off.

Cleaning the Notebook's Exterior

Use the steps below to clean the outer surface of the system.

1. Power off the system and remove all battery packs. Unplug all cables connected to the system.
2. Wipe the outside of the system unit, keyboard, and display with a soft, clean cloth. Remove stains with a damp, almost dry cloth. Use liquid glass cleaner to clean the LCD indicator panel. Apply the glass cleaner directly to the cloth and then wipe the LCD indicator panel. Do not use solvents or strong, abrasive cleaners on any part of the system.
3. Clean the keys with a damp cloth. A small, soft-bristle brush may be used to clean between the keys. Make sure to use a damp cloth (not wet) to prevent moisture from seeping between the keyboard and the metal plate, possibly damaging the components under the keys. If the keyboard gets wet, thoroughly dry it before re-assembling the system unit.

Cleaning the Notebook's Interior

When servicing the inside of the notebook, remove dust and other foreign particles from inside the system unit as follows.

1. Remove the top cover and keyboard using the disassembly procedures discussed later in this section.
2. Dust or vacuum (with a rubber-tipped nozzle) the inside of the system unit particularly the motherboard surface. Use care to avoid damaging or dislodging any components or cables.
3. Inspect all cables connectors for damage. Ensure that connectors are seated properly before replacing the cover.

Protecting the Disk Drives

To protect the disk drives and data, back up the system disk periodically on diskettes. Occasionally use a head-cleaning diskette in the disk drive to prolong the life of the drive and to help maintain data integrity.

Here are some maintenance procedures to use when servicing a hard disk:

- Always back up the data files from the hard disk.
- Run a virus detecting program to check for possible virus infected areas on the hard disk.
- Use the preinstalled ScanDisk program to correct any errors found in the directory and File Allocation Table (FAT). This will also free up space from any unused sectors.
- Never turn the computer off when the hard disk is being accessed.
- Never move or raise the computer while the hard disk is being accessed, most especially don't jar the hard disk as this may cause a hard disk crash.
- Acquire a hard disk maintenance program like DEFRAG under DOS, or Norton Utilities SPEEDISK programs. These programs reorganize your hard disk by eliminating fragmentation and improves the hard disk access time.

Handling the Battery Packs

The battery packs furnished with the computer require reasonable care and handling to ensure efficient operation and maximum life. Periodically inspect the battery terminals and the batteries for evidence of corrosion and oxide build-up.

To ensure that the battery packs endure normal life cycle, always observe the following precautions when handling the battery packs:

- Do not drop the battery packs or subject them to excessive shock and vibration.
- Do not expose the battery packs to direct sunlight, moisture, or chemical compounds, or extreme heat.
- Do not disassemble the battery packs.
- Do not use the battery packs to power other devices.
- Do not short the battery leads or connect the battery with reversed polarity.
- Never attempt to charge the battery packs in any way other than as described in this manual and the User's Guide.
- Always charge the battery packs as soon as possible after a low battery indication.

Maintaining the LCD Quality

When it comes to screen problems, heat plays a big part. After a good working session, the typical routine is to shut the machine and close the cover. The display surface (no matter what type it is) radiates heat. When you close the cover, you trap the heat against the screen. Make sure to leave the computer's cover open for about ten minutes while the heat disperses, before closing the LCD.

REQUIRED TOOLS AND EQUIPMENT

All NEC Versa corrective maintenance procedures can be performed using the following tools:

- Tweezers
- Small flat-head screwdriver
- Small Phillips screwdriver
- Small Hex-bolt screwdriver

DISASSEMBLY AND REASSEMBLY

This subsection contains step-by-step disassembly procedures for the system. Reassembly is the reverse of disassembly. Each procedure is supported by a simplified disassembly illustration to facilitate removal. The Illustrated Parts Breakdown and parts lists for the system unit are shown later in this subsection.

For complete disassembly of the system unit, follow the disassembly order listed in Table 4-1. To reassemble, follow the table in reverse order.

Table 4-1 NEC Versa 6220/30/60 Disassembly Sequence

| Sequence | Part | See Page |
|----------|---|----------|
| 1 | Hard Disk Drive | 4-5 |
| 2 | Diskette Drive (installed in VersaBay II) | 4-7 |
| 3 | Main Battery Pack (Li-Ion Type) | 4-8 |
| 4 | Removing the Keyboard | 4-10 |
| 5 | Memory Upgrade | 4-12 |
| 6 | LCD and Top Cover | 4-15 |
| 7 | VersaGlide | 4-18 |
| 8 | LCD Status Bar and Power Button | 4-19 |
| 9 | Bridge Battery, CMOS Battery, Buzzer | 4-20 |
| 10 | Sound Board and Microphone | 4-21 |
| 11 | IR Assembly and Graph Board | 4-21 |
| 12 | CPU Assembly | 4-23 |
| 13 | I/O Board | 4-24 |

When disassembling the system unit, follow these general rules.

- Turn off and disconnect all power and all options, including the AC adapter (if connected) and battery packs (see the procedures that follow).
- Do not disassemble the system into parts that are smaller than those specified in the procedure.
- Label all removed connectors. Note where the connector goes and in what position it was installed.

Hard Disk Drive

To disassemble the entire NEC Versa computer, start by removing the hard disk drive as follows.



NEC Versa hard disk drives can be used in other NEC notebook computers such as the NEC Versa 2000 and 4000 Series systems. However, hard disk drives from earlier models can only be used in the VersaBay II. Check the top of the hard drive for a blue dot. If the drive case has the blue dot on it, you can use the drive in either the drive bay or the VersaBay II.

1. Check that the NEC Versa power is off.
2. Turn the NEC Versa upside down with the front of the unit facing you.
3. Remove the drive cover as follows:
 - Locate the drive cover screw. Remove screw. Push the drive cover release latch up while using some pressure to slide the cover to the left.
 - Lift the cover up and off the system.

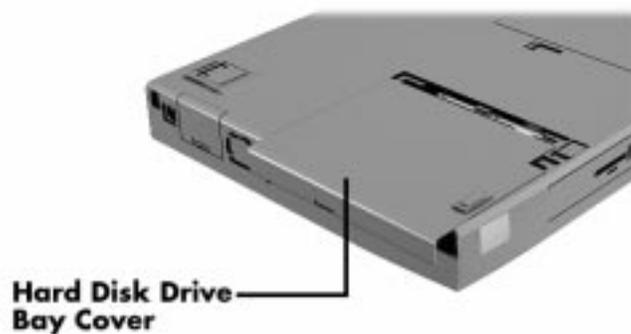


Figure 4-1 Removing the Drive Bay Cover

4. Remove the hard disk drive as follows:

- Using your fingers, press down on the hard disk drive at the end closest to the connector.
- While maintaining pressure, slide the drive towards the front of the system.

 **CAUTION**

Do not lift the drive out of the system before releasing it from the system connector. Doing so can damage the connectors.

- Once the drive is disconnected, lift the drive up and out of the system.

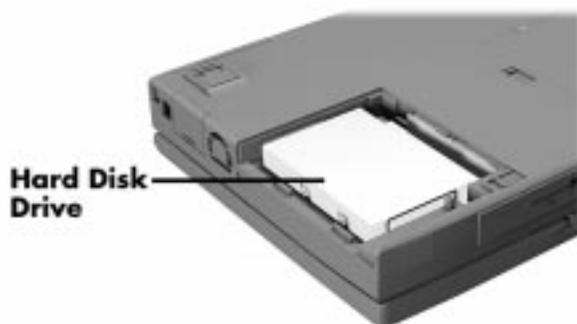


Figure 4-2 Removing the Hard Disk Drive

Diskette Drive

Remove the diskette drive as follows.

1. Make sure the NEC Versa is powered off, all options are disconnected, and the LCD panel is closed.
2. Turn the system upside down with the front facing you.
3. Locate the VersaBay II release latches on the bottom of the unit.

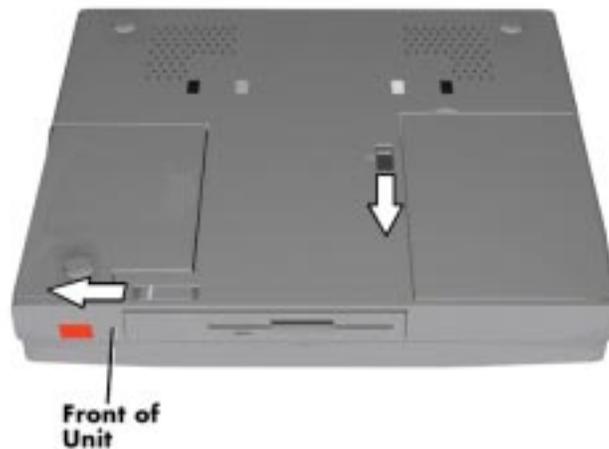


Figure 4-3 VersaBay II Release Latches

4. Slide the front latch towards the hard disk drive side of the system, and hold it.
5. Push the middle latch towards you until the diskette drive pops part way out of the unit.
6. Continue to hold the latch near the front of the system to the left, and pull the diskette drive the rest of the way out of the system.



If you release the front latch before completely removing the device, the device casing catches on the inside of the latch.



Figure 4-4 *Removing the Standard Diskette Drive*

Main Battery Pack (Li-Ion Type)

Remove the main battery pack as follows.



Use Li-Ion batteries in the NEC Versa computer for which they are designed. Also, installing another manufacturer's battery, or using a combination of very old and new batteries can deteriorate battery and equipment performance.

1. Save your files, exit Windows, and press the Suspend button or turn off system power.
2. Close the LCD and turn the system over, with the front facing you.

3. Release the battery cover latch and slide the battery bay cover away from the system.



Figure 4-5 Removing the Battery Compartment Cover

4. Place a finger in the notch on the battery and lift the battery out of the system.



Always lift the battery out of the system by the notch. Failure to do so can damage the battery terminals.



Figure 4-6 Removing the Battery

Removing the Keyboard

1. Make sure the system is powered off and that no peripheral devices are attached.
2. Locate and remove the two Phillips-head screws on the bottom of the NEC Versa that secure the speaker caps. Put the screws in a safe place for reassembly.

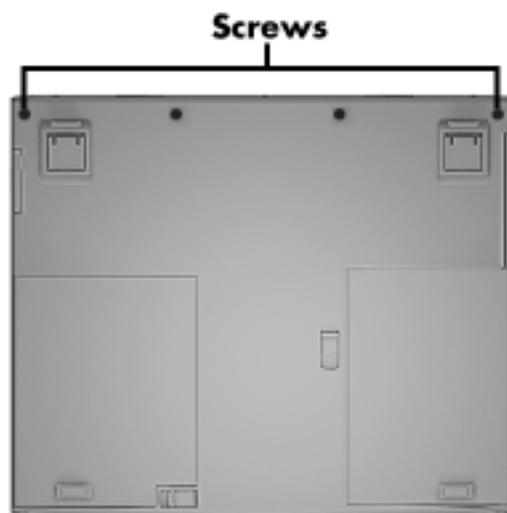


Figure 4-7 Locating the Speaker Cap Screws

3. Turn the NEC Versa over and open the LCD panel.
4. Locate the two speaker caps, slide each one toward the outside edge of the system, and remove it.

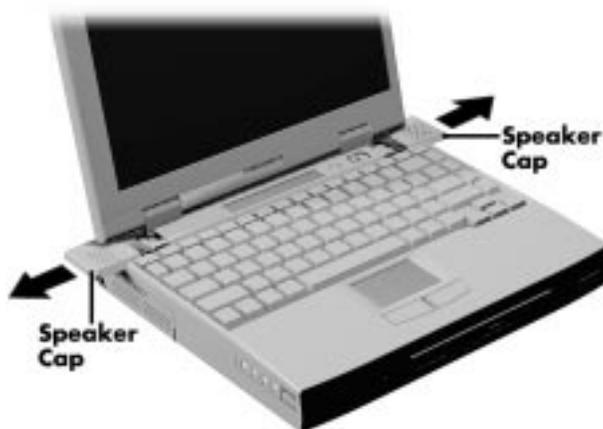


Figure 4-8 Removing the Speaker Caps

5. Gently lift up the edge of the keyboard nearest the LCD and slide the keyboard toward the LCD screen to release the tabs that secure it.



Figure 4-9 Lifting Up the Keyboard

6. Carefully turn over the keyboard and place it face down on the VersaGlide. Memory Upgrades do not require disconnecting the keyboard ribbon cable from the graph board. To disassemble the NEC Versa further you need to disconnect the keyboard ribbon cable at P15 and remove the keyboard.
7. Memory Upgrades are detailed in the next section. Instructions to further disassemble the NEC Versa are provided following Memory Upgrade starting with "LCD and Top Cover."



Figure 4-10 Positioning the Keyboard

Memory Upgrade

The NEC Versa 6220/30/60 notebook comes standard with 32 megabytes (MB) of random access memory (RAM). You can increase system memory to a maximum of 128 MB. The RAM combinations possible are 32, 48, 64, 96 and 128 MB depending on which two of the listed dual inline memory modules (DIMM) are used.

- 16-MB memory module
- 32-MB memory module
- 64-MB memory module

The following table shows the memory expansion possibilities.

Table 4-2 System RAM Expansion

| Base Memory | Expansion Memory | Total Memory |
|-------------|------------------|--------------|
| 32 MB | 16 MB | 48 MB |
| 32 MB | 32 MB | 64 MB |
| 32 MB | 64 MB | 96 MB |
| 64 MB* | 64 MB | 128 MB |

*Replacing the provided 32-MB DIMM with a 64-MB DIMM provides optimum memory expansion.

Install DIMMs as follows:

1. Remove the keyboard as described in the preceding section.
2. Locate the lock notches and alignment key on the DIMM.

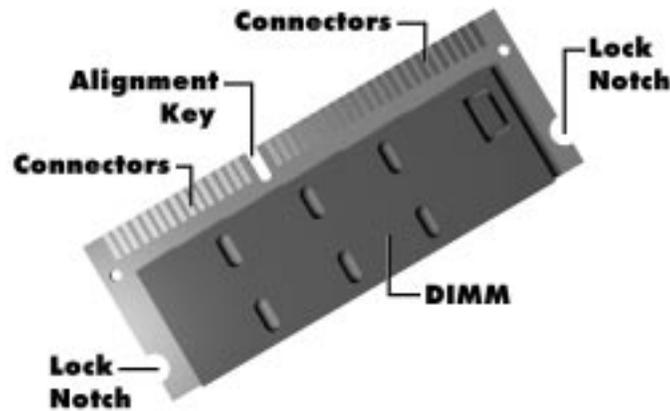


Figure 4-11 DIMM Features

3. Locate the DIMM expansion port.
4. Hold the DIMM at a 45 degree angle and align the DIMM contacts with the socket in the system. Push the connector into the socket.
5. Press down on the edge of the DIMM opposite the contacts until the lock tabs on the sides snap into place, securing the module.

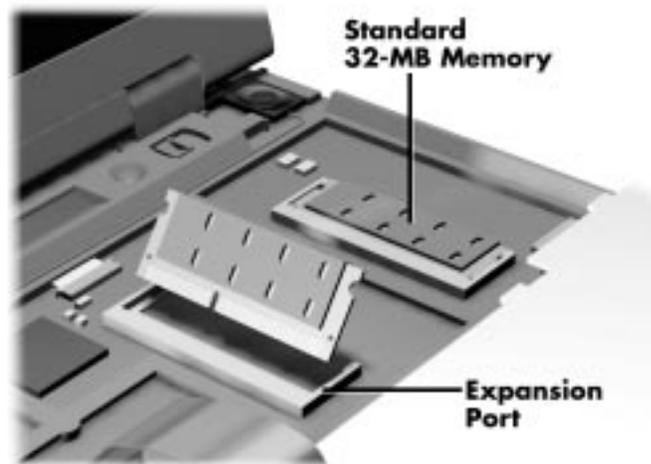


Figure 4-12 Installing the DIMM

If you are replacing a DIMM and need to remove one that is already installed, do so as follows:

- Press the locking tabs away from the sides of the DIMM and hold while gently lifting on the edge of the DIMM.
- When the edge of the DIMM pops up and is at approximately a 60 degree angle, pull the DIMM from the socket.

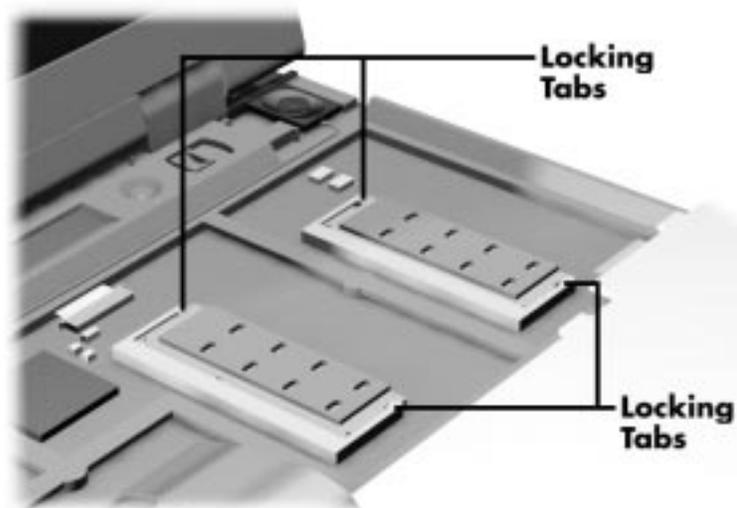


Figure 4-13 Removing an installed DIMM



The system switches are also located underneath the keyboard.

LCD and Top Cover

Remove the LCD and top cover as follows.

1. Perform the previous disassembly process as described.
2. Remove the bottom base unit cover as follows.
 - Turn the computer over with the VersaBay II slot facing towards you.
 - Locate the 10 screws that secure the bottom base unit cover. In all, there are 4 long screws, 6 short screws.

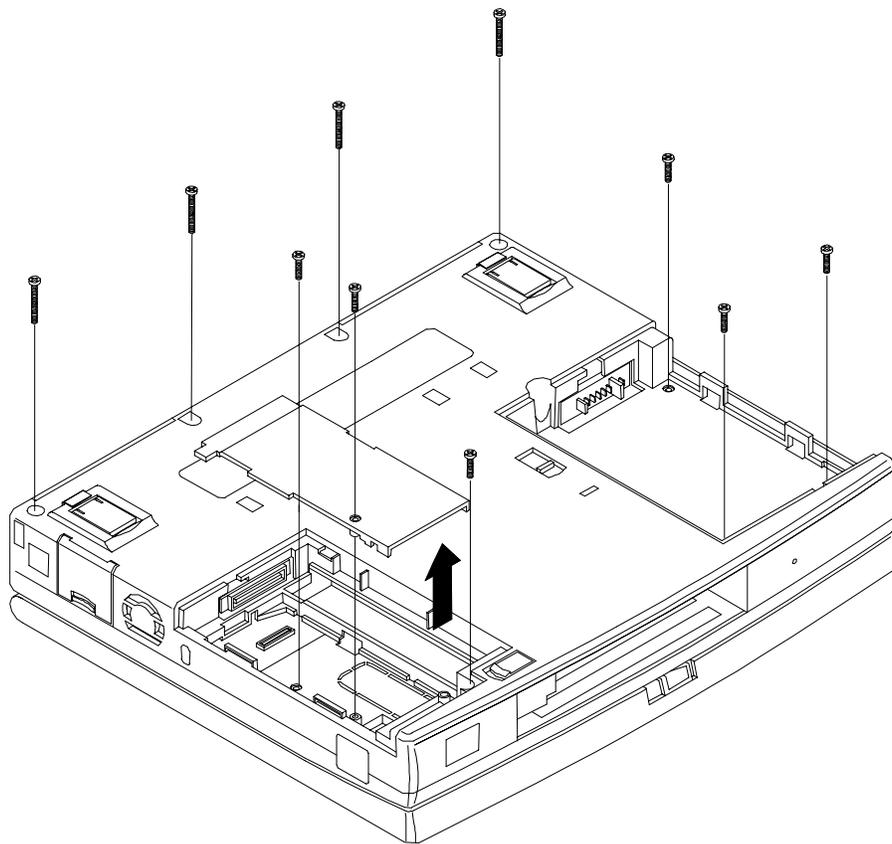


Figure 4-14 Removing the Bottom Base Screws

- Remove the remaining screws (two of the ten were removed when removing the keyboard).
- Turn the laptop over and remove three screws. (There are 2 medium screws and 1 short screw.)

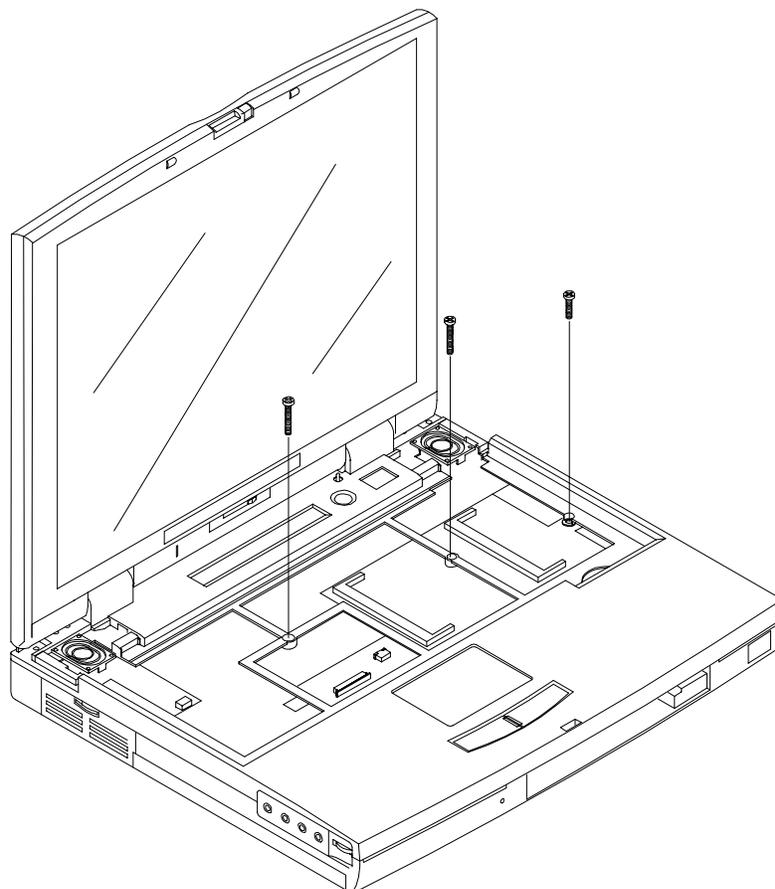


Figure 4-15 Location of Three Screws

- Using a flat-head screwdriver, carefully detach the bottom base unit cover from the top cover.
- To lift off the top cover, place your left hand in the PC cards slot bay, and pull the left corner of the system upward with your right hand. Be careful not to lift the cover up too far until you have disconnected the LCD cables (see the next step.)

3. Disconnect the LCD cables from connector P6 on the Graph board. Also disconnect the speaker cables (P17) and VersaGlide cables (P14).

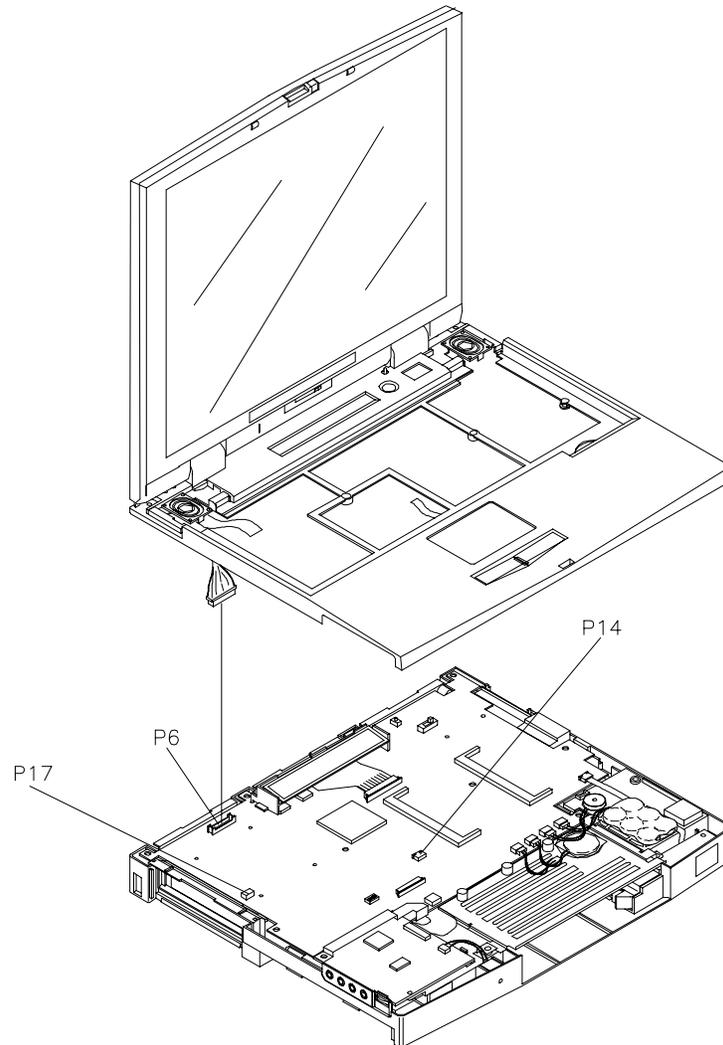


Figure 4-16 Separating Top Cover from Base Unit

VersaGlide

Remove three screws on the underside of the top cover to remove the VersaGlide.

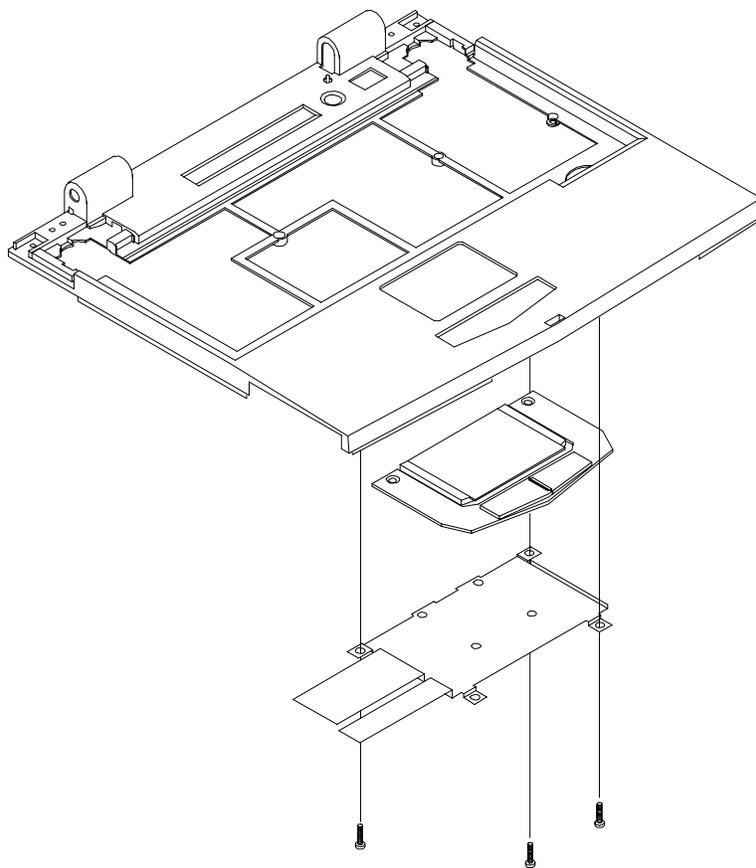


Figure 4-17 Removing the VersaGlide

LCD Status Bar and Power Button

Remove the LCD status bar and Power button as follows.

1. Remove the keyboard, LCD and top cover as previously described.
2. When the LCD and top cover are removed the Power button sets unattached on the Graph board over the Power switch.
3. Remove the LCD status bar as follows.
 - Locate the ribbon cable that attaches to the Graph board via connector P9.
 - Use the tip of a screwdriver and carefully open the connector tabs.
 - Lift up the LCD status bar.

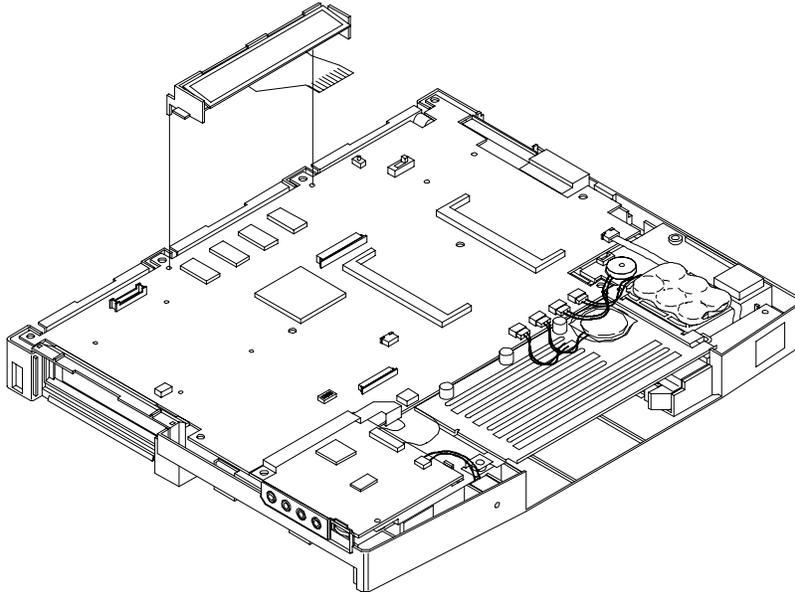


Figure 4-18 LCD Status Bar

Bridge Battery, CMOS Battery, Buzzer

Remove the bridge battery, CMOS battery, and/or buzzer (speaker) as follows.

1. Remove the following as previously described:
 - LCD
 - top cover
 - keyboard
 - LCD status bar and Power button
2. To remove the bridge battery disconnect the cable from connector P11 on the Graph board and remove the bridge battery.
3. Remove the CMOS battery as follows.
 - Locate the cable on the CMOS battery.
 - Disconnect the cable from connector P13 on the Graph board and lift the CMOS battery out of the base unit.
4. To remove the buzzer, disconnect the buzzer cable from P12 on the Graph board and remove the buzzer.

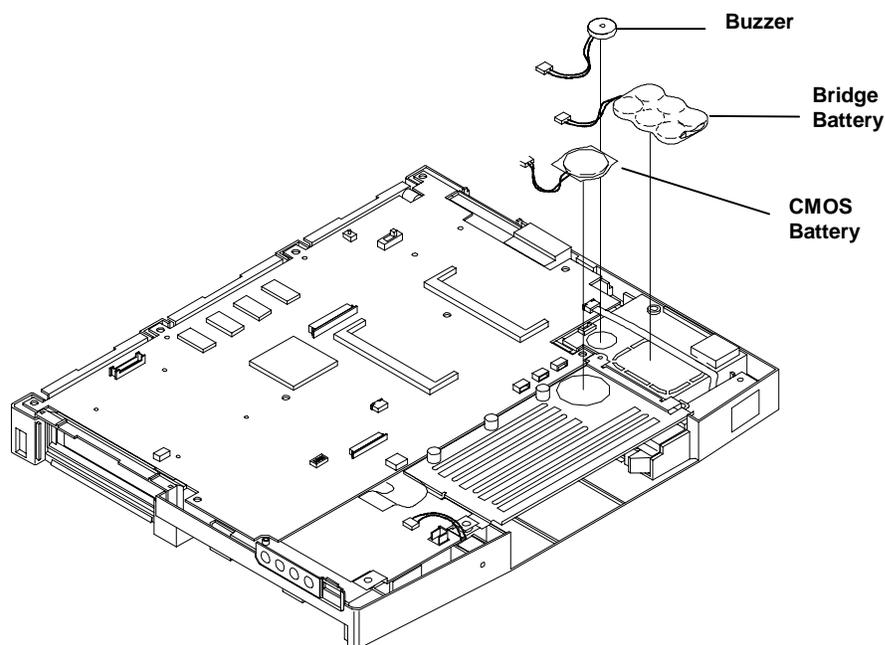


Figure 4-19 Removing Bridge Battery, CMOS Battery and Buzzer

Sound Board and Microphone

Remove the sound board as follows.

1. Remove the following as previously described:
 - LCD
 - top cover
 - keyboard
 - LCD status bar and power button
2. Disconnect the microphone cable at connector (P3) and the ribbon cable at connector P6 on the sound board.
3. Remove the screw and bracket that secure the sound board to the base unit.
4. Lift the sound board straight up and disconnect it from the graph board.

IR Assembly and Graph Board

Remove the IR assembly and Graph board as follows.

1. Remove the following as previously described:
 - LCD
 - top cover
 - keyboard
 - LCD status bar and power button
 - bridge battery, CMOS battery and buzzer.
2. Disconnect the cable from connector P10 and remove screw securing IR board and lift out the IR assembly.
3. Remove the remaining screw from the main board as shown in the following figure. Gently separate the Graph board from the base unit and I/O board, disconnecting two connectors.

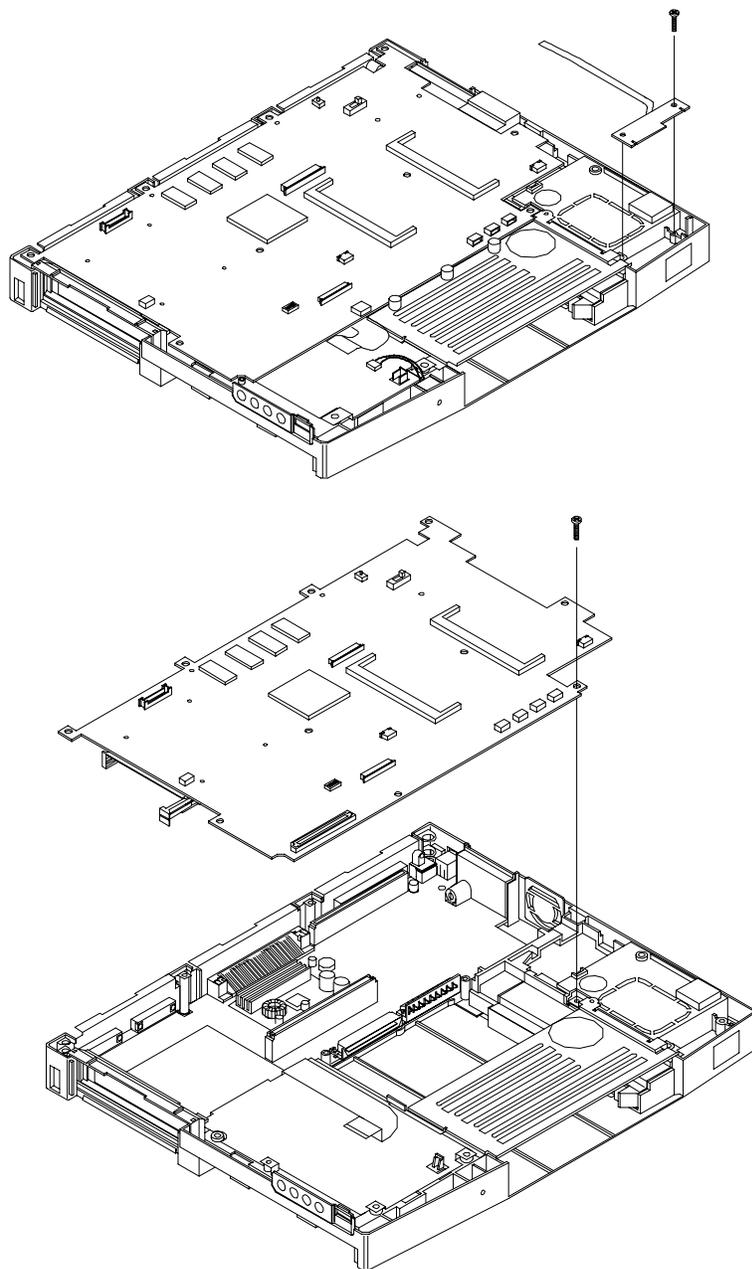


Figure 4-20 Removing IR Assembly and Graph Board

CPU Assembly

Remove the CPU assembly from the graph board as follows.

1. Remove the Graph board as previously described:
 - LCD
 - top cover
 - keyboard
 - LCD status bar and Power button
 - Sound Board
 - Graph Board.
2. Disconnect the fan cable from connector P18.
3. Remove insulator sheet from CPU and fan assembly.
4. Remove 4 screws from the CPU and fan assembly.
5. Gently lift the CPU assembly out of connectors P3 and P4 on the Graph board.

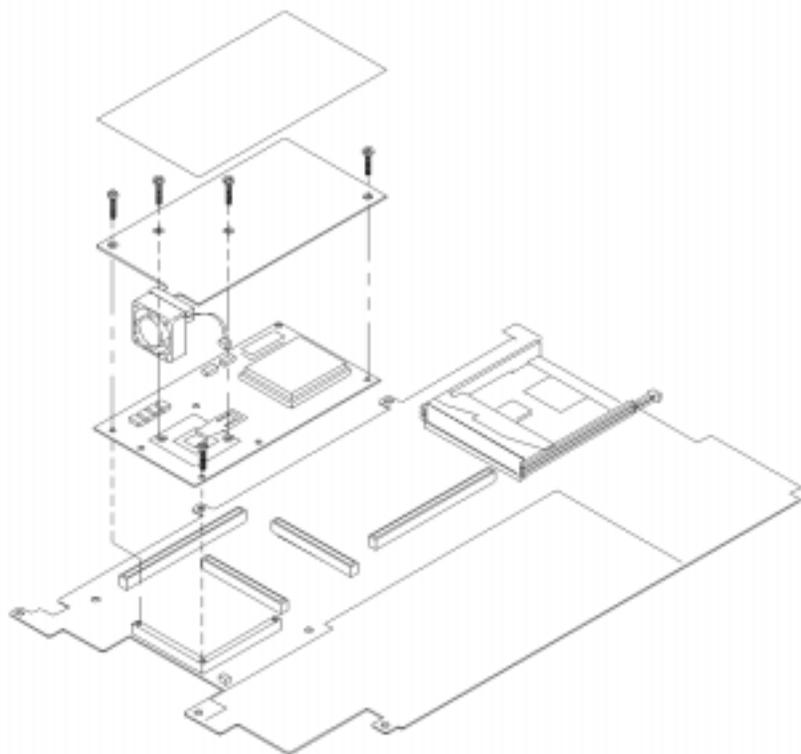


Figure 4-21 *Removing the CPU Board from the Graph Board*

I/O Board

Remove the I/O board as follows.

1. Remove the following as previously described:
 - LCD
 - top cover
 - keyboard
 - LCD status bar
 - Sound board
 - Bridge battery, CMOS battery, buzzer
 - Graph board.

2. Remove the 5 screws securing the I/O board to the bottom base unit.
3. Lift the I/O board up and out of the base unit, being careful to note the position of the two spacers.

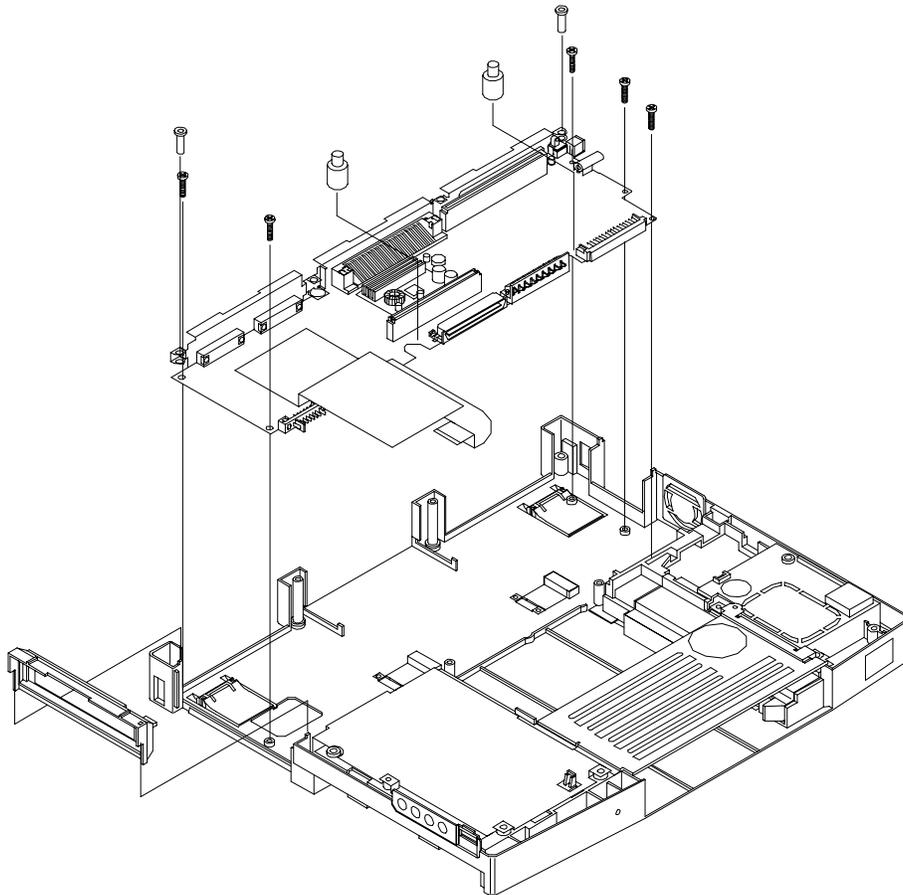
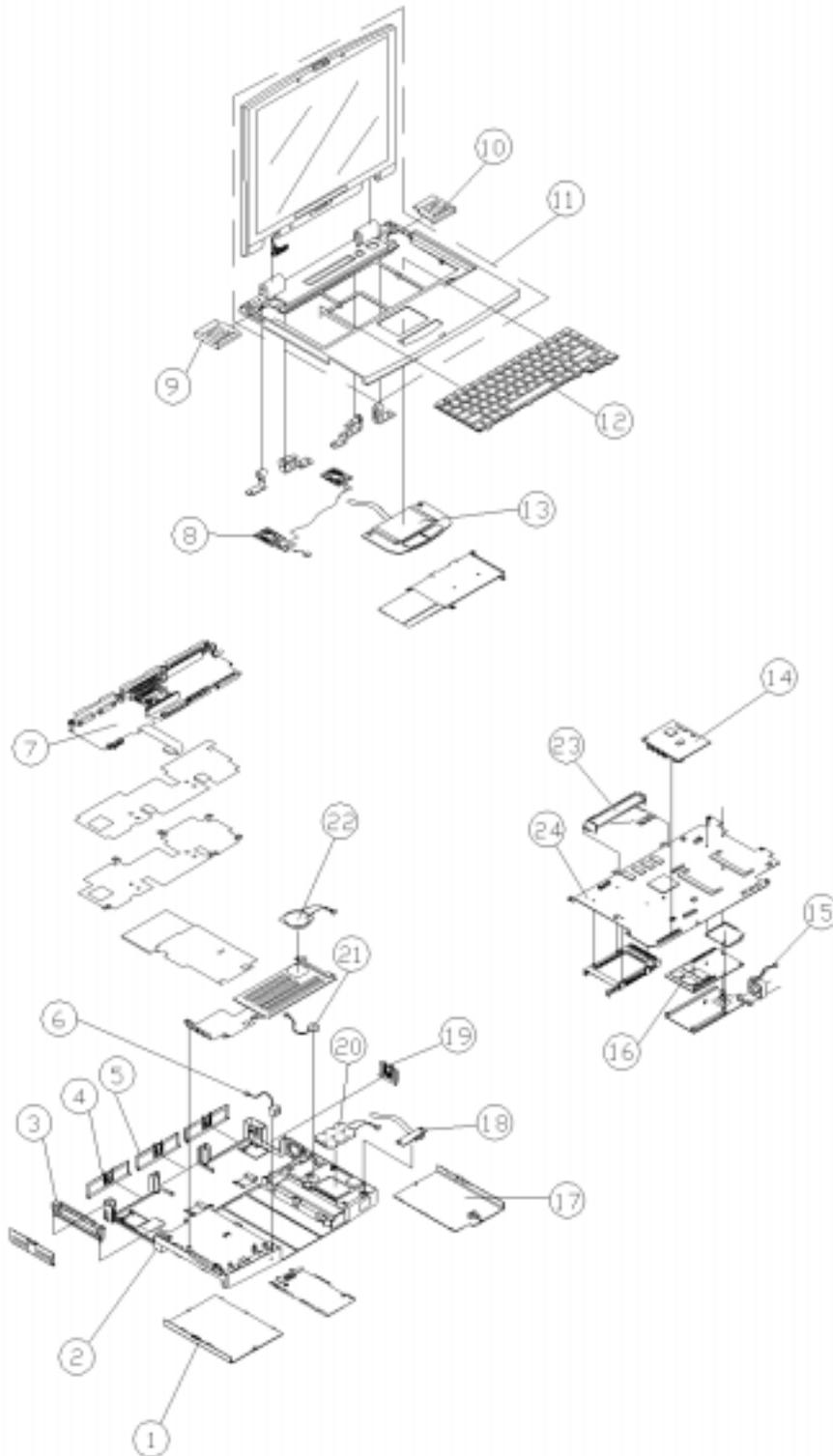


Figure 4-22 Removing the I/O Board

ILLUSTRATED PARTS BREAKDOWN

The next section contains the NEC part numbers and illustrated parts breakdown (IPB) figure for the NEC Versa. The following figure shows the system exploded view diagram, or IPB. Table 4-3 lists field-replaceable parts and corresponding part numbers.

Review the entire exploded diagram to see how each part is connected or assembled. Try to sub-divide the entire diagram paying particular attention to the LCD Assembly, Top Unit Cover Assembly, and the Base Unit Assembly.



**Figure 4-23 NEC Versa 6220/30/60
Illustrated Parts Breakdown**

Table 4-3 NEC Versa 6220/30/60 Series Field-Replaceable Parts

| Item | Part Number |
|--|---|
| 1. Battery Compartment Cover (Cap) | 136-240832-103A |
| 2. Bottom Base Assembly | 136-242123-001A |
| 3. PCMCIA Card Cap Assembly | 136-240835-101A |
| 4. Connector Cap Assembly | 136-240833-101A |
| 5. Docking Station Cap Assembly | 136-240834-101A |
| 6. Microphone Assembly with Cable | 808-876316-001A |
| 7. I/O Board | 158-057394-000E |
| 8. Speaker Assembly | 808-876317-002A |
| 9. Speaker Cover (left) | 136-628885-101A |
| 10. Speaker Cover (right) | 136-628886-101A |
| 11. Top Cover Assembly with VersaGlide Assembly | 136-242121-001A |
| 12. Keyboard - U.S. U.K. (128WC-012) GERM (128WC-012) AUSTRALIA (128WC-012) Europe (128WC-012) | 808-897300-001A 808-897300-002A 808-897300-003A 808-897300-004A 808-897300-101A |
| 13. VersaGlide (Logitech TP2) | 808-897316-001A |
| 14. Sound Board Assembly | 158-057396-000B |
| 15. Fan | 808-876290-002A |
| 16. CPU 200MHz Assembly 233MHz Assembly 266MHz Assembly | 158-057398-000A 158-057398-001A 158-057398-002A |
| 17. HDD Compartment Cover (Cap) 17mm 12.5mm | 136-241429-101A 136-240831-103A |
| 18. Infrared Assembly | 808-876328-001A |
| 19. TV Compartment Cover (Cap) | 136-240910-101A |
| 20. Bridge Battery | 804-021205-003A |
| 21. Speaker/Buzzer | 802-870018-008A |
| 22. CMOS Battery (Lithium type CR2430) | 804-021107-003A |
| 23. LCD Indicator | 808-872191-005A |
| 24. Graph Board | 158-057395-000E |

This data was prepared January, 1998. For an up-to-date listing of spare parts, please call FaxFlash (888) 329-0088 (international (978) 635-6090) and order document number 42200282.

**Table 4-3 NEC Versa 6220/30/60 Field-Replaceable Parts
(cont'd)**

| Items Not Shown on IPB | Part Number |
|---|--|
| AC Power Cord-U.S. | 808-741299-001A |
| AC Power Cord-GERM | 808-741300-001A |
| AC Power Cord-U.K. | 808-741301-001A |
| AC Power Cord-AUSTRALIA | 808-741303-001A |
| AC Adapter | 808-891864-003A |
| Cable 13.3' XGA Assembly | 808-742928-001C |
| CD-ROM (20X) Assembly | 136-242043-001A |
| CD-ROM Carry Case | 158-032107-000 |
| Conn Cap Assembly | 136-240922-101A |
| Diskette Drive Assembly | 134-507049-0010 |
| Foot (tilt) | 136-628872-101A |
| Hard Drive 2.1 GB 3.2 GB (17mm) 4.X GB 5.X GB | OP-220-62008 OP-220-62010 OP-220-62012 OP-220-62011 |
| Hinge Cap (center) | 136-240921-101A |
| Hinge Cap (left) | 136-629333-101A |
| Hinge Cap (right) | 136-629334-101A |
| Insert Foam, End Cap (2 per box required) | 158-041039-000 |
| Inverter Assembly 13.3" XGA | 808-892091-001C |
| LCD Cover (XGA 13.3") Assembly | 136-240920-101A |
| LCD Top Cover (Keyboard Cover) Assembly | 136-242122-001A |
| LCD Panel (LCD 272, 13.3) | 808-876534-001A |
| Logo Badge (NEC) | 158-032256-000 |
| Main Battery | 804-021248-001A |
| Power Button | 136-628878-101A |
| Rubber Foot (SJ-5756 Banpon) (4 per) | 136-634031-A |
| Service and Reference Manual | 819-200282-001 |
| Shipping Carton | 158-041029-001 |
| Sound Cable | 808-876531-001A |
| User's Guide (U.S.) | 819-200279-001 |

| | |
|------------------------|-----------------|
| User's Guide (U.K.) | 819-200279-201 |
| User's Guide (Germany) | 819-200279-401 |
| Volume Knob | 136-629500-101A |

SERVICE INFORMATION

NEC service and information telephone numbers are listed in Table 4-4.

Table 4-4 NEC Service and Information Telephone Numbers

| Service | Call |
|--|--|
| To order NECCSD spare parts | In the U.S., call 1(800) 632-4525 |
| To order options in the U.S. | Local Sales Office |
| To access the NECCSD Electronic Bulletin Board System (BBS) | 1(978) 635-4706 |
| To download files - provides software drivers and the latest ROM BIOS | 1(978) 635-4706 |
| NECCSD Customer Service and Technical Support Center | In the U.S., call 1-800-632-4525 |
| <p>Listen to the automated attendant and select the appropriate menu to reach one of the following departments:</p> <p>Information Center — literature, dealer locations, sales leads, response to ads</p> <p>NSRC (National Service Response Center) — questions other than products, spare parts or technical support</p> <p>Service Contracts</p> | |
| NEC FaxFlash SM Service — automated service that sends the latest information about NEC products to the fax machine 24 hours a day | <p>In the U.S. and Canada, call 1(888) 329-0088</p> <p>Outside U.S., 1(978) 635-6090</p> |

TECHNICAL SUPPORT

NECCSD Customer Service Response Center provides an E-mail service for Internet users. Technical questions regarding NEC products can be sent over the Internet system to the Center. The Internet address is as follows:

tech-support@neccsd.com

If it is more convenient, questions may also be faxed to the Customer Service Response Center. The fax number is:

(978) 635-4666

Along with the complete product name and question(s), be sure to include your name and fax number or Internet address, so that an expert can respond to the question.

It would also help to include your telephone number in case the Customer Service Response Center can not get their answer to you. We will reply to all questions received by Internet or fax within one business day.

PRODUCT INFORMATION

NEC FaxFlash is an automated electronic information service used to obtain up-to-date product application notes, installation procedures, troubleshooting tips, data sheets, technical information bulletins, price lists, and other information.

Information can be obtained from the FaxFlash service 24 hours a day, 7 days a week. Using a touch-tone telephone, call the FaxFlash number, order the desired information through the automated attendant, and FaxFlash will automatically fax the information.

Catalogs that list the documents and the document numbers are available. Current catalogs include:

- Catalog 1 – Telephone Directory and information about Online Services
- Catalog 3 – Product specifications, warranty policy, UltraCare guidelines, and sales information
- Catalog 5 – Pro Serva and Express Server System technical support information
- Catalog 6 – NEC Ready System technical support information
- Catalog 7 – Powermate Systems technical support information
- Catalog 8 – NEC Portable System (including Versa Notebooks and MobilePro Handheld Personal computers) technical support information

ORDERING INFORMATION FROM FAXFLASH

Order information from FaxFlash as follows:

1. Check that the fax machine is on.
2. Locate the document part number.
3. Using a touch-tone telephone, call 1-888-329-0088 (U.S. and Canada only).

For international use, enter the international long distance access number, the U.S. telephone number, and the U.S. extension (1-978-635-6090).

4. Listen to the instructions provided by the automated attendant.

Press **1** to skip the FaxFlash introduction and jump to the automated instructions for ordering a document or catalog.

Press **2** for an introduction to FaxFlash, followed by the automated instructions for ordering a document or catalog.

5. When asked by the automated attendant, enter your fax number and telephone number.

For international use, first enter the international long distance access number (011), your country code, area code or city code, then your fax number.

The information requested will be sent automatically to your fax machine. If FaxFlash attempts to send the second order before the first order is completed, the order could be canceled. After three tries, FaxFlash assumes that the line is busy.

Appendix A

Connector Locations and Pin Assignments

Figure A-1 and Table A-1 show Graph board connectors. The remaining tables provide pin assignments for additional system connectors.

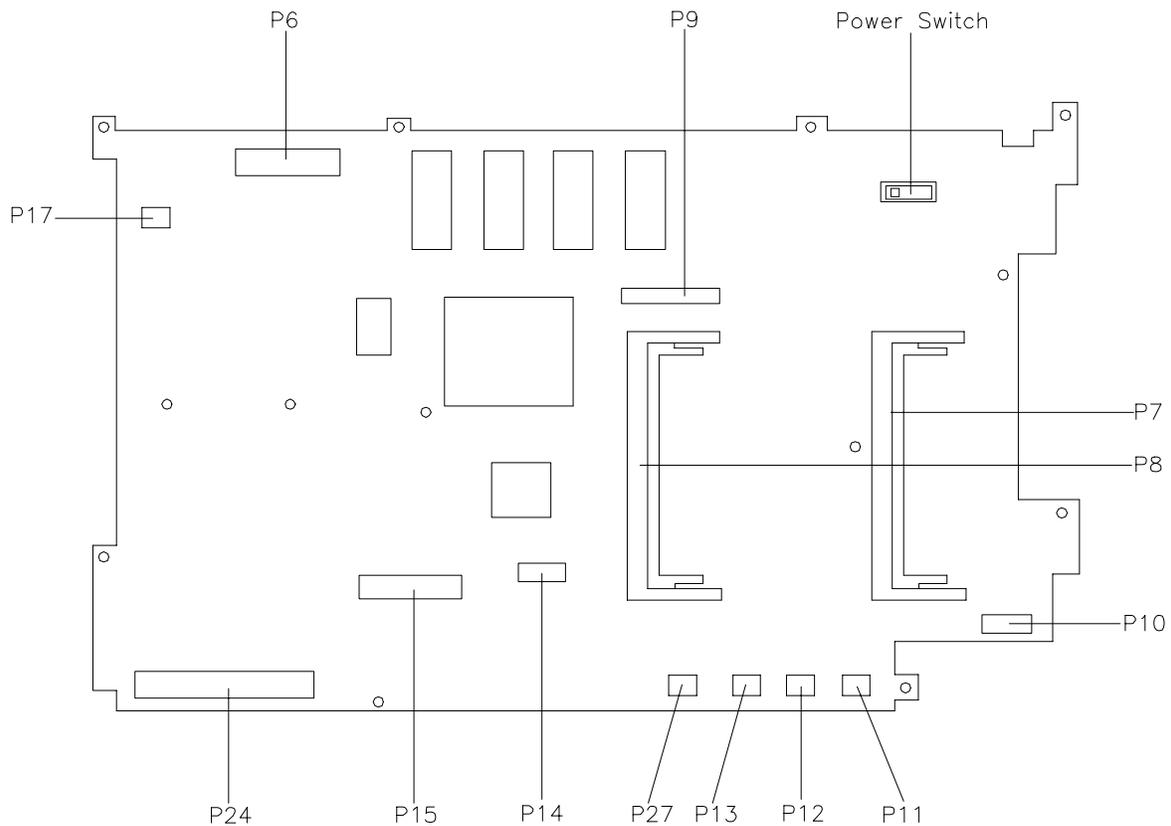


Figure A-1 Graph Board Layout

Table A-1 Graph Board Connectors

| Connector | Description |
|-----------|-------------------------------|
| P6 | LCD Screen |
| P7, P8 | DIMM Connectors |
| P9 | LCD Status Bar |
| P10 | Infrared Assembly Connector |
| P11 | Bridge Battery |
| P12 | Buzzer |
| P13 | CMOS Battery |
| P14 | VersaGlide Assembly Connector |
| P15 | Keyboard |
| P17 | Speaker Connector |
| P24 | Sound Board |
| P27 | VersaBay II |
| SW1 | Power Switch |
| SW2 | Suspend Switch |

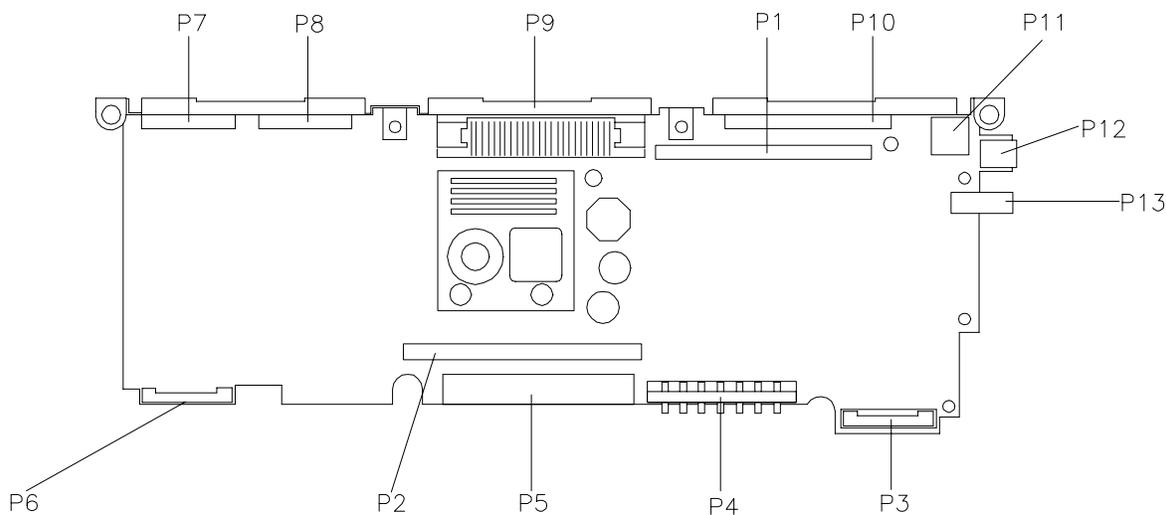


Figure A-2 I/O Board Layout

Table A-2 I/O Board Connectors

| Connector | Description |
|-----------|---------------------------------|
| P1 | Graph Board Connector |
| P2 | Graph Connector (opposite side) |
| P3 | Hard Drive Connector |
| P4 | Optional Battery Connector |
| P5 | VersaBay II Connector |
| P6 | Main Battery Connector |
| P7 | Serial Port Connector |
| P8 | External Monitor |
| P9 | Expansion Connector |
| P10 | Parallel Port |
| P11 | PS/2 Keyboard/Mouse Connector |
| P12 | AC Adapter Connector |
| P13 | TV Output Jack |

Table A-3 Keyboard/Mouse Connectors

| Pin | Signal |
|-----|----------------|
| 1 | Keyboard Data |
| 2 | Mouse Data |
| 3 | Ground |
| 4 | +5V |
| 5 | Keyboard Clock |
| 6 | Mouse Clock |

Table A-4 Serial Port Connector Pin Assignments

| Pin | Signal |
|-----|---------------------|
| 1 | Data Carrier |
| 2 | Receive Data |
| 3 | Transmit Data |
| 4 | Data Terminal Ready |
| 5 | Ground |
| 6 | Data Set Ready |
| 7 | Request to Send |
| 8 | Clear to Send |
| 9 | Ring Indicator |

Table A-5 CRT Connector Pin Assignments

| Pin | Signal |
|-----|------------------|
| 1 | Red |
| 2 | Green |
| 3 | Blue |
| 4 | OPT1 |
| 5 | Ground |
| 6 | Ground |
| 7 | Ground |
| 8 | Ground |
| 9 | +5V PnP VESA Vcc |
| 10 | Ground |
| 11 | OPT2 |
| 12 | PnP VESA Data |
| 13 | Horizontal Sync |
| 14 | Vertical Sync |
| 15 | PnP VESA Clock |

Table A-6 Parallel Printer Pin Assignments

| Pin | Signal |
|-----|---------------|
| 1 | - Strobe |
| 2 | Data Bit 0 |
| 3 | Data Bit 1 |
| 4 | Data Bit 2 |
| 5 | Data Bit 3 |
| 6 | Data Bit 4 |
| 7 | Data Bit 5 |
| 8 | Data Bit 6 |
| 9 | Data Bit 7 |
| 10 | - Acknowledge |
| 11 | Busy |
| 12 | PE |
| 13 | Select |

Table A-6 Parallel Printer Pin Assignments

| Pin | Signal |
|--------|----------------|
| 14 | - Auto Feed XT |
| 15 | - Error |
| 16 | - Initialize |
| 17 | - Select In |
| 18 -25 | Ground |

Table A-7 Power Connector

| Pin | Signal |
|-----|--------|
| 1 | Ground |
| 2 | DCSYS |
| 3 | DCCHG |

Table A-8 Hard Disk Drive Connector

| Pin | Signal |
|-----|----------------|
| 1 | HDD Access LED |
| 2 | +5V |
| 3 | Chip Select 0 |
| 4 | +5 |
| 5 | Chip Select 1 |
| 6 | +5V |
| 7 | Address 0 |
| 8 | +5V |
| 9 | Address 2 |
| 10 | +5V |
| 11 | Address 1 |
| 12 | +5V |
| 13 | Diagnostic |
| 14 | Not Used |
| 15 | IRQ |
| 16 | Not Used |
| 17 | Not Used |

Table A-8 Hard Disk Drive Connector

| Pin | Signal |
|------------|------------------|
| 18 | IO Channel Ready |
| 19 | MS Select |
| 20 | IO Write |
| 21 | I/O Read |
| 22 | Not Used |
| 23 | Data0 |
| 24 | Data1 |
| 25 | Data15 |
| 26 | Data14 |
| 27 | Data2 |
| 28 | Data13 |
| 29 | Data3 |
| 30 | Not Used |
| 31 | Data12 |
| 32 | Ground |
| 33 | Data4 |
| 34 | Ground |
| 35 | Data4 |
| 36 | Ground |
| 37 | Data5 |
| 38 | Ground |
| 39 | Data10 |
| 40 | Ground |
| 41 | Data6 |
| 42 | Ground |
| 43 | Data9 |
| 44 | Ground |
| 45 | Data7 |
| 46 | Not Used |
| 47 | Ground |
| 48 | Ground |
| 49 | RESET |
| 50 | Ground |

Appendix B

Video Modes

The following tables list NEC Versa system video modes.

**Table B-1 LCD Display Mode Setting
(1024x768 TFT Color LCD and Simultaneous CRT Display)
Standard Video Mode**

| Mode | Mode Type | Display Mode | Pixel Resolution | Colors | Display Fonts | Font Size | Video Memory (KB) |
|------|-----------|--------------|------------------|----------|---------------|-----------|-------------------|
| 0 | Text | CGA | 320x200 | 16(gray) | 40x25 | 8x8 | 256 |
| | | EGA | 320x350 | 16(gray) | 40x25 | 8x14 | 256 |
| | | VGA | 360x400 | 16 | 40x25 | 9x16 | 256 |
| 1 | Text | CGA | 320x200 | 16 | 40x25 | 8x8 | 256 |
| | | EGA | 320x350 | 16 | 40x25 | 8x14 | 256 |
| | | VGA | 360x400 | 16 | 40x25 | 9x16 | 256 |
| 2 | Text | CGA | 640x200 | 16(gray) | 80x25 | 8x8 | 256 |
| | | EGA | 640x350 | 16(gray) | 80x25 | 8x14 | 256 |
| | | VGA | 720x400 | 16 | 80x25 | 9x16 | 256 |
| 3 | Text | CGA | 640x200 | 16 | 80x25 | 8x8 | 256 |
| | | EGA | 640x350 | 16 | 80x25 | 8x14 | 256 |
| | | VGA | 720x400 | 16 | 80x25 | 9x16 | 256 |
| 4 | Graph | All | 320x200 | 4 | 40x25 | 8x8 | 256 |
| 5 | Graph | CGA | 320x200 | 4(gray) | 80x25 | 8x8 | 256 |
| | | EGA | 320x200 | 4(gray) | 80x30 | 8x8 | 256 |
| | | VGA | 320x200 | 4 | 80x30 | 8x8 | 256 |
| 6 | Graph | All | 640x200 | 2 | 80x25 | 8x8 | 256 |
| 7 | Text | MDA | 720x350 | Mono | 80x25 | 9x14 | 256 |
| | | EGA | 720x350 | Mono | 80x25 | 9x14 | 256 |
| | | VGA | 720x400 | Mono | 80x25 | 9x16 | 256 |
| D | Graph | E/VGA | 320x200 | 16 | 40x25 | 8x8 | 256 |
| E | Graph | E/VGA | 640x200 | 16 | 80x25 | 8x8 | 256 |
| F | Graph | E/VGA | 640x350 | Mono | 80x25 | 8x14 | 256 |
| 10 | Graph | E/VGA | 640x350 | 16 | 80x25 | 8x14 | 256 |
| 11 | Graph | VGA | 640x480 | 2 | 80x30 | 8x16 | 256 |
| 12 | Graph | VGA | 640x480 | 16 | 80x30 | 8x16 | 256 |
| 13 | Graph | VGA | 320x200 | 256 | 40x25 | 8x8 | 256 |

NOTE: 200-, 350-, and 400-line modes are converted to 768 lines by the BIOS.

200-line mode (0, 1, 2, 3, 4, 5, 6, D, E, 10, 13) is converted to 400-line mode with double scan.

Table B-2 Frequency Table for Standard Video Mode

| Display Mode | Dot Clock (MHz) | Horiz. Freq. (KHz) | Vert. Freq. (Hz) |
|-------------------|-----------------|--------------------|------------------|
| LCD Only Mode | 65 | 48.3 | 60 |
| Simultaneous Mode | 65 | 48.3 | 60 |

Table B-3 Expanded Video Mode

| Mode | Mode Type | Memory Org | Pixel Resolution | Color | Display Fonts | Font Size | Video Memory (KB) |
|------|-----------|------------|------------------|-------|---------------|-----------|-------------------|
| 30 | Graph* | Pack Pix | 640x480 | 256 | 80x30 | 8x16 | 512 |
| 31 | Graph* | Pack Pix | 640x400 | 256 | 80x25 | 8x16 | 256 |
| 32 | Graph* | Pack Pix | 800x600 | 256 | 100x37 | 8x16 | 512 |
| 34 | Graph* | Pack Pix | 1024x768 | 256 | 128x48 | 8x16 | 1024 |
| 40 | Graph* | Pack Pix | 640x480 | 32K | 80x30 | 8x16 | 1024 |
| 41 | Graph* | Pack Pix | 640x480 | 64K | 80x30 | 8x16 | 1024 |
| 42 | Graph* | Pack Pix | 800x600 | 32K | 100x37 | 8x16 | 1024 |
| 43 | Graph* | Pack Pix | 800x600 | 64K | 100x37 | 8x16 | 1024 |
| 44 | Graph* | Pack Pix | 1024x768 | 32K | 128x48 | 8x16 | 1536 |
| 45 | Graph* | Pack Pix | 1024x768 | 64K | 128x48 | 8x16 | 1536 |
| 64 | Graph | Planer | 1024x768 | 16 | 128x48 | 8x16 | 512 |
| 6A | Graph | Planar | 800x600 | 16 | 100x37 | 8x16 | 256 |
| 70 | Graph | Pack Pix | 640x480 | 256 | 80x30 | 8x16 | 512 |
| 71 | Graph | Pack Pix | 640x400 | 256 | 80x25 | 8x16 | 256 |
| 72 | Graph | Pack Pix | 800x600 | 256 | 100x37 | 8x16 | 512 |
| 74 | Graph | Pack Pix | 1024x768 | 256 | 128x48 | 8x16 | 1024 |

*Linear Addressing Mode.

NOTE: 200-, 350-, and 400-line modes are converted to 768 lines by the BIOS.
200-line mode (0, 1, 2, 3, 4, 5, 6, D, E, 10, 13) is converted to 400-line mode with double scan.

Table B-4 Frequency Table of Extended Video Mode

| Display Mode | Dot Clock (MHz) | Horizontal Frequency (KHz) | Vertical Frequency (Hz) |
|-------------------|-----------------|----------------------------|-------------------------|
| LCD Only Mode | 65 | 48.3 | 60 |
| Simultaneous Mode | 65 | 48.3 | 60 |

Table B-5 CRT Display Mode Setting (CRT-Only Display)

| Mode | Mode Type | Display Mode | Pixel Resolution | Colors | Display Fonts | Font Size | Dot Clock (MHz) | Horiz. Freq. (KHz) | Vert. Freq. (Hz) | Video Memory (KB) |
|------|-----------|--------------|------------------|-----------|---------------|-----------|-----------------|--------------------|------------------|-------------------|
| 0 | Text | CGA | 320x200 | 16 (gray) | 40x25 | 8x8 | 25.175 | 31.5 | 70 | 256 |
| | | EGA | 320x350 | 16 (gray) | 40x25 | 8x14 | 25.175 | 31.5 | 70 | 256 |
| | | VGA | 360x400 | 16 | 40x25 | 9x16 | 28.322 | 31.5 | 70 | 256 |
| 1 | Text | CGA | 320x200 | 16 | 40x25 | 8x8 | 25.175 | 31.5 | 70 | 256 |
| | | EGA | 320x350 | 16 | 40x25 | 8x14 | 25.175 | 31.5 | 70 | 256 |
| | | VGA | 360x400 | 16 | 40x25 | 9x16 | 28.322 | 31.5 | 70 | 256 |
| 2 | Text | CGA | 640x200 | 16 (gray) | 80x25 | 8x8 | 25.175 | 31.5 | 70 | 256 |
| | | EGA | 640x350 | 16 (gray) | 80x25 | 8x14 | 25.175 | 31.5 | 70 | 256 |
| | | VGA | 720x400 | 16 | 80x25 | 9x16 | 28.322 | 31.5 | 70 | 256 |
| 3 | Text | CGA | 640x200 | 16 | 80x25 | 8x8 | 25.175 | 31.5 | 70 | 256 |
| | | EGA | 640x350 | 16 | 80x25 | 8x14 | 25.175 | 31.5 | 70 | 256 |
| | | VGA | 720x400 | 16 | 80x25 | 9x16 | 28.322 | 31.5 | 70 | 256 |
| 4 | Graph | All | 320x200 | 4 | 40x25 | 8x8 | 25.175 | 31.5 | 70 | 256 |
| 5 | Graph | CGA | 320x200 | 4 (gray) | 80x25 | 8x8 | 25.175 | 31.5 | 70 | 256 |
| | | EGA | 320x200 | 4 (gray) | 80x30 | 8x8 | 25.175 | 31.5 | 70 | 256 |
| | | VGA | 320x200 | 4 | 80x30 | 8x8 | 25.175 | 31.5 | 70 | 256 |
| 6 | Graph | All | 640x200 | 2 | 80x25 | 8x8 | 25.175 | 31.5 | 70 | 256 |
| 7 | Text | MDA | 720x350 | Mono | 80x25 | 9x14 | 28.322 | 31.5 | 70 | 256 |
| | | EGA | 720x350 | Mono | 80x25 | 9x14 | 28.322 | 31.5 | 70 | 256 |
| | | VGA | 720x400 | Mono | 80x25 | 9x16 | 28.322 | 31.5 | 70 | 256 |
| D | Graph | E/VGA | 320x200 | 16 | 40x25 | 8x8 | 25.175 | 31.5 | 70 | 256 |
| E | Graph | E/VGA | 640x200 | 16 | 80x25 | 8x8 | 25.175 | 31.5 | 70 | 256 |
| F | Graph | E/VGA | 640x350 | Mono | 80x25 | 8x14 | 25.175 | 31.5 | 70 | 256 |
| 10 | Graph | E/VGA | 640x350 | 16 | 80x25 | 8x14 | 25.175 | 31.5 | 70 | 256 |
| 11 | Graph | VGA | 640x480 | 2 | 80x30 | 8x16 | 25.175 | 31.5 | 60 | 256 |
| 12 | Graph | VGA | 640x480 | 16 | 80x30 | 8x16 | 25.175 | 31.5 | 60 | 256 |
| 13 | Graph | VGA | 320x200 | 256 | 40x25 | 8x8 | 25.175 | 31.5 | 70 | 256 |

NOTE: 200, 350 and 400 line modes are converted to 768 lines by the BIOS.
200-line mode (0, 1, 2, 3, 4, 5, 6, D, E, 10, 13) is converted to 400-line mode with double scan.

Table B-6 Extended Video Mode

| Mode | Mode Type | Memory Org | Pixel Resolution | Color | Display Fonts | Font Size | Dot Clock (MHz) | Horiz. Freq. (KHz) | Vert. Freq. (Hz) | Video Memory (KB) |
|------|-----------|------------|------------------|-------|---------------|-----------|----------------------|----------------------|------------------|-------------------|
| 30 | Graph* | Pack Pix | 640x480 | 256 | 80x30 | 8x16 | 25.175 31.5 36 | 31.5 37.5 43.3 | 60 75 85 | 512 |
| 31 | Graph* | Pack Pix | 640x400 | 256 | 80x25 | 8x16 | 25.175 | 31.5 | 70 | 256 |
| 32 | Graph* | Pack Pix | 800x600 | 256 | 100x37 | 8x16 | 40 49.5 56.25 | 37.9 46.9 53.7 | 60 75 85 | 512 |
| 34 | Graph* | Pack Pix | 1024x768 | 256 | 128x48 | 8x16 | 65 78.75 94. | 48.4 60 68.7 | 60 75 85 | 1024 |
| 38 | Graph* | Pack Pix | 1280x1024 | 256 | 160x64 | 8x16 | 78.75 | 47 | 43(l) | 1280 |
| 40 | Graph* | Pack Pix | 640x480 | 32K | 80x30 | 8x16 | 25.175 31.5 36 | 31.5 37.5 43.3 | 60 75 85 | 1024 |
| 41 | Graph* | Pack Pix | 640x480 | 64K | 80x30 | 8x16 | 25.175 31.5 36 | 31.5 37.5 43.3 | 60 75 85 | 1024 |
| 42 | Graph* | Pack Pix | 800x600 | 32K | 100x37 | 8x16 | 40 49.5 56.25 | 37.9 46.9 53.7 | 60 75 85 | 512 |
| 43 | Graph* | Pack Pix | 800x600 | 64K | 100x37 | 8x16 | 40 49.5 56.25 | 37.9 46.9 53.7 | 60 75 85 | 512 |
| 44 | Graph* | Pack Pix | 1024x768 | 32K | 128x48 | 8x16 | 65 78.75 | 48.4 60 | 60 75 | 1536 |
| 45 | Graph* | Pack Pix | 1024x768 | 64K | 128x48 | 8x16 | 65 78.75 | 48.4 60 | 60 75 | 1536 |
| 50 | Graph* | Pack Pix | 640x480 | 16M | 80x30 | 8x16 | 25.175 31.5 36 | 31.5 37.5 43.3 | 60 75 85 | 1024 |
| 52 | Graph* | Pack Pix | 800x600 | 16M | 100x37 | 8x16 | 40 | 37.9 | 60 | 1536 |
| 6A | Graph | Planar | 800x600 | 16 | 100x37 | 8x16 | 40 49.5 56.25 | 37.9 46.9 53.7 | 60 75 85 | 256 |
| 64 | Graph | Planar | 1024x768 | 16 | 128x48 | 8x16 | 65 78.75 | 48.4 60 | 60 75 | 512 |
| 68 | Graph | Planar | 1280x1024 | 16 | 160x64 | 8x16 | 78.75 | 47 | 43(l) | 768 |
| 70 | Graph | Pack Pix | 640x480 | 256 | 80x30 | 8x16 | 25.175 31.5 36 | 31.5 37.5 43.3 | 60 75 85 | 512 |
| 71 | Graph | Pack Pix | 640x400 | 256 | 80x25 | 8x16 | 25.175 | 31.5 | 70 | 256 |
| 72 | Graph | Pack Pix | 800x600 | 256 | 100x37 | 8x16 | 40 49.5 56.25 | 37.9 46.9 53.7 | 60 75 85 | 512 |
| 74 | Graph | Pack Pix | 1024x768 | 256 | 128x48 | 8x16 | 65 78.75 | 48.4 60 | 60 75 | 1024 |
| 78 | Graph | Pack Pix | 1280x1024 | 256 | 160x64 | 8x16 | 78.75 | 47 | 43(l) | 768 |

*Linear Addressing Mode.

NOTE: 200-, 350-, and 400-line modes are converted to 768 lines by the BIOS.

200-line mode (0, 1, 2, 3, 4, 5, 6, D, E, 10, 13) is converted to 400-line mode with double scan.

Table B-7 Panning Video Mode for (1024x768 TFT Color LCD and Simultaneous CRT Display)

| Mode | Mode Type | Memory Org | Pixel Resolution | Color | Display Fonts | Font Size | Dot Clock (MHz) | Horiz. Freq. (KHz) | Vert. Freq. (Hz) | Video Memory (KB) |
|------|-----------|------------|-------------------------|-------|--------------------|-----------|-----------------|--------------------|------------------|-------------------|
| 38 | Graph* | Pack Pix | 1024x768 (1280x1024) | 256 | 128x48 (160x34) | 8x16 | 65 | 48.3 | 60 | 1280 |
| 68 | Graph | Planar | 1024x768 (1280x1024) | 16 | 128x48 (160x34) | 8x16 | 65 | 48.3 | 60 | 768 |
| 78 | Graph | Pack Pix | 1024x768 (1280x1024) | 256 | 128x48 (160x34) | 8x16 | 65 | 48.3 | 60 | 1280 |

*Linear Addressing Mode.

NOTE: 200-, 350-, and 400-line modes are converted to 768 lines by the BIOS.

200-line mode (0, 1, 2, 3, 4, 5, 6, D, E, 10, 13) is converted to 400-line mode with double scan.

Table B-8 NTSC/PAL TV Display Mode

| Mode | Mode Type | Display Fonts | Resolution | Font Size | Colors | Video Memory (KB) |
|-------|-----------|---------------|------------|-----------|--------|-------------------|
| 2+,3+ | Text | 80x25 | 640x400 | 8x16 | 16 | 256 |
| 12 | Graph | 80x30 | 640x480 | 8x16 | 16 | 256 |
| 13 | Graph | 40x25 | 320x200 | 8x8 | 256 | 256 |
| 30 | Graph* | 80x30 | 640x480 | 8x16 | 256 | 512 |
| 31 | Graph* | 80x25 | 640x400 | 8x16 | 256 | 256 |
| 40 | Graph* | 80x30 | 640x480 | 8x16 | 32K | 1024 |
| 41 | Graph* | 80x30 | 640x480 | 8x16 | 64K | 1024 |
| 50 | Graph* | 80x30 | 640x480 | 8x16 | 16M | 1024 |
| 71 | Graph* | 80x25 | 640x400 | 8x16 | 256 | 256 |

*Linear Addressing Mode.

Table B-9 Panning NTSC/PAL TV Display Mode

| Mode | Mode Type | Display Fonts | Resolution | Font Size | Colors | Video Memory (KB) |
|------|-----------|---------------|------------|-----------|--------|-------------------|
| 32 | Graph* | 100x37 | 800x600 | 8x16 | 256 | 512 |
| 34 | Graph* | 128x48 | 1024x768 | 8x16 | 256 | 1024 |
| 42 | Graph* | 100x37 | 800x600 | 8x16 | 32K | 1024 |
| 43 | Graph* | 100x37 | 800x600 | 8x16 | 64K | 1024 |
| 44 | Graph* | 128x48 | 1024x768 | 8x16 | 32K | 1536 |
| 45 | Graph* | 128x48 | 1024x768 | 8x16 | 64K | 1536 |
| 52 | Graph* | 100x37 | 800x600 | 8x16 | 16M | 1536 |
| 6A | Graph | 100x37 | 800x600 | 8x16 | 16 | 256 |
| 64 | Graph | 128x48 | 1024x768 | 8x16 | 16 | 512 |
| 72 | Graph | 100x37 | 800x600 | 8x16 | 256 | 512 |
| 74 | Graph | 128x48 | 1024x768 | 8x16 | 256 | 1024 |

*Linear Addressing Mode.

NOTE: Actual display resolution is 640x480 on TV.

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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.



This is a Class B Digital Device. 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.

To meet FCC standards, shielded cables and power cords are required to connect this device to a personal computer or other Class B certified device.

Canadian Department of Communications Compliance Statement

This equipment does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio interference Regulations of the Canadian Department of Communications.

Avis de conformité aux normes du ministère des Communications du Canada

Cet appareil respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

European Community Directive Conformance Statement

This product is in conformity with the protection requirements of EC Council Directive 89/336/EEC on the approximation of laws of the Member States relating to electro-magnetic compatibility. This product satisfied the Class B limits of EN 55022.

NEC Computer Systems Division, Packard Bell NEC, Inc.
1414 Massachusetts Avenue
Boxborough, Massachusetts 01719
1-800-632-4525

BATTERY REPLACEMENT

A lithium CMOS clock 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. Have an authorized NEC service representative replace the battery.

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

The bridge battery is made of nickel metal hydride (NiMH). The main battery and CMOS battery are made of lithium-ion (Li-Ion).

Contact your local waste management officials for other information regarding the environmentally sound collection, recycling, and disposal of the batteries. For additional information on the proper collection or disposal of rechargeable batteries, please call 1-800-8-BATTERY.