

## **PROPRIETARY NOTICE AND LIABILITY DISCLAIMER**

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

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

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

Versa is a U.S. registered trademark of NEC Technologies, Inc.

FastFacts, and NEC SVGA, are U.S. trademarks of NEC Technologies, Inc.

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

First Printing — September 1996

Copyright 1996  
NEC Technologies, Inc.  
1414 Massachusetts Avenue  
Boxborough, MA 01719  
All Rights Reserved

Copyright 1996  
NEC Corporation  
7-1 Shiba 5-Chome, Minato-Ku  
Tokyo 108-01, Japan  
All Rights Reserved

# Preface

This service and reference manual contains the technical information necessary to set up, and maintain the NEC Versa<sup>®</sup> 2400 Series notebook computer. It also provides hardware and interface information for users who need an overview of the system's 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 — Introduction**, provides an overview of the hardware and interface components.

**Section 2 — General Specifications**, lists system specifications including dimensions, weight, environment, safety compliance, and power consumption.

**Section 3 — Hardware Functional Overview**, defines major system functions and subsystems.

**Section 4 — Field Service Guidelines**, provides system disassembly procedures, and an exploded-view diagram with corresponding part numbers.

**Section 5 — Troubleshooting and Repair**, lists technical support phone numbers, error messages and their meanings, and ways to troubleshoot the notebook.

**Appendix A — Video Modes**, provides a list of video modes available for use with the notebook.

An **Index** is included for convenience.

---

---

# Contents

Preface.....	xi
Abbreviations.....	xiii
 <b>Section 1 Introduction</b>	
Feature Highlights.....	1-2
System Configuration.....	1-3
Quick Tour of the Notebook.....	1-4
Main Components.....	1-4
Color LCD Display Panel.....	1-4
Power Switch/LCD Cover Switch.....	1-4
Status Panel and Power Indicator.....	1-5
Keyboard.....	1-5
VersaGlide.....	1-7
Memory Slot Compartment.....	1-7
The Right Side Of the Notebook.....	1-8
Built-in Floppy Disk Drive.....	1-8
PCMCIA Slot Compartment.....	1-8
Hard Disk Drive Compartment.....	1-9
Front of the Notebook.....	1-9
Battery Compartment.....	1-9
Left Side of the Notebook.....	1-10
DC-IN Connector Jack.....	1-10
Hardware Reset Switch.....	1-10
The Rear of the Notebook.....	1-11
External Keyboard and PS/2 Mouse Port.....	1-11
VGA Port.....	1-12
Printer Port.....	1-13
Serial Port (COM 1).....	1-13
Bottom of the Notebook.....	1-14
Battery Module Handle and Lock.....	1-14
ROM Memory Compartment Cover.....	1-14

---

System BIOS Setup Program ..... 1-14  
The Boot Setup Menu..... 1-15  
System Upgrades ..... 1-19  
Memory Upgrade Procedure ..... 1-19  
System BIOS Upgrade Procedure ..... 1-21

**Section 2 General Specifications**

Product Mix..... 2-6  
System Board Specifications ..... 2-7  
Transfer Board Specifications ..... 2-8  
Converter Board Specifications..... 2-8  
LED Indicator Board ..... 2-9  
I/O Board ..... 2-10  
LCD Inverter Board..... 2-12  
LED Status Indicators..... 2-13  
FDD Specification..... 2-13  
HDD Unit Specification ..... 2-14  
NiMH Battery Pack Specification..... 2-14  
DC/DC Converter & Battery Charger Specification..... 2-15  
Battery Charger ..... 2-15  
Keyboard ..... 2-16  
AC/DC Adapter ..... 2-16  
BIOS ..... 2-17  
Micro-Controller Function Description ..... 2-18  
Power Management Features (Mode Definition) ..... 2-19  
Power Management Features (Mode Transition) ..... 2-20  
Hot Key Definition..... 2-21  
Environmental Specification ..... 2-21  
Power Source ..... 2-22  
Vibration ..... 2-22  
Shock ..... 2-23  
Electro-static Discharge (ESD) ..... 2-23

---

---

### Section 3 Hardware Functional Overview

Functional Block Diagram.....	3-2
System BIOS .....	3-3
System Processor.....	3-3
Major Functional Blocks .....	3-3
System Logic Controller .....	3-4
Memory Subsystem.....	3-6
DRAM Memory.....	3-6
ROM Memory .....	3-6
I/O Subsystem .....	3-6
Video Subsystem .....	3-7
Video Chipset Controller .....	3-7
External VGA Capability.....	3-8
Keyboard Subsystem.....	3-8
PCMCIA Controller and Sockets .....	3-9
Hard Disk Subsystem.....	3-10
Floppy Disk Drive Subsystem .....	3-10
Pointing Device Subsystem .....	3-10
Power Subsystem.....	3-10
AC Power Adapter .....	3-11
Internal Battery Pack .....	3-11
Powerboard .....	3-11
LCD Inverter Board Assembly .....	3-11

### Section 4 Field Service Guidelines

Preventive Maintenance .....	4-1
Cleaning the Notebook's Exterior .....	4-1
Cleaning the Notebook's Interior .....	4-2
Protecting the Disk Drives .....	4-2
Handling the Computer Battery Packs.....	4-2
Maintaining the LCD Quality .....	4-3
Required Tools and Equipment .....	4-3
Parts Removal and Replacement Procedures .....	4-4
Removing/Replacing the Notebook Battery Pack .....	4-4
Removing/Replacing the Hard Disk Drive Module .....	4-5
Removing/Replacing the Floppy Disk Drive Module .....	4-5
Removing/Replacing the LCD Status Bar Cover and Hinges .....	4-6

---

Removing/Replacing the Keyboard.....	4-7
Removing/Replacing the Heat Plate.....	4-7
Removing/Replacing the CPU.....	4-7
Removing/Replacing the Cover-Display LCD Assembly Module.....	4-8
Removing/Replacing the System Top Cover Assembly and the VersaGlide Assembly.....	4-8
Removing/Replacing the LED Board.....	4-9
Removing/Replacing the System Board and I/O Board.....	4-10
Separating the System Board and I/O Board.....	4-11
Removing/Replacing the Power Board.....	4-12
NEC Versa 2400 Series Illustrated Parts Breakdown.....	4-13
Packaging and Documentation.....	4-16

## **Section 5 Troubleshooting and Repair**

Service Information.....	5-1
Technical Support.....	5-1
Product Information.....	5-2
Ordering Information from FastFacts.....	5-2
Helpful Starters.....	5-3
Power On Self Test (POST).....	5-4
POST Messages.....	5-4
Informational Messages.....	5-7
Run-time Error Messages.....	5-8
Quick Troubleshooting.....	5-9

## **Appendix A Video Modes**

### **List of Figures**

1-1	NEC Versa 2400 Series Notebook.....	1-1
1-2	System Configuration Diagram.....	1-3
1-3	Standard Keyboard Layout.....	1-5
1-4	VersaGlide.....	1-7
1-5	Memory Slot Compartment.....	1-7
1-6	Inserting a PCMCIA Card.....	1-8
1-7	Removing the Battery Pack.....	1-9
1-8	Left Side of the Notebook.....	1-10

---

---

1-9	Connecting the AC Adapter to the Notebook.....	1-10
1-10	The Rear Side of the Notebook.....	1-11
1-11	Connecting External Keyboard and Mouse.....	1-11
1-12	Connecting an External Monitor.....	1-12
1-13	Connecting to the Printer Port.....	1-13
1-14	Connecting to the Serial Port .....	1-13
1-15	The Boot Setup Menu.....	1-15
3-1	Functional Block Diagram.....	3-2
4-1	Hard Disk Drive Module Assembly .....	4-5
4-2	Floppy Drive Module Assembly .....	4-6
4-3	The LED Board Module Assembly.....	4-9
4-4	The System Board Module Assembly .....	4-10
4-5	The I/O Board Module Assembly .....	4-11
4-6	Power Board Module Assembly .....	4-12
4-7	NEC Versa 2400 Series Illustrated Parts Breakdown.....	4-15

**List of Tables**

1-1	Model Configurations .....	1-1
1-2	Feature Highlights.....	1-2
1-3	Fn Key Combination Summary.....	1-6
1-4	Boot Main Setup Menu.....	1-16
1-5	Boot Setup Peripherals Menu.....	1-17
1-6	Boot Setup Security Menu .....	1-17
1-7	Boot Setup Power Savings Menu.....	1-18
1-8	8 MB Memory Configurations.....	1-20
1-9	16 MB Memory Configurations.....	1-20
2-1	NEC Versa 2400 Series Specifications .....	2-1
2-2	Product Mix.....	2-6
2-3	Main Board Specifications.....	2-7
2-4	Transfer Board Specifications.....	2-8
2-5	Converter Board Specifications .....	2-8
2-6	LED Indicator Board Specifications .....	2-9
2-7	I/O Board Specifications .....	2-10
2-8	LCD Inverter Board Specifications.....	2-12

---

2-9	Status LED Descriptions .....	2-13
2-10	FDD Specifications .....	2-13
2-11	Hard Disk Drive Specifications.....	2-14
2-12	CD-ROM Reader Specifications.....	2-14
2-13	Battery Specifications.....	2-14
2-14	DC/DC Converter & Battery Charger .....	2-15
2-15	Battery Charger Specifications .....	2-15
2-16	Keyboard Specifications .....	2-16
2-17	AC/DC Adapter Specifications.....	2-16
2-18	BIOS Specifications .....	2-17
2-19	Micro-Controller Specifications.....	2-18
2-20	Power Management Modes .....	2-19
2-21	Mode Definitions .....	2-20
2-22	Hot Keys.....	2-21
2-23	Environmental Specifications.....	2-21
2-24	Power Specifications .....	2-22
2-25	Vibration Specifications .....	2-22
2-26	Shock Specifications .....	2-23
2-27	Electro-static Discharge (ESD) Specifications .....	2-23
4-1	NEC Versa 2400 Series Field-Replaceable Parts.....	4-13
4-2	Packaging and Documentation Part Numbers .....	4-16
5-1	NEC Service and Information Telephone Numbers.....	5-1
5-2	POST Error Messages.....	5-4
5-2	POST Error Messages.....	5-5
5-3	BIOS Informational Messages.....	5-7
5-4	Run-time Error Messages.....	5-8
5-5	Quick Troubleshooting.....	5-9
A-1	VGA Standard Modes (Text Mode) .....	A-1
A-2	VGA Standard Modes (Graphics Mode) .....	A-2
A-3	VGA Standard Modes (Planar Mode) .....	A-2
A-4	VGA Standard Modes (Packed Pixel Mode) .....	A-2
A-5	VGA Extended Modes (Text Mode) .....	A-3
A-6	VGA Extended Modes (4-Bit Linear Mode).....	A-3
A-7	VGA Extended Modes (8-Bit Linear Mode).....	A-3

---



A-8	VGA Extended Modes (15-Bit Linear Mode).....	A-3
A-9	VGA Extended Modes (16-Bit Linear Mode) - 1 MB Video Memory Only .....	A-4
A-10	VGA Extended Modes (24-Bit Linear Mode).....	A-4
A-11	VGA Extended Modes (Planar Mode).....	A-4
A-12	VGA Extended Modes (Packed Pixel Mode).....	A-4
A-13	VGA High Refresh Modes (Packed Pixel Mode).....	A-5
A-14	VGA High Refresh Modes (Planar Mode).....	A-5
A-15	VGA High Refresh Modes (Packed Pixel Mode).....	A-5

---

(For United States Use Only)

**FEDERAL COMMUNICATIONS COMMISSION  
RADIO FREQUENCY INTERFERENCE STATEMENT**

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

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from the one to which the receiver is connected.

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

(For Canadian Use Only)

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

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

---

## Abbreviations

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

---

IRR	Interrupt Request register	PCB	printed circuit board
ISA	Industry Standard Architecture	PFP	plastic flat package
ISR	In Service register	PIO	parallel input/output
I/O	input/output	pixel	picture element
IPC	integrated peripheral controller	PJQFP	plastic J-lead quad flat pack
ips	inches per second	PLCC	plastic lead chip carrier
IRQ	interrupt request	PLL	phase lock loop
K	kilo (1024)	p-p	peak-to-peak
k	kilo (1000)	PPI	programmable peripheral interface
KB	kilobyte	PROM	programmable ROM
kg	kilogram	QFP	quad flat pack
kHz	kilohertz	RAM	random-access memory
kV	kilovolt	RAMDAC	RAM digital-to-analog
lb	pound	RAS	row address strobe
LDTR	local descriptor table register	RGB	red green blue
LED	light-emitting diode	RGBI	red green blue intensity
LSB	least-significant bit	ROM	read-only memory
LSI	large-scale integration	rpm	revolutions per minute
M	mega	R	read
mA	milliamps	RTC	real-time clock
max	maximum	R/W	read/write
MB	megabyte	S	slave
MDA	Monochrome Display Adapter	SCSI	Small Computer System Interface
MFM	modified frequency modulation	SDLC	Synchronous Data Link Control
Mhz	megahertz	SG	signal ground
mm	millimeter	SOIC	small outline integrated circuit
ms	millisecond	SQFP	silver quad flat package
MSB	most-significant bit	SVGA	Super Video Graphics Array
NASC	National Authorized Service Center	SW	switch
NC	not connected	TCP	Thin chip package
NDP	numeric data processor	TQFP	Thin-quad flat package
NMI	Non-maskable Interrupt	TSC	Technical Support Center
ns	nanosecond	TTL	transistor/transistor logic
NSRC	National Service Response Center	tpi	tracks per inch
PAL	programmable array logic		
PC	personal computer		

---

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
$\mu\text{f}$	microfarad
$\mu\text{PD}$	microprocessor
$\mu\text{s}$	microsecond
$\Omega$	ohm

---

## Section 1

---

# Introduction

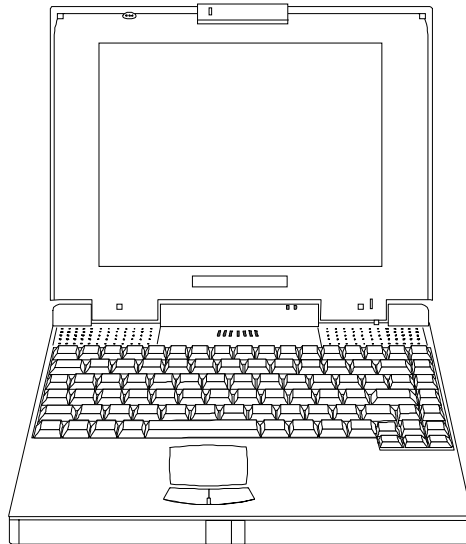
This section focuses on providing outline features and operations of the NEC Versa 2400 Notebook Computer Series, including the BIOS Setup program. (Refer to the User's Guide for more information how to operate the notebook.) The NEC Versa 2400 Series of notebooks are lightweight, compact, and fully IBM compatible.

The NEC Versa 2400 Notebook Series comes in the following model configurations.

**Table 1-1 Model Configurations**

Configuration	NEC Versa 240X	NEC Versa 240XCD*	NEC Versa 243XCD*
<b>CPU</b>	Intel P54CSLM-100	Intel P54CSLM-100	Intel P54CSLM-133
<b>On-Board DRAM</b>	8 MB	8 MB	16 MB
<b>Video Memory</b>	1 MB	1 MB	1 MB
<b>Hard Disk Drive</b>	810 MB	1 GB	1 GB
<b>Color LCD</b>	11.3" DSTN LCD	11.3" DSTN LCD	11.3" DSTN LCD
<b>Battery Pack</b>	A (3500mA NiMH)	A (3500mA NiMH)	A (3500Ma NiMH)

\* Models contain built-in CD-ROM readers



**Figure 1-1 NEC Versa 2400 Series Notebook**

---

## FEATURE HIGHLIGHTS

The NEC Versa 2400 notebook series includes a variety of innovative features designed to meet the most demanding computing requirements:

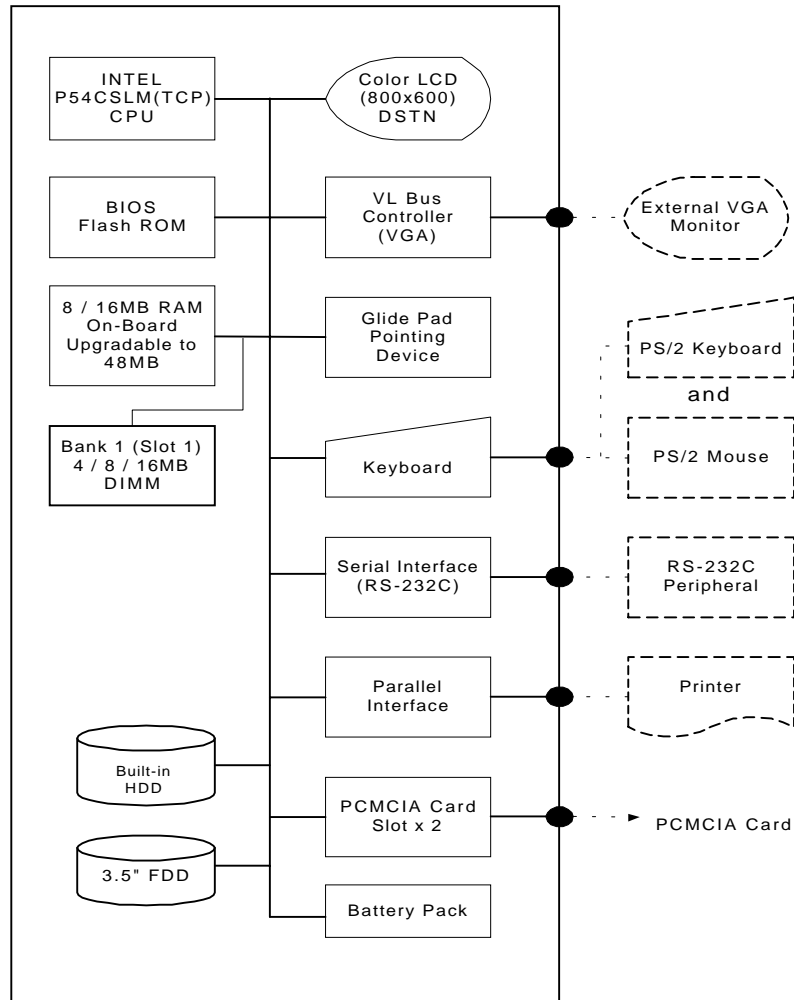
**Table 1-2 Feature Highlights**

<b>Features</b>	<b>Description</b>
<b>CPU</b>	Intel P54CSLM-100MHz (Intel P54CSLM-133MHz for 243X) processor with internal 16KB cache memory and math coprocessor
<b>Memory</b>	On-board 8MB RAM (16MB for NEC Versa 243XCD) and can be upgraded to 40MB
<b>Display</b>	11.3" DSTN VGA Color LCD at 600 x 800 pixels resolution with 256 colors
<b>VGA</b>	32-bit Video PCI bus VGA controller/ 1MB RAM Video Memory / Supports up to 1024 x 768 pixels resolution for external CRT monitor with 256 colors
<b>HDD</b>	Built-in 2.5-inch IDE high capacity hard drive (12.7mm height)
<b>FDD</b>	Built-in 3.5-inch 1.44MB floppy disk drive
<b>Keyboard</b>	Built-in 87/88-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
<b>Pointing Device</b>	VersaGlide
<b>PCMCIA Slot</b>	Two PCMCIA 2.1 card slots that support two Type II PC cards at the same time or one Type III and one Type II PC cards at the same time
<b>I/O Port</b>	1 x Serial Port (w/ FIFO) / 1 x Printer Port (ECP/EPP) / 1 x VGA Port / 1 x PS/2 keyboard & mouse port
<b>Power System</b>	Auto-switching AC Adapter (90V - 264V) / Rechargeable NiMH Battery pack / Advanced power management capabilities

---

## SYSTEM CONFIGURATION

The following diagram shows the NEC Versa 2400 system configuration.



**Figure 1-2 System Configuration Diagram**



## QUICK TOUR OF THE NOTEBOOK

Take a moment to become familiar with the locations and functions of all controls. It is recommended that you first go through the notebook's user guide for more information on how to operate all of the features.

### Main Components

This section describes the main features of the NEC Versa 2400 computer.

#### *Color LCD Display Panel*

Both the NEC Versa 240X and 243X series have a built-in 11.3" passive matrix dual scan DSTN color liquid crystal display (LCD) which you can adjust and tilt to your desired viewing position. The LCD provides 800x600 pixel resolution with a maximum of 256 colors, and supports simultaneous display with an external VGA monitor.

The LCD screen also uses Cold Cathode Fluorescent Tube (CCFT) backlighting which consumes most of the power from the notebook. To save battery power, the system has an advanced power management feature that powers down the LCD when it has not been used for a predetermined amount of time. You can adjust the brightness and contrast level of the LCD by pressing the "Fn" key (lower left corner) and the desired brightness or contrast keys (lower right corner) at the same time.

#### *Power Switch/LCD Cover Switch*

The power switch button, when pressed, turns on the notebook's power. Press it again to turn computer power off. Whenever the notebook is in "Save-to-file" suspend mode, the power switch button serves as a manual resume switch that allows you to continue your application work at the place you last left it before the suspend mode was activated.

---

**NOTE:** Always wait for a few seconds between turning off and turning on the power. Likewise, check to see if the power switch is turned off before installing the power supply.

---

On the top of the unit underneath the right hinge is the LCD cover switch button. This button automatically depresses and releases when you lower or raise the LCD display panel. Depending on your power management settings, this button will either switch the notebook to the Suspend mode or will shut off the LCD when you close the cover.

---

---

**NOTE:** If the NEC Versa 2400 has been left unused for a prolonged period of time the battery may become completely discharged. It will then be necessary for you to reconnect the AC adapter for approximately 30 minutes before the battery will begin to recharge normally.

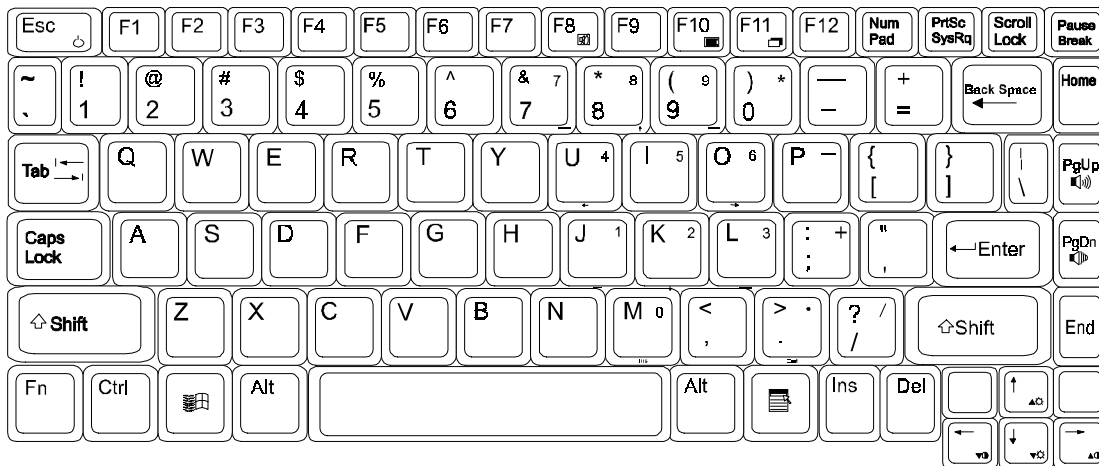
---

### **Status Panel and Power Indicator**

Directly below the LCD display, in the center near the right hinge, is the Suspend Mode LED Displays. These LEDs provide an easy way of determining what the power mode the unit is in at the moment. Below these two LEDs is a row of seven more. These LEDs will light to indicate whether a device is being accessed, whether an operation is being done, or if a certain mode is or has been activated.

### **Keyboard**

The notebook has a built-in 87/88-key keyboard that provides complete emulation of a full-sized IBM AT-enhanced keyboard with function keys and screen/cursor control keys.



**Figure 1-3 Standard Keyboard Layout**

The notebook keyboard includes an embedded numeric keypad, and some special function keys that are activated by pressing the **<Fn>** key together with another key. These special function keys (more popularly known as “hot keys”) allow you to control and adjust some of the notebook’s functions like; display controls, speaker volume, and power management features. The embedded numeric keypad is activated by pressing the **<Num Lock>** key. Once the **<Num Lock>** key is pressed the upper blue symbols will become active.

---

**NOTE:** Activating the Num Lock key will in turn disable the alphanumeric keys where the embedded keys are located. Press the **Num Lock** key again to disable the embedded keys and resume normal keyboard operation.

---

**Table 1-3 Fn Key Combination Summary**

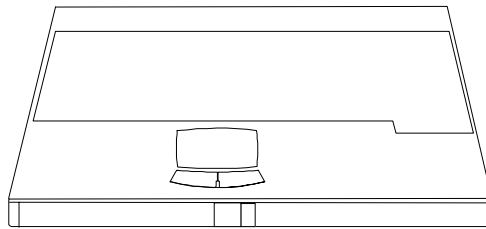
Key Combination	Function
<Fn> key + <Esc> key	This key combination puts the system in Suspend mode.
<Fn> key + <F8> key	This key combination mutes the speaker volume.
<Fn> key + <F10> key	This key combination toggles between video display output to the LCD display, to an external CRT monitor, or to a simultaneous display of LCD and CRT.
<Fn> key + <F11> key	This key combination toggles the LCD display backlighting (CCFT) on and off.
<Fn> key + <right> key	This key combination increases the contrast level.
<Fn> key + <left> key	This key combination decrease the contrast level.
<Fn> key + <Up> key	This key combination increase the brightness incrementally for the LCD.
<Fn> key + <Down> key	This key combination decreases the brightness incrementally for the LCD.
<Fn> key + <PgUp> key	This key combination increases the speaker volume level incrementally.
<Fn> key + <PgDn> key	This key combination decreases the speaker volume level incrementally.

The notebook's keyboard also features an embedded editing keypad, which offers an optional method for editing and moving within documents. The embedded editing keys are color coded in blue and embedded on the front side of the embedded numeric keypads. To use these editing keys, first press the **Num Lock** key and then combine the **Shift** key + the desired function key to enable these editing keys. When the embedded editing keys are operational, the Num Lock LED will be activated. To return to normal keyboard operation, press the **Num Lock** key again. When the Num Lock LED glows the embedded numeric key pads are activated.

---

### ***VersaGlide***

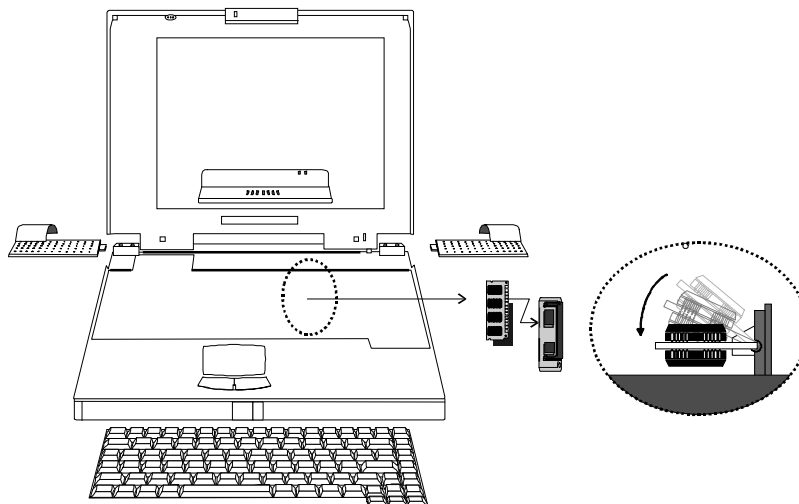
In front of the keyboard panel, in the center of the palm rest typing surface, is the VersaGlide pointing device. The buttons below the glide pad are configured (by default) as the left and right button respectively. While the button to the right is configured as the right button on the mouse. Moving the pointer on the screen is done by moving your finger over the surface and directing the pointer where you want it to go. The VersaGlide is compatible with the standard PS/2 mouse and can be activated using the normal DOS or Windows IBM or PS/2 mouse driver.



**Figure 1-4 VersaGlide**

### ***Memory Slot Compartment***

The memory compartment is located just under the keyboard. Inside the compartment are two extra memory module sockets which can accommodate any standard JEDEC 4MB, 8MB, and 16MB DIMM modules.



**Figure 1-5 Memory Slot Compartment**

## The Right Side of the Notebook

This section describes the features on the right side of the NEC Versa 2400 computer.

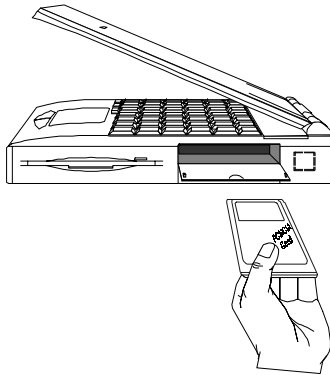
### ***Built-in Floppy Disk Drive***

On the right-front side of the notebook you will find the floppy disk drive which supports 3.5-inch 1.44MB high density (HD) diskettes or 720KB double-sided (DS) diskettes. Insert the floppy diskette with the metal shutter towards the drive and the diskette label facing up. To remove the floppy diskette, you press the eject button found on the upper right of the floppy disk drive.

### ***PCMCIA Slot Compartment***

The PCMCIA slot compartment houses two card slots that support two PCMCIA Type II devices or one Type III device. Open the compartment door to view the PCMCIA slots. Insert Type III cards into the lower slot. Insert the card with the pin sockets facing towards the drive and the label facing up. To remove the PCMCIA card, push on the eject button to release the pin connections and slowly pull out the card.

The NEC Versa 2400 Series also comes with DOS/Windows PCMCIA drivers for supporting various PCMCIA cards like modem cards, network cards, and other I/O and memory cards. The LED Status Bar, likewise, provides lights to indicate when the computer is accessing the inserted PCMCIA cards. The upper PCMCIA slot is referred to “**Slot 0**” while the bottom slot is referred to as “**Slot 1**”. Slot 0 always takes precedence over Slot 1 in drive designations.



**Figure 1-6** *Inserting a PCMCIA Card*

---

### ***Hard Disk Drive Compartment***

Just beside the floppy disk drive, and below the PCMCIA slots, is the notebook's internal hard drive. The NEC Versa 2400 provides industry standard 2.5-inch IDE hard disk drive at 810MB and 1GB. The System BIOS of the notebook also includes Auto IDE detection and LBA mode for easy installation as well as later upgrades for higher capacity disk drives.

### **Front of the Notebook**

This section describes the features on the front side of the NEC Versa 2400 computer.

### ***Battery Compartment***

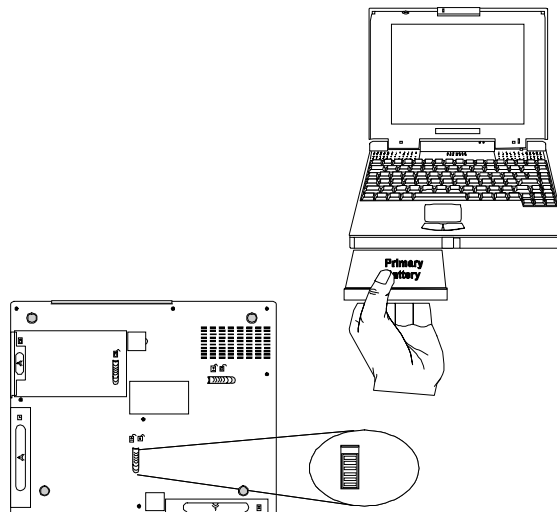
In the left front corner of the notebook is the battery compartment. It houses the rechargeable NiMH battery pack. The battery pack begins charging whenever you connect the AC adapter to the notebook. It is very important to always have the battery installed on the notebook, to have it always charged. Leaving the battery pack out of the unit for a long period of time will completely drain the battery cells.

To remove the battery pack from the compartment unit, push the battery compartment release lock and slowly pull out the battery pack.

---

**NOTE:** There are two types of battery packs for the NEC Versa 2400 Series. The NEC Versa 240X models uses Type A battery packs with 3500mA; while the NEC Versa 243X models uses Type B battery packs with 3500mA. Both battery packs are not interchangeable and may cause damage to the computer if swapped.

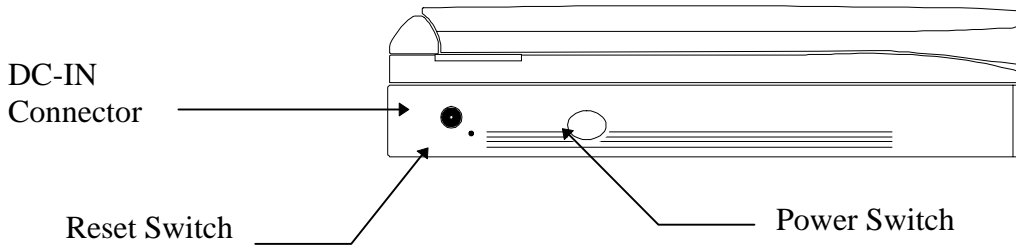
---



**Figure 1-7 Removing the Battery Pack**

## Left Side of the Notebook

The following details the left side of the NEC Versa 2400.



**Figure 1-8** *Left Side of the Notebook*

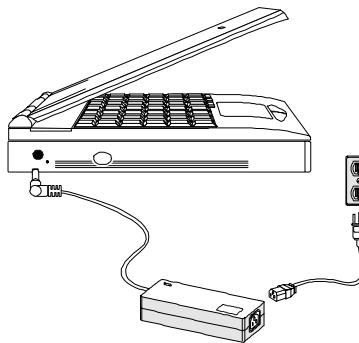
### **DC-IN Connector Jack**

To the left of the PCMCIA compartment, you will find a connector jack for the AC. The NEC Versa 2400 series provides a universal auto-switching AC adapter where you connect the AC power cord and into the power outlet. It is important to have the AC adapter connected to the notebook to recharge the battery and keep the notebook working continuously.

---

**NOTE:** Use only the AC adapter that comes with the NEC Versa 2400 notebook.

---



**Figure 1-9** *Connecting the AC Adapter to the Notebook*

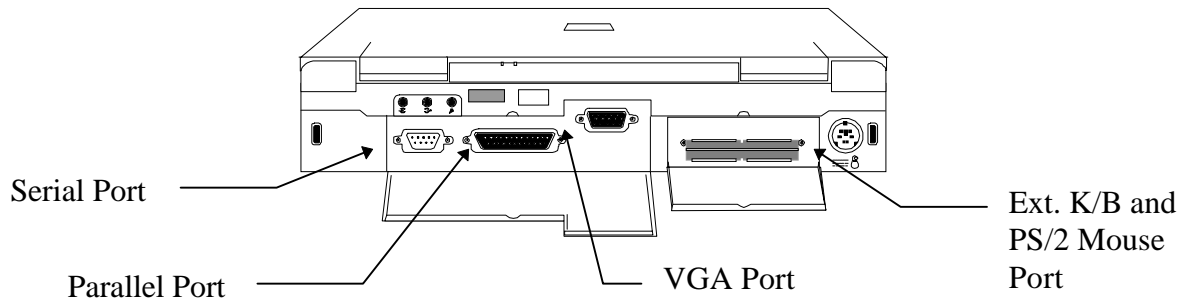
### **Hardware Reset Switch**

To the right of the AC adapter connector jack, you will notice a small hole which allows an easy alternative to resetting the notebook's hardware.

---

## The Rear of the Notebook

The following details the rear side of the NEC Versa 2400.

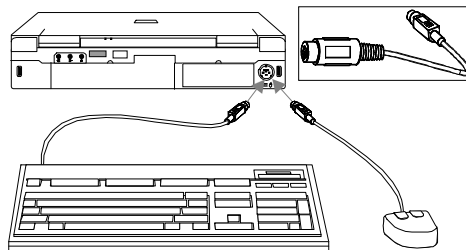


**Figure 1-10** The Rear Side of the Notebook

### External Keyboard and PS/2 Mouse Port

The external keyboard and PS/2 mouse port allows you to connect an external full-sized IBM AT-enhanced keyboard. When an external keyboard is connected, both the built-in keyboard of the notebook and the external keyboard can be used simultaneously.

The NEC Versa 2400 also provides a Y-connector adapter allowing simultaneous use of an external AT-enhanced keyboard and a PS/2 mouse. When the external PS/2 mouse is connected using the Y-connector, the built-in VersaGlide is disabled.



**Figure 1-11** Connecting External Keyboard and PS/2 Mouse

---

**NOTE:** When connecting an external PS/2 mouse, it is required that you power off the computer first before connecting the PS/2 mouse. This way, the system can detect the external PS/2 mouse and disable the built-in VersaGlide.

---



**VGA Port**

The 15-pin female VGA connector allows you to connect an external VGA monitor that supports up to 1024x768 pixels resolution. When displaying on the external VGA monitor alone, the VGA port can support resolution at 800x600 at 256 colors and 1024x768 at 16 colors for the NEC Versa 2400 and 640x480 at 64K colors, 800x600 at 256 colors, and 1024x768 at 256 colors for both the NEC Versa 2400 and 2430.

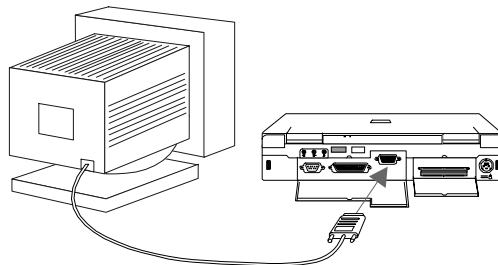
The NEC Versa 2400 series provides a VGA VESA driver diskette for installing different display resolution drivers for Windows Setup. You can also toggle the display between the LCD and the external monitor by pressing the **<Fn>** key + **<F10>** key combination.

---

**NOTE:** Even when set to 800x600 or 1024x768 resolution, the external monitor will only show 800x600 resolution if the computer is running at Simultaneous display. You need to toggle the display to the external monitor only in order to display higher resolution.

Refer also to Appendix A for a list of supported video modes.

---

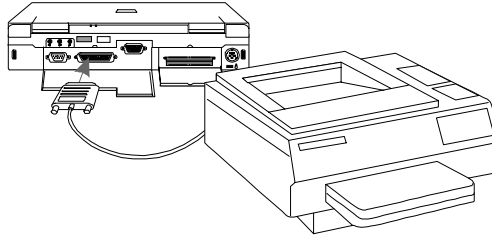


**Figure 1-12** Connecting an External Monitor

---

### **Printer Port**

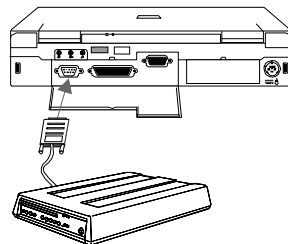
The 25-pin printer port provides a parallel interface to connect a parallel printer or pocket network adapter. Many operating systems and software applications refer to this port as LPT1. You can run the BIOS SETUP program to change the configuration of the parallel port to Standard or Bi-directional.



**Figure 1-13** Connecting to the Printer Port

### **Serial Port (COM 1)**

The 9-pin serial port provides a serial interface for a RS-232C device such as external serial modem. This port is commonly referred to as COM1.



**Figure 1-14** Connecting to the Serial Port

---

**NOTE:** First power off the system before connecting an external serial device. After turning on the power again, run the BIOS SETUP program if needed.

---

## **Bottom of the Notebook**

The following details the bottom of the NEC Versa 2400.

### ***Battery Module Handle and Lock***

To release the battery module from its compartment, push the battery compartment latch as indicated by the arrow marked on it. While doing this, hold the handle of the battery module and slowly pull it out from its compartment.

### ***ROM Memory Compartment Cover***

The ROM memory compartment cover is secured by tabs. Lift the cover with your fingernail to open this cover. Inside is the ROM chip. It is not necessary to remove this cover while performing normal service operations.

## **SYSTEM BIOS SETUP PROGRAM**

This section provides the outline features and operation of the Phoenix BIOS Setup program used in the NEC Versa 2400 Series. The BIOS (Basic Input-Output System) Setup program allows you to change the system configuration settings such as the current date and time, the disk drive and ports settings, and the power management as well.

As POST (Power-On Self Test) executes during boot up process, the screen will display the following message:

**Press F2 to Enter SETUP**

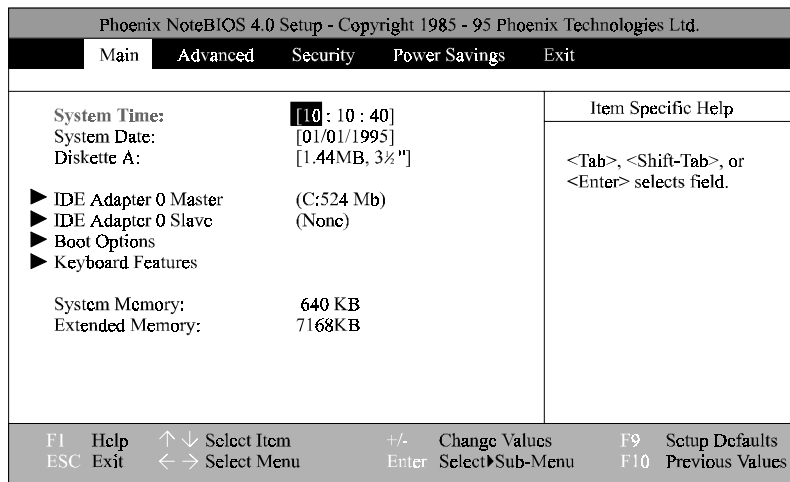
---

Press the **F2** key to run the BIOS Setup program. The BIOS Setup program is organized into two pages of menus. Change settings using the PgDn and PgUp keys. To move from one option to another, you use the up and down arrow keys while using the spacebar and - keys to change the settings.

To exit the BIOS Setup program, simply press the **Esc** key and select from the pop-up window whether you want to load the default values for all fields; save your changes and exit; or exit without saving any changes.

## THE BOOT SETUP MENU

The boot setup menu allows you to change the following configurations:



**Figure 1-15 The Bootup Setting Menu**

The boot setup menus let you configure system settings as listed in the following tables.

**Table 1-4 Boot Main Setup Menu**

Item	Function
System Time	This option allows you to change the system time, using the format <i>hour : minute : second</i> . You can change the system time here or from your operating system's command prompt.
System Date	This option allows you to change the system date, using the format <i>month day, year</i> . You can change the system date here or from your operating system's command prompt.
Diskette A	This option allows you to specify the type of diskette drive mounted inside the notebook. The default setting for this option is <i>3.5", 1.44MB disk drive</i> .
HDD LBA Mode	The NEC Versa 2400 supports LBA (logical block addressing) mode which is <i>Enabled</i> automatically for large capacity hard drives over DOS' limit of 528MB.
Hard Disk	<p>This option allows you to specify the type of hard drive mounted inside the notebook.</p> <p>Select the <i>Auto</i> option to instruct the BIOS to automatically detect the relevant parameters of the hard drive.</p> <p>Some hard drives, however, do not respond correctly to the values detected. In such cases, you must search and select, from the list, the make and model of the drive being used.</p>
Base Memory	This field reports the amount of base (or conventional) memory found by the BIOS during its POST. The value should not exceed or go below 640KB.
Extended Memory	This field reports the amount of extended memory found by the BIOS during POST. The value displayed is the amount of the memory address map. Because all models in the NEC Versa 2400 series have a minimum of 8MB of memory as the standard configuration, this value should not be less than 3072KB.
Boot Sequence	<p>This option allows you to configure the computer to which drive it will first try to look for the operating system.</p> <p>Select <i>A: then C:</i> if you want to boot from a diskette. If there is no diskette found in the floppy drive, the computer will then try to load the operating system from the hard drive.</p> <p>Select <i>C: then A:</i> if you want to boot from a hard drive. If there is no operating system found in the hard drive the computer will try to load the operating system from a floppy drive.</p> <p>Select <i>C: only</i> if the hard drive already holds an operating system and all necessary startup file configurations.</p>
Num Lock	This option allows you to toggle the Num Lock key on or off.
Keyboard Repeat Rate	This option allows you to select the auto-repeat key speed. Possible values include <i>2, 6, 10, 13.3, 18.5, 21.8, 26.7, or 30 seconds</i> .

**Table 1-5 Boot Setup Peripherals Menu**

Item	Function
<b>Serial Port</b>	This option allows you to configure the notebook's serial port as either (3F8-IRQ4), (2F8-IRQ3), (3E8-IRQ4), (2E8-IRQ3), or none. The default setting is (3F8-IRQ4).
<b>Infrared Serial Port</b>	This option allows you to configure the notebook's infrared serial port as either (3F8-IRQ4), (2F8-IRQ3), (3E8-IRQ4), (2E8-IRQ3), or none. The default is (2F8-IRQ3).
<b>Parallel Port</b>	This option allows you to configure the notebook's parallel port as either (378-IRQ5), (3BC-IRQ7), (278-IRQ5), (378-IRQ7), or none. The default is (378-IRQ7).
<b>Parallel Mode</b>	This option allows you to configure the notebook's parallel mode as either Unidirectional, Bi-directional, Enhanced, or ECP. The default is ECP.
<b>Diskette Controller</b>	This option allows you to disable the floppy disk controller.
<b>IDE Adapter</b>	This option allows you to disable the IDE adapter.

**Table 1-6 Boot Setup Security Menu**

Item	Function
<b>Password</b>	<p>This option allows you to limit access to the computer through the use of a password. If you select this option, a pop-up window will appear asking you to set or change the password. A password can be up to seven characters in length, and is cleared by eliminating the password with the F1 key.</p> <p><b>Note: If you forget the password of the computer, the only way to access the system again is to discharge the CMOS battery. See note below.</b></p>
<b>Set Password</b>	Press <Enter> to enter the Password.
<b>Password on Boot</b>	This option allows you to configure the Password to be enabled at the operating system level.
<b>Password on Resume</b>	<p>This option allows you to configure the Password to be enabled when resuming from the suspend mode.</p> <p>The CapsLock and ScrollLock LED's will flash in sequence for 30 seconds, indicating that the password is required to resume. The LED's will start flashing again as soon as a key is hit until a password is entered.</p>

---

**NOTE:** You can discharge the CMOS battery by simply unplugging the RTC CMOS battery from the connector CN11 of the motherboard. You must wait for 10 minutes before plugging in the battery again.

---

**Table 1-7 Boot Setup Power Savings Menu**

Item	Function
<b>Power Saving</b>	<p>This option allows you to enable or disable power management.</p> <p>Select <i>Disabled</i>, all other power management settings are ignored and disabled as well.</p> <p>Select <i>Disabled ON AC</i>, the power management is disabled only when the computer is powered by the AC adapter, but will enable the power management while on battery.</p> <p>Select Enabled, the power management is enabled all the time.</p>
<b>Standby Time-out</b>	<p>This option allows you to specify the length of time the system will be in the Idle Mode before entering the Standby Mode.</p> <p>Standby Mode Places the Serial, infrared and parallel ports, floppy drive, and hard drive into a power saving mode.</p> <p>Possible values include <i>Disabled, 1, 2, 4, 8, or 16 minutes</i>.</p>
<b>Auto Suspend Time-out</b>	<p>This option allows you to specify the length of time the system will be in the Standby Mode before entering the SUSPEND Mode.</p> <p>Possible values include <i>Disabled, 1, 2, 4, 8, or 16 minutes</i>.</p>
<b>SUSPEND Mode</b>	<p>This option allows you to enable SUSPEND Mode.</p> <p>Select <i>Save to File</i>, the computer will save data to the hard drive.</p> <p>It is important to have a hidden file on the hard drive when enabling this; otherwise an error message will appear on the display screen when the system restarts.</p> <p>Select <i>SUSPEND</i>, the computer will save data to RAM</p> <p>The computer will switch to the SUSPEND Mode after the preset time of inactivity. During this SUSPEND Mode the computer becomes inactive, all devices are in SUSPEND Mode, and the CPU is powered off.</p>

**Table 1-7 Boot Setup Power Savings Menu**

Item	Function
<b>Hard Disk Time-out</b>	<p>This option allows you to select a specific time-out value after which power to the hard drive is shut down. Possible values include <i>Disabled</i>, <i>1</i>, <i>2</i>, <i>4</i>, <i>8</i>, or <i>16 minutes</i>.</p> <p>When not disabled, the hard drive will shut off after the preset time of inactivity. The hard drive will activate again when the system tries to access it; this may cause a slight delay in the computer's operation as it waits for the hard drive to power up again.</p> <p>Set this option to <i>Disable</i> if you want the hard drive to always be spinning.</p>
<b>Video Time-out</b>	<p>This option allows you to specify a length of time the keyboard and mouse is inactive before the screen is turned off. Possible values include <i>Disabled</i>, <i>1</i>, <i>2</i>, <i>4</i>, <i>8</i>, or <i>16 minutes</i>.</p> <p>Note: If you use "screen saver" software, the <b>Video Monitor</b> should be set to <i>Disabled</i>.</p>
<b>Cover Switch Control</b>	<p>This option allows you to effectively program the type of event which occurs when the display panel is closed.</p> <p>Select <i>SUSPEND</i>, the computer enters the SUSPEND Mode when the LCD Panel is closed.</p> <p>Select <i>Backlight Off</i>, the system will power down the LCD when the LCD Panel is closed.</p>
<b>Serial Port Ring Resume</b>	<p>This option allows you to resume the system if an incoming call is received from the serial port modem.</p> <p>Select <i>Off</i>, the computer will not resume.</p> <p>Select <i>On</i>, the computer will resume.</p> <p>This feature does not apply to PCMCIA port modems.</p>

## SYSTEM UPGRADES

The NEC Versa notebook is easily upgradable to a higher capacity hard drive. In addition, you can add an optional second memory modules to increase the system memory to as much as 48MB. This section provides the settings needed as well as illustrations for upgrading the system.

## MEMORY UPGRADE PROCEDURE

The NEC Versa notebook allows you to install and expand the on-board 8MB system memory via the memory compartment found under the keyboard. Inside the compartment is an extra memory module socket which can accommodate any standard JEDEC 4MB, 8MB, and 16MB DIMM modules.



For NEC Versa 2400 Series Notebooks, the following memory configurations are applicable:

**Table 1-8 8 MB Memory Configurations**

<b>On-Board Memory</b>	<b>Extra Socket</b>	<b>Total Memory</b>
8MB	empty	8MB
8MB	8MB	16MB
8MB	16MB	24MB
8MB	24MB	32MB
8MB	32MB	40MB

**Table 1-9 16 MB Memory Configurations**

<b>On-Board Memory</b>	<b>Extra Socket</b>	<b>Total Memory</b>
16 MB	empty	16 MB
16 MB	8 MB	24 MB
16 MB	16 MB	32 MB
16 MB	32 MB	48 MB

To upgrade the memory in the notebook, follow the steps mentioned below:

1. Power off the computer and remove the AC adapter and battery pack.
  2. Remove the hinge covers, status bar cover, and the keyboard from the top of the unit and locate the memory expansion sockets.
  3. Remove the extra DIMM module from its anti-static wrapping.
  4. Hold the memory module with its golden teeth connector pointed towards the memory socket. Incline the module at 60-degrees and gently attached it to the memory socket by pushing it forward.
  5. Slowly push the module downwards until the locking tabs snap into the retaining notches or holes at each corner of the module.
  6. Replace the keyboard, status bar cover, and hinge covers.
  7. Reconnect the AC adapter and reattach the battery pack to the computer.
-

8. Power on the notebook and notice the BIOS error message informing you that the memory size stored in CMOS does not match the installed memory size. Press **F2** to run the **SETUP** program and save the CMOS settings anew. The computer will automatically adjust the memory size.

---

**NOTE:** If the notebook has been configured for save-to-disk, it may be necessary to run PHDisk to re-partition the drive. The save-to-disk partition must be of a size sufficient to store the content of the whole memory size.

---

## SYSTEM BIOS UPGRADE PROCEDURE

The NEC Versa 2400 Series supports the EPROM Flash BIOS that allows you to easily update the system BIOS using the Flash Programming utility program called “**PHLASH.COM & PLATFORM.BIN**”. Update the system BIOS whenever you are upgrading the LCD Panel or adding modifications to the computer’s hardware function. To upgrade the System BIOS:

1. Copy the **PHLASH.COM & PLATFORM.BIN** BIOS utility program and the BIOS ROM file to the hard disk subdirectory. You can also choose to run the program from the floppy diskette.
  2. Disable EMM386 or other memory manager programs before restarting the computer. When booting the DOS, press **F5** to bypass the **CONFIG.SYS** and **AUTOEXEC.BAT**. You may also choose to boot from Drive A: with a clean DOS diskette.
  3. At the DOS prompt, type “**PHLASH <BIOSfilename.ROM>**” to activate Flash BIOS programming utility. The computer will then prompt you again before starting to update the system BIOS. After programming is complete, the system will prompt you to reboot the computer to activate the new system BIOS.
-

## Section 2

---

# General Specifications

The following table lists NEC Versa 2400 Series system specifications.

**Table 2-1 NEC Versa 2400 Series Specifications**

ITEM	SPECIFICATION
CPU	Pentium P54CSLM-100MHz
	TCP Package
	Pentium P54CSLM-133MHz
	TCP Package
System RAM	8MB On-board
	Upgradeable to 40 MB on 240X model or 48 on 243X model
	Memory Modules: 8MB/16MB/24MB/32MB
RAM Module Slot	Two Slots
System Management	2M (256K x 8) Flash BIOS: Includes System and VGA Shadow BIOS Capability
Power Management	Operation Modes: Full On Mode Doze Mode Standby Mode 5V Suspend Mode 0-volt Suspend Mode Peripheral Automatic Power Down Cover Switch Support

---

**Table 2-1 NEC Versa 2400 Series Specifications**

<b>ITEM</b>	<b>SPECIFICATION</b>
Hard Disk Drive	Removable HDD Module  2.5-inch format / 12.7mm high  Enhanced IDE Interface  Support IDE PIO mode up to MODE 4  Support IDE MASTER MODE  810MB/1GB
CD-ROM	Removable CD-ROM Module  6x speed
Floppy Disk Drive	Removable FDD Module  720KB/1.44MB Mode Support (Overseas version)
Display	11.3" DSTN Color LCD Module:  800 x 600 in 256 colors  External CRT Capability:  640 x 480 in 64K colors  800 x 600 in 64K colors  1024 x 768 in 256 colors  LCD / CRT Display Simultaneously  32-bit PCI Bus  LCD / CRT Auto-Sense  32-bit Graphics Engine
Video RAM	1MB as Standard  5V EDO 60NS DRAM 40-Pin SOJ
PCMCIA Slots	Two Type II slots or one Type III slot  PCMCIA Socket compatible with CARD BUS standard
Pointing Device	Glide Pad  PS/2 Interface
Keyboard	Keyboard Layout:  US Layout - 87 Keys  European Layout - 88 Keys

**Table 2-1 NEC Versa 2400 Series Specifications**

ITEM	SPECIFICATION
Hot-Key	Fn + F8 = Volume Mute
Operation	Fn + Esc = Suspend Control  Fn + <right> = Contrast Up  Fn + <left> = Contrast Down  Fn + <Up> = Brightness Up  Fn + <Down> = Brightness Down  Fn + PgDn = Decrease Speaker Volume  Fn + PgUp = Increase Speaker Volume  Fn + F10 = CRT/LCD/Simul.  Fn + F11 = Backlight On/Off
I/O Port	25-pin Parallel Port 9-pin Serial Port 15-pin VGA Monitor Port External Keyboard or PS/2 Mouse Port NEC Y-Cable Support DC-IN Jack IR Port
Port Replicator	Support GAME port TV out External Keyboard External PS/2 Mouse Serial Port (COM1) Printer Port (LPT1)

**Table 2-1 NEC Versa 2400 Series Specifications**

ITEM	SPECIFICATION
Audio	Support external Stereo Headphone Jack  Support external Stereo Line-In Jack  Support external MIC. Jack  Two Built-in speakers  Built in microphone
Status Indicator	LED Display External LED Power ON & Battery Low (Blanking) 5V Suspend Mode (Blanking) Internal LED Battery Charge PCMCIA A/B Slot - Read / Write HDD / FDD / CDROM - Read / Write PMU - Enable Num Lock - Enable Caps Lock - Enable Scroll Lock - Enable
Power Supply	AC Adapter AC 100V to 240V, 47/63Hz, 36W (Max) Constant Power Output Dimensions: 120 (L) x 60 (W) x 36 (H) mm Battery Input Battery A: 10 long A-size 3500mA/hr Ni-MH Battery Cells, 12V (Total - 42W) Battery Fast Charge (Single Battery Pack) Machine On: 6 hours maximum Machine Off: 3 hours maximum
Heat Dissipation	Heat Pipe
Dimension	297mm (L) x 240mm (W) x 50.8mm (H)

**Table 2-1 NEC Versa 2400 Series Specifications**

ITEM	SPECIFICATION
Optional Items	External Battery Charger  Port Replicator
Key Components	11.3" Color DSTN SVGA LCD: LMG9910ZWCC Hitachi  CD-ROM: CDR-N16-P Sanyo, or CD-46E TEAC  810MB HDD or 1GB HDD  FDD, NEC FD1238H  Keyboard: 87/88 Key Full Size (Win95)  Controller: Mitsubishi M38813M4  Glide Pad: TM1002S-D Synaptics  Battery: Sanyo Ni-MH 1.2V, LA, HR 4 / 3  Audio Amplifier: ROHM BA7786FP  Micro Controller: Micro Chip PIC16C62  Clock:  Generator: ICS AV9154-43  Buffer: NS CGS74CT2524 & CGS74CT2525  Core Logic:  UMC 8891BF-N  UMC 8892BF-N  UMC 8886BF-N  VGA Chip: C&T 65548  Super I/O: NS PC87336VLJ  PCMCIA Controller: Omega 82C094 Decoder: Omega OM82C28  Power Switch: Micreel MIC2563-1  BIOS: Phoenix  IR Chip: TemicTFDS3000  Audio Chip: ESS 1788  Regulor: NS LP2952  RS232 Driver: MAXIUM MAX213  Flash ROM: AMD AM29F002T  PWM Controller: MAXIUM MAX797

## PRODUCT MIX

The following table lists the NEC Versa 2400 Series product mix.

**Table 2-2 Product Mix**

	<b>240XD (RT4)</b>	<b>240XCD (RT4CD)</b>	<b>243XCD (RT4CD)</b>
CPU	Pentium / 100MHz P54CSLM(TCP) / Intel	Pentium / 100MHz P54CSLM(TCP) / Intel	Pentium / 133MHz P54CSLM(TCP) / Intel
On-Board DRAM	8 MB	8 MB	16 MB
Video RAM	1 MB	1 MB	1 MB
HDD	810 MB	1 GB	1 GB
LCD	11.3" DSTN LCD	11.3" DSTN LCD	11.3" DSTN LCD
FDD	Removable	Removable	Removable
CD-ROM	None	6X	6X
Battery Pack	Type A  3500mAH NiMH	Type A  3500mAH NiMH	Type A  3500mAH NiMH
Pointing Device	Glide Pad	Glide Pad	Glide Pad
PCMCIA	2 x Type II / 1 x Type III	2 x Type II / 1 x Type III	2 x Type II / 1 x Type III
Keyboard	87/88 Keyboard (Win95)	87/88 Keyboard (Win95)	87/88 Keyboard (Win95)
EPP/ECP Parallel	Yes	Yes	Yes
Serial Port	Yes	Yes	Yes
VGA Port	Yes	Yes	Yes
PS/2 Port	Yes	Yes	Yes
DC-in Jack	Yes	Yes	Yes
Audio Port	Yes	Yes	Yes
IR Port	Yes	Yes	Yes
Expansion Port	Yes	Yes	Yes
Power Code	Yes	Yes	Yes



## SYSTEM BOARD SPECIFICATIONS

The following table lists system board specifications.

**Table 2-3 Main Board Specifications**

ITEM	SPECIFICATION
Clock	* NS Clock Buffer CGS74CT 2524
CPU	* PGA Socket
DRAM	* 1M x 16-bit DRAM x 4
Video RAM	* 256K x 16-bit DRAM (5V / 60ns), SOJ x 2
System Chipset	* UMC UM8891BN, 208 Pin, PQFP * UMC UM8892BN, 208 Pin, PQFP
VGA	* C&T 65548, 208 Pin, PQFP
PCMCIA	* Omega 82C094, 208 Pin, TQFP * Omega 82C028, 28 Pin SOIC
Internal	To System PCB:
Connector & Socket	100 Pin, AMP To HDD: 50 Pin, KEL To CDROM: 40 Pin, KEL 2 Pin, Molex To Transfer PCB: 2 Pin, Molex To DC Converter 32 Pin, Suyin
External	COM1:
Connector	9 Pin, Suyin Printer: 25 Pin Docking: 160 Pin
PCB	Thickness: 1.2mm Layers: 8

## TRANSFER BOARD SPECIFICATIONS

The following table lists Transfer board specifications.

**Table 2-4 Transfer Board Specifications**

ITEM	SPECIFICATION
Internal Connector	To FDD: 100 Pin, AMP To second battery 100Pin, AMP
PCB	Thickness: 1.2mm Layers: 4

## CONVERTER BOARD SPECIFICATIONS

The following table lists Converter board specifications.

**Table 2-5 Converter Board Specifications**

ITEM	* SPECIFICATION
Internal Connector	To I/O PCB:  32 Pin, Suyin  To 1 <sup>st</sup> Battery:  10 Pin, Suyin
External Connector	To Y-Cable Connector:  32 Pin, Suyin  To AC Adapter  2 Pin
PCB	Thickness 1.2mm Layers: 6

---

## LED INDICATOR BOARD

The following table lists LED indicator board specifications.

**Table 2-6 LED Indicator Board Specifications**

ITEM	SPECIFICATION
Internal Connector	To System PCB
	50 Pin, Suyin
	To System PCB
	40 Pin, Suyin
	To LCD Panel
	50 Pin, KEL
	To Inverter
	8 Pin, Molex
	To Left Speaker
	2 Pin, Molex
External Connector	To Right Speaker
	2 Pin, Molex
	To Headphone
	5 Pin, Suyin
	To Line-In
	5 Pin, Suyin
	To LCD Panel
	41 Pin, KEL
To IR	
8 Pin, Temic	
To USB	
4 Pin, AMP	

**I/O BOARD**

The following table lists I/O board specifications.

**Table 2-7 I/O Board Specifications**

<b>ITEM</b>	<b>SPECIFICATIONS</b>
Clock	Crystal 14.318MHz, DIP Type
	Crystal 32.768KHz, DIP Type
	Crystal 4MHz, DIP Type
	Generator:  AV9154-43, SOP 16 Pin
ROM	Flash ROM for BIOS  256K x 8, 150ns
System Chip Set	UMC UM8886BN, 208 Pin, PQFP
Super I/O	NS87336, 100 Pin, PQFP
Keyboard Controller	Mitsubishi 38813M4, 64 Pin, QFP
Micro Controller	PIC16C62, 28 Pin, SOIC
RCT Battery	VARTA 60mA, 3.6V NiMH Battery
Audio	ES17888 Sound Chip, 100 Pin, PQFP
Amplifier	ROHM BA77786FS, 25 Pin, SOIC

---

**Table 2-7 I/O Board Specifications**

<b>ITEM</b>	<b>SPECIFICATIONS</b>
Internal Connector	To System PCB
	100 Pin, AMP
	To System PCB
	100 Pin, AMP
	To HDD Unit
	50 Pin, KEL
	To CD ROM Unit
	40 Pin, KEL
	To RTC Battery
	2 Pin, Molex
	To Transfer PCB
	40 Pin, Suyin
	To DC Converter
	32 Pin, Suyin
External Connector	COM1
	9 Pin, Suyin
	Printer
	25 Pin, Suyin
	Docking
PCB	160 Pin, Berg
	Thickness: 1.2 mm Layers: 6

**LCD INVERTER BOARD**

The following table lists LCD inverter board specifications.

**Table 2-8 LCD Inverter Board Specifications**



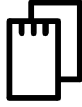



<b>ITEM</b>	<b>Specification</b>
Color Inverter	Hitachi 11.3" DSTN LMG9910ZWCC
Input Voltage	8V to 20V
Output Voltage	500VAC Max.
Contrast Voltage	28V ~ 31V
Output Load Current	6mA (Max.)
Brightness Control	VR Type (Lower)
Contrast Control	VR Type (Upper)
Efficiency	70% Min.
Unit Size (L x W x H)	146 (L) x 22.5(W) x 9.5 (H)

---

## LED STATUS INDICATORS

The following table lists NEC Versa 2400 Series LEDs. For example, the AC IN LED lights to indicate power is on and that the battery is charging.

**Table 2-9 Status LED Descriptions**

ITEM	LED
PMU Enabled	
HDD Read / Write	
PCMCIA Slots	
Num Lock	
Caps Lock	
Scroll Lock	

## FDD SPECIFICATION

The following table lists the standard diskette drive specifications.

**Table 2-10 FDD Specifications**

ITEM	Specification
Module	3.5" Module
Mode	2 Mode FDD (1.44MB / 720KB)
Unit Size	110mm (L) x 96mm (W) x 12.7mm (H)

## HDD UNIT SPECIFICATION

The following table lists the standard hard drive specifications.

**Table 2-11 Hard Disk Drive Specifications**

ITEM	SPECIFICATION
Module	2.5" Removable HDD Module
Capacity	810MB / 1 GB
Interface	Enhanced IDE Interface
Unit Size	100mm (L) x 70mm (W) x 12.7mm (H)

## CD-ROM SPECIFICATION

The following table lists the standard CD-ROM reader specifications.

**Table 2-12 CD-ROM Reader Specifications**

ITEM	SPECIFICATION
Module	6X CD-ROM
Mode	IDE Interface
Data Transfer	13.3MB/sec
Unit Size	140.5mm (L) X 130.6mm (W) X 17.0mm (H)

## NIMH BATTERY PACK SPECIFICATION

The following table lists the standard battery specifications.

**Table 2-13 Battery Specifications**

ITEM	SPECIFICATIONS
Capacity	3500 mA x 10 cells
Cell Type	Long A
Voltage	12V
Connector	10-Pin

---



## DC/DC CONVERTER & BATTERY CHARGER SPECIFICATION

The following table lists DC/DC converter & battery charger specifications.

**Table 2-14 DC/DC Converter & Battery Charger**

ITEM	SPECIFICATION
Input Voltage	9V -> 20V
Output Voltage	12V, 5V, 3.3V
Output Current	0.1A, 2.5A, 2.5A
Output Ripple Voltage	150mV, 100mV, 100mV
Protection	Short Circuit Protection, OCP Input under voltage latch
Efficiency	80% Min. (Typ.)
PCB	1.2mm / 6 Layers

## BATTERY CHARGER

The following table lists battery charger specifications.

**Table 2-15 Battery Charger Specifications**

ITEM	SPECIFICATION
Input Voltage	20V (Max.)
Support Battery	NiMH Battery (12V)
Protection	Max. Temp., Max. Timer
Charge Method	Delta T / Delta t: 1 °C (min.)
Max. Temperature	53 °C ~ 60 °C
Timer Setting	360 Min.
Charge Time	Machine On: 6 hours Machine Off: 1.5 hours
Charge IC	BQ2014
Connector	To M/B: 10 Pin & 18 Pin, Male, Straight, DIP/SMT

## KEYBOARD

The following table lists keyboard specifications.

**Table 2-16 Keyboard Specifications**

ITEM	SPECIFICATION
Key Switch Type	Membrane
Key Stroke	3.0 ± 0.5mm
Operating Force	50 ± 20GF
Key Pitch	19.05mm

## AC/DC ADAPTER

The following table lists AC/DC adapter specifications.

**Table 2-17 AC/DC Adapter Specifications**

ITEM	SPECIFICATION
Input Voltage	AC 90V -> 265V, 50 -> 63Hz
Ripple Noise	100mvp-P
Output Voltage	20V Max.
Protection	Short Circuit UVP, OVP
AC Cord	Safety Approval, FCC Shielding AC cord
DC Output Cable	2-pin, 100cm long with coil at system end
Indicator	AC Power On
Unit Size	120mm (L) x 62mm (W) x 36mm (H)

---

## BIOS

The following table lists BIOS specifications.

**Table 2-18 BIOS Specifications**

<b>ITEM</b>	<b>Specification</b>
Floppy Disk Drive	Support standard 3.5" FDD Support 720KB and 1.44MB Modes
Hard Disk Drive	Support Standard IDE Hard Disk Auto-detect IDE Features Support LBA mode for larger capacity
VGA Display	Use Chips OC65548 VGA BIOS to support Monitor Sense or Auto Display PCI Super VGA Function Call 8 Sets Built-In Panel Parameters
Serial Port	Support Standard COM Port Address with optional selection on Setup Menu Support for IR communication port
Parallel Port	Support EPP, ECP, and Standard Printer Port Address Provide Optional Item in Parallel Port on Setup Menu
Shadow & Cache	Always enable VGA and System BIOS Shadow
PCMCIA	Phoenix PCM Plus will be provided PCMCIA 2.1 Spec Compliance
External Device Support	Interface of external PS/2 mouse and external keyboard The internal Glide Pad will be disabled while external PS/2 mouse is connected
CD-ROM	Can save power during Suspend Mode
APM	Supports APM 1.1 Specification
Power Management Support	Full On Mode Doze Mode Standby Mode Suspend Mode (Suspend to RAM) Save to Disk System Off Mode
VGA Display	Boot on simultaneous display while external monitor attached

**Table 2-18 BIOS Specifications**

ITEM	Specification
Suspend (To RAM)	STR can be invoked by Hot-Key, Cover-Switch, Battery Low-Low Condition, & Operating System request
	STR can be resumed by Keyboard && Power Button
Save To Disk	STD can be invoked by Hot-Key, Cover-Switch, Battery Low-Low condition & Operating System request
	STD can be resumed by Power Button only.

## MICRO-CONTROLLER FUNCTION DESCRIPTION

The following table lists Micro-Controller specifications.

**Table 2-19 Micro-Controller Specifications**

ITEM	SPECIFICATION
Keyboard Type	US Keyboard: 87 Keys  European Keyboard: 88 Keys  Support WIN95 extra 3 Keys
External Device Support	Internal and External Keyboard can be used simultaneously. Internal Glide Pad and External PS/2 Mouse can be used Simultaneously
Y-Connector Support	External PS/2 Mouse and External Keyboard can be used
LED Connector	Num Lock, Caps Lock & Scroll Lock Status should be kept during Suspend Process.  All the above should be cleared while Power On  Support AC-IN, Battery-Charging, Battery-Low, Suspend-To-RAM Status LED
System Peripheral Control	Support the Audio/Contrast/Brightness control Support the Backlight control
SMI Signal	Edge Trigger (High Active) Activity Events Hot-Key Press Battery Low & Battery Low-Low Cover Switch => Enter into Suspend Mode or Turn off Backlight via CMOS SETUP

**POWER MANAGEMENT FEATURES (MODE DEFINITION)**

The following table lists power management specifications.

**Table 2-20 Power Management Modes**

Mode	Device	Speed
Full-On Mode	CPU State	Full speed
	Peripherals State	Normal
Doze Mode	Timer	On / Off
	CPU State	Stop Grant State
	DRAM State	Slow Refresh
	Peripherals State	Normal
	Activity Events	Video Monitoring, Keystrokes, FDD, HDD, Com1, Com2, Lpt2, Audio
Standby Mode	Timer	Off/1/2/4/8/16 Min.
	CPU State	Stop Clock
	DRAM State	Slow Refresh
	VGA State	Standby
	Audio State	Power Down
	AMP Circuit	Power Down
	HDD State	Power Down
	LCD state	Backlight Off, Negative Volt. Off
Suspend To RAM	Activity Events	Video Monitoring, Keystrokes, FDD, HDD, Com1, Com2, Lpt1, Audio
	Timer	Off/1/2/4/8/16 Min
	CPU State	Stop Clock
	DRAM State	Slow Refresh
	LCD State	Backlight off, Negative Volt. Off
		Power Down
	VGA, HDD, I/O Chip, PCMCIA, Audio, AMP Circuit, KBC, Clock Generator	UM8890BN
	Power-On Group	Keyboard, Power, Com1, Fax/Modem, PCMCIA Ring
Activity Events		

**Table 2-20 Power Management Modes**

<b>Mode</b>	<b>Device</b>	<b>Speed</b>
Suspend To Disk	Timer	Off/1/2/4/8/16 Min
	CPU State	Off
	Power System	Off
	Power-On Group	Micro-Controller
	Activity Events	Power Switch
Battery Low Condition	CPU State	CPU Clock/2
	LCD State	Backlight On (Lower 25%)
Battery Low / Low Condition	CPU State	Off
	System Power	Off

## POWER MANAGEMENT FEATURES (MODE TRANSITION)

The following table lists power management transition modes.

**Table 2-21 Mode Definitions**

<b>FROM/TO</b>	<b>FULLY-ON</b>	<b>DOZE</b>	<b>SLEEP</b>	<b>SUSPEND</b>
Fully-On	X	1	X	2
Doze	3	X	4	5
Sleep	6	X	X	7
Suspend	8	X	X	X

O current Condition:

1. Doze Mode Time-Out
2. APM CPU-Idle
3. APM Power Management Event: System Suspend Request Notification
4. Battery Low - Low Condition
5. Suspend Events Occurs
6. Fully-On Activity Events Occur
7. Sleep Mode Time-Out
8. Sleep Timer Disabled and Suspend Mode Time-Out
9. Battery Low - Low Condition

10. Fully-On Activity Events Occur
11. Suspend Mode Time-Out
12. Battery Low - Low Condition
13. Resume Events Occur

## HOT KEY DEFINITION

The following table lists hot key definitions.

**Table 2-22 Hot Keys**

FUNCTION KEY	CONTENT
<Fn> + <Esc>	Suspend
<Fn> + <F10>	LCD/CRT/SIMUL. Display
<Fn> + <F11>	Panel Backlight On/Off
<Fn> + <F8>	Sound Mute
<Fn> + <right>	Contrast Up
<Fn> + <left>	Contrast Down
<Fn> + <PgUp>	Speaker Volume Increases
<Fn> + <PgDn>	Speaker Volume Decreases
<Fn> + <up>	Brightness Increases
<Fn> + <down>	Brightness Decreases
<Num>	Numeric Lock

## ENVIRONMENTAL SPECIFICATION

The following table lists appropriate operating temperatures.

**Table 2-23 Environmental Specifications**

ITEM	SPECIFICATION
Operating Mode	* 5 °C ~ 35 °C (80%)
Non-Operating	* -20 °C ~ 60 °C (90%)

## POWER SOURCE

The following table lists system power specifications.

**Table 2-24 Power Specifications**

<b>Input</b>	<b>Nominal</b>	<b>Version</b>
AC Voltage	100 ~ 250 V	90 ~ 265 V
AC Frequency	50 / 60 Hz	47 ~ 63 Hz

## VIBRATION

The following table lists vibration specifications.

**Table 2-25 Vibration Specifications**

<b>ITEM</b>	<b>MODE</b>
Operating Mode	Direction of Movement: X, Y, Z Axis  Vibration Level: 5 ~ 500 ~ 5 Hz, 0.5 Gs Acceleration  Duration Time: 60 min. for each axis
Non-Operating	Direction of Movement: X, Y, Z Axis Vibration Level: 5 ~ 500 ~ 5 Hz 2 Gs Acceleration Duration Time: 60 min. for each axis

---



## SHOCK

The following table lists system shock specifications.

**Table 2-26 Shock Specifications**

ITEM	MODE
Operating Mode	Impact Accelerator: 1g/10g Based on Half Sine-Wave Shock Pulses of 11Msec  Number of Shock: 3 Shocks for each of the 6 faces  Direction of movement: 6 Faces
Non-Operating Mode	Impact Accelerator: 10g, 20g, 30g, 40g, 50g Based on Half Sine-Wave Shock Pulses of 11Msec  Number of Shock: 3 Shocks for each of the 6 faces  Direction of Movement: 6 Faces

## ELECTRO-STATIC DISCHARGE (ESD)

The following table lists static discharge specifications.

**Table 2-27 Electro-static Discharge Specifications**

ITEM	SPECIFICATION
Contact Discharge	±2, 4, 8, 12.5, 15 kV
Air Discharge	±2, 4, 15 kV
HCP	±2, 4 kV
VCP	±2, 4 kV

## Section 3

---

# Hardware Functional Overview

The NEC Versa 2400 Series notebooks consist of several major functions and subsystems including:

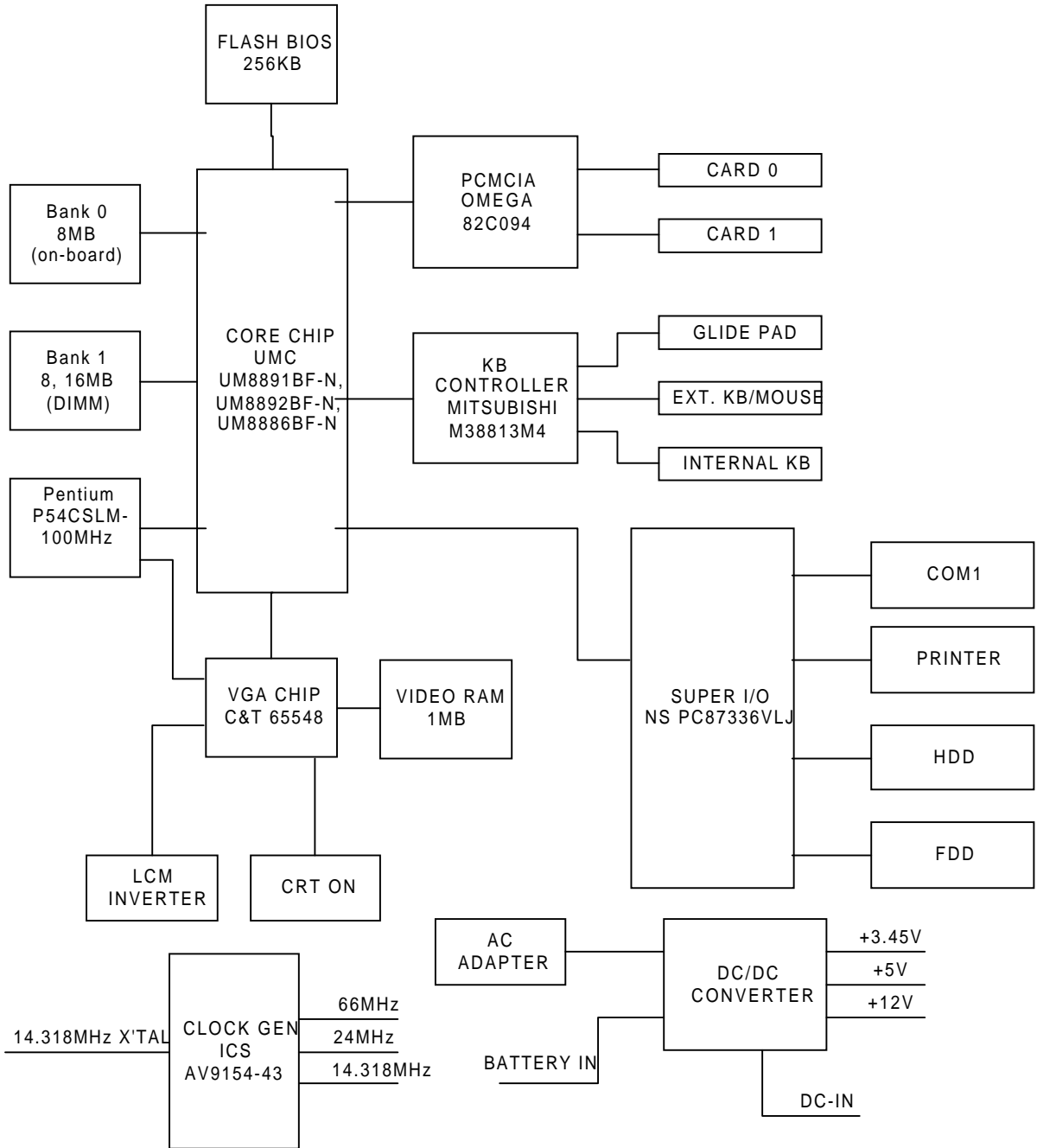
- system BIOS - implemented on the system board and EPROM
- system processor - implemented on the system board
- system logic controller - implemented on the I/O Board
- memory subsystem - implemented on the system board
- video subsystem - implemented on the I/O board, LED board, and LCD display panel
- I/O subsystem - implemented on the I/O board
- keyboard subsystem - implemented on part of the system board, and keyboard assembly
- PCMCIA controller and sockets - implemented on the system board
- pointing device subsystem - implemented on the I/O board and keyboard assembly
- hard disk subsystem - implemented on the system board and the hard drive assembly
- floppy disk subsystem - implemented on the system board and the floppy drive
- power subsystem - implemented on the power supply board, inverter board, battery packs, and AC adapter

A simplified block diagram of the notebook is shown on the next page.

---

## FUNCTIONAL BLOCK DIAGRAM

The following figure shows the NEC Versa 2400 Series functional diagram.



**Figure 3-1 Functional Block Diagram**

## SYSTEM BIOS

In AT-compatible systems, configuration data must be stored somewhere when the computer is turned off. This data is usually stored in the CMOS RAM. Unlike the DRAM, used for system memory, the CMOS RAM requires very little power. When the computer is turned off, a back-up battery powers the CMOS RAM, which retains the system parameters. The computer is configured with the values stored in the CMOS RAM by the system BIOS, which gains control when the computer is powered on.

The primary function of the system BIOS (Basic Input-Output System) is to provide a series of software interrupts, functions, and sub-functions that control operations on certain devices, such as the hard disk drive, the floppy drive, and the video subsystem.

The NEC Versa 2400 Series uses the Phoenix BIOS. The BIOS SETUP program is an easy-to-use system utility configuration that sets system parameters and copies them on the EPROM chip with the system BIOS.

The EPROM chip also includes BIOS Power-On Self Test (POST) diagnostic and booting codes that tests the system components, initializes certain data structures, and boots the operating system.

## System Processor

The system processor function for the notebook is implemented on the system board using an Intel P54LM-100MHz Processor Chip. The processor operates in conjunction with the RAM and ROM memory plus other system control logic (e.g. UMC 8486F) to process software instructions (BIOS, Windows, applications).

The Intel P54CSLM microprocessor is a high performance 586-class CPU which is compatible with all the popular x86 operating systems including DOS, Windows, Windows NT, Windows 95, Unix, Novell, and OS/2. The super pipelined architecture of the integer unit combined with single cycle execution, branch prediction, 16-Kbyte write-back cache, and single cycle instruction decode results in true 586-class performance. These features result in a 60 to 90 percent gain in processing speed compared to the Cyrix 486DX2-50.

Additionally, the P54CSLM CPU provides many power savings features making it ideal for power sensitive systems like notebook computers. Aside from operating at 3.45V only, the CPU clock can also be completely stopped. Moreover, the CPU automatically powers down the FPU and other internal circuits when not in use. Fast entry and exit from the SMM mode allows frequent use of the SMM feature without noticeable performance degradation.

## Major Functional Blocks

The Intel P54CSLM, in a 320-pin TCP packaging, is divided into five major functional blocks:

- Integer Unit
  - Floating Point Unit
-

- Cache Unit
- Memory Management Unit
- Bus Interface Unit

Instructions are executed in the Integer Unit pipeline and in the Floating Point Unit (FPU). The Cache Unit stores the most recently used data and instructions and provides fast access to this information for the Integer and Floating Point Units.

When external memory access is required, the physical address is calculated by the Memory Management Unit and then passed to the Bus Interface Unit (BIU). The BIU provides the interface between the external system board and the processor's internal execution and cache units.

## **SYSTEM LOGIC CONTROLLER**

The System Logic Controller function for the notebook is implemented on the system board using UMC 8890 Series Notebook Chipset. The UM8890 is an advanced 586 compatible single chip specially designed for notebook computers and other portable computers. Aside from supporting almost all 586-based CPUs, the UM8890 also integrates PMU, System Controller, RTC and Peripheral Controller (206) into a single 208 QFP package.

Features Summary:

- System -
    - Fully compatible with IBM PC/AT
    - Supports PCI Bus-Master mode
    - System Operation Voltage from 3V to 5.5V
    - Three programmable non cacheable regions
    - Flash ROM Boot block erase protection
    - Supports general purpose I/O
    - Hybrid Voltage
    - 208 Pins QFP
  - Integration -
    - Built-in 206
    - Built-in 146818A
    - Built-in Memory Controller
-

**■ Memory Controller -**

- Supports ROM DOS up to 64MB by XIP, 16MB by EMS
- Supports Shadow RAM from C0000-FFFFFF
- Supports SLOW and SELF Refresh DRAM
- Supports Stagger Refresh
- On-board memory up to 48MB
- Supports Three Memory Banks
- Supports Page Mode/Burst mode operation
- Supports 512KBx8, 1Mx4, 1Mx16, 2Mx8 and 4Mx4 type DRAM
- Supports 8 or 16 bit ROM configuration
- Programmable DRAM timing for each bank

**■ Power Management -**

- Supports up to Ten Programmable PMC Outputs
  - Supports Multiple Power Saving Mode
  - All Register Read/Writeable for 0V SUSPEND
  - Microsoft APM Compatible
  - Supports 0V SUSPEND
  - Demand Driven Clock Control
  - Supports RESUME/SUSPEND Key
  - Auto-Wake Up Function
  - Three Low Battery Monitor Input
  - System Operating Voltage from 3V to 5.5V
  - Low Power Consumption (at 3.3V)
-

## MEMORY SUBSYSTEM

The memory subsystem, implemented on the system board, includes ROM and DRAM memory. Primary control for the memory subsystem is provided by the UMC 8890 System Controller chipset.

### DRAM Memory

The NEC Versa 240X notebooks contain 8MB (16MB for NEC Versa 243X) of 70ns page-interleaved DRAM on the System board. The notebook provides one extra memory slot for upgrading the DRAM memory to 8MB, 16MB, 24MB, 32MB, 40MB, & 48MB for the NEC Versa 2400 Series) using standard JEDEC small-outline DIMM memory modules. (Refer to Chapter 1 on System Upgrades to know more about how to upgrade the system memory).

### ROM Memory

The NEC Versa 2400 Series notebooks contains both the main system BIOS and the VGA BIOS with Shadow BIOS capability.

## I/O SUBSYSTEM

The I/O Subsystem of the notebook is implemented on the I/O Board using the NS PC87336VLJ chipset. The supported I/O interface on the notebook includes the internal hard disk drive interface, the internal floppy disk drive interface, the external printer port interface, the external serial port, and the external PS/2 keyboard and mouse ports.

Feature's summary of the NC87336VLJ:

- Compatible with IBM AT architecture
  - Supports up to two 360K, 720K, 1.2M, or 1.44MB floppy disk drives
  - Supports IBM PC/AT interface to IDE (Intelligent Drive Electronics)-type Winchester drives
  - Hardware or software configuration
  - Address decoding and strobe generator for game port
  - Supports two serial port functions
  - Supports one bi-directional IBM PS/2 compatible parallel port function
  - All functions can be enabled or disabled individually
  - Configuration Register can be easily selected
  - Only one 24MHz crystal needed
  - 100-pin plastic flat package
-

## VIDEO SUBSYSTEM

The video subsystem, implemented on the system board and on the LCD Panel, controls the display output to both the LED Panel and to the external VGA port.

The video subsystem utilizes the C&T 65548 High Performance Flat Panel / CRT VGA Controller. It also includes 1MB DRAM memory, 32-bit DRAM bus, and separate display and memory clocks. An additional frame buffer/accelerator DRAM increases the available memory bandwidth for CPU accesses.

### Video Chipset Controller

The C&T 65548 initiates a family of 208-pin, high performance for the full-featured notebook that requires the highest graphics performance available. The 65548 achieves superior performance through direct connection to system processor buses up to 32-bits in width. When combined with the CHIPS' advanced linear acceleration software driver technology, this device exhibits exceptional performance compared with devices of similar architecture. The 65548 also adds a sophisticated 32-bit graphics hardware engine for the Bit Block Transfer (BITBLT), line drawing, hardware cursor, and other functions intensively used in Graphical User Interface (GUIs) such as Microsoft Windows.

Features Summary:

- Highly integrated design (flat panel/CRT VGA controller, RAMDAC, clock synthesizer)
  - Multiple Bus Architecture Integrated Interface
    - Local Bus (32-bit CPU Direct and VL)
    - EISA/ISA (PC/AT) Bus
    - PCI Bus
    - Flexible display memory configurations
    - Two 256Kx16 DRAMs (1MB)
  - Integrated programmable linear address feature accelerates GUI performance
  - Hardware windows acceleration (65548)
  - 32-bit graphics engine
    - System-to-screen and screen-to-screen BitBlt
    - 3 operand ROP's
    - Color expansion
    - Optimized for Windows BitBlt format
-



- Hardware line drawing
- 64x64x2 hardware cursor
- High performance resulting from zero wait-state writes (write buffer) and minimum wait-state reads (internal asynchronous FIFO design)
- Supports panel resolutions up to 800x600
- Supports non-interlaced CRT monitors with resolutions up to 1024x768 at 256 colors
- True-color and Hi-color display capability with flat panels and CRT monitors up to 800x600 resolution
- Advanced power management features minimize power consumption during:
  - Normal operation
  - Standby (Sleep) modes
  - Panel-Off Power-Saving Mode
- Power Sequencing control outputs regulate application of Bias voltage, +5V to the panel and +12V to the inverter for backlight operation
- Fully compatible with IBM VGA
- EIAJ-standard 208-pin plastic flat pack

### **External VGA Capability**

The NEC Versa 2400 Series notebooks provide a 15-pin female D-type external VGA connector that can be connected to an external video graphics adapter (VGA) type monitor.

Another feature of the notebook computer is the ability to auto-sense the display output to both LCD and the external CRT monitor. The notebook provides external resolution of 1024x768 by 256 colors for the NEC Versa 2400 series with 1MB video memory. The NEC Versa 2400 Series can also provide simultaneous display at 800x600 at 256 colors with the standard VGA DSTN LCD.

### **KEYBOARD SUBSYSTEM**

The Keyboard Subsystem of the notebook is implemented on the I/O Board and Keyboard Assembly using the Motorola G10 LapKat keyboard controller chip.

The NEC Versa 2400 Series keyboard is an 87/88-key, IBM enhanced-type keyboard with standard characters and function keys plus 12 programmable function keys and the Special Function (Fn) key. The notebook also provides an external PS/2 port for supporting an external PS/2 keyboard or standard DIN-type AT-keyboard. See Section 1 for more information.

---

## PCMCIA CONTROLLER AND SOCKETS

The PCMCIA controller is implemented on the system board using Omega's 82C094 Interface Controller. The 82C094 is compatible with the Intel i882092AA PCI to PCMCIA controller chip. It supports two independent 68 pins PC card sockets and is register compatible with Intel's 82365SL.

The NEC Versa 2400 Series notebook incorporates PCMCIA double deck slots that supports insertion of two Type I or II cards at the same time or one Type III card on the upper slot and one Type I or II card on the bottom slot.

Feature summary of the Omega 82C094:

- PC Card 95, PCMCIA 2.1, and JEIDA 4.1 compatible Interface
  - Power Management Function that includes Individual Socket power control, Hot insertion/removal, Hardware/Software controlled power down, Modem Ring in Resume, CS Controlled Power Down, and Power Saving with Windows inactivity
  - Direct connection to 33MHz PCI bus and to PCMCIA sockets without glue logic
  - Serial Power Control to support the designs with most PCMCIA power switch IC
  - Legacy DMA and serial IRQ to directly support advanced PCI Core Logic
  - Single-Chip PCMCIA host controller
  - Supports CLOCKRUN# of the PCI Mobile Design Guide for power saving
  - Intelligent power management for lowest operating power
  - Programmable power management with individual socket activity counter
  - Four-level FIFO and programmable PCMCIA interface timing
  - Five programmable memory windows and two programmable I/O windows per socket
  - Intel EXCA register compatible
  - Register-set compatible to Intel i82092AA (PPEC) and Intel i82365SL
  - 208 Pin PQFP or TQFP
-

## **HARD DISK SUBSYSTEM**

The hard disk subsystem, implemented on the system board and on the associated built-in hard disk drive, provides disk storage for all system software and user files.

The NEC Versa 2400 Series notebook is equipped with high capacity hard disk drive ranging from 810MB to 1.4GB using the IDE controller with LBA (Logical Block Addressing) mode support. The I/O subsystem controller, NS PC87336CLJ, provides the IDE controller for the hard disk.

The built-in hard drive can support any industry standard 2.5-inch IDE hard disk drive at 19mm or 17mm height. Setting up the hard disk type is done automatically by the CMOS SETUP programs that auto-detects the installed hard disk type settings for optimized performance.

---

**NOTE:** Do not move the notebook when the HDD LED is activated. This protects the hard disk drive from any accidental damage or loss of data.

---

## **FLOPPY DISK DRIVE SUBSYSTEM**

The Floppy Disk Drive Subsystem consists of a FDD controller provided by SMC 37C665IR and the built-in floppy disk drive. The floppy disk drive supports standard 3.5-inch 720KB and 1.44MB mini-diskettes.

## **POINTING DEVICE SUBSYSTEM**

The pointing device subsystem consists of the VersaGlide device on the system top cover assembly and a pre-programmed Mitsubishi M38813M4 micro-controller that interfaces the mouse device to the Motherboard. An external PS/2 port also supports the use of an external PS/2 compatible mouse which the system automatically detects during system power up and then disables the internal VersaGlide.

## **POWER SUBSYSTEM**

The Power Subsystem consists of the following major sections:

- External AC Power Adapter
  - Internal Battery Pack
  - Powerboard (on Motherboard)
  - LCD Inverter Board (in LCD Panel Assembly)
  - Power Conservation Logic (part of Motherboard)
-

## **AC Power Adapter**

The computer is equipped with a universal AC power adapter that converts AC voltage (90 to 265VAC, 47 to 63Hz) into DC voltage used to operate the notebook and charge the batteries.

## **Internal Battery Pack**

The NEC Versa 2400 Series notebooks utilizes NiMH (Nickel Metal-Hydride) that provides DC power for the notebook (and for the NVRAM and real time clock battery on the Motherboard) when the AC Adapter is not connected to the computer.

The battery pack contains ten size A battery cells that provide the system with 12V. When installed in the notebook, the battery LED automatically appears and will also start to re-charge whenever the AC adapter is connected to the notebook.

Normal charging time for the battery pack is around 1.5 hours when the computer is turned off while it should take around 6 hours maximum when the computer is running.

## **Power Board**

The power board receives approximately 12VDC from the battery pack and uses this input voltage to generate +12V, +5V, +3.3V, (+3.45V) regulated output voltages to provide power for all internal notebook board assemblies. The output of the +5V regulator also drives the LCD inverter circuit on the LCD inverter board assembly. Refer to Chapter 2 for more detailed information.

## **LCD Inverter Board Assembly**

The LCD Inverter Board Assembly, located in the LCD Panel Assembly, converts the +5VDC input from the Powerboard module of the system board into a high voltage AC output used to light the CCFT (Cold-Cathode Fluorescent Tube).

---

## Section 4

---

# Field Service Guidelines

This section contains preventive and corrective maintenance procedures for the NEC Versa 2400 Series notebook computers. The first part of this section will describe the computer cleaning procedures and preferred handling procedures for sensitive components (i.e. disk drives, batteries).

The second part of this section will identify all field replaceable parts plus the removal and replacement procedures for these parts.

### PREVENTIVE MAINTENANCE

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

---

**NOTE:** Remove the battery and disconnect the AC adapter before performing any maintenance. Voltage will still be present inside the system unit and LCD even after the system has been turned off.

---

### Cleaning the Notebook's Exterior

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

1. Power off the system, remove the primary battery pack, and unplug all cables connected to the system.
  2. Wipe the outside of the system unit, keyboard, and display with a soft, clean cloth. Remove any stains with water only. Use 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, this could possibly damage the components under the keys. If the keyboard gets wet, thoroughly dry it before reassembling the system unit.
-

## **Cleaning the Notebook's Interior**

When servicing the inside of the notebook to remove dust and other foreign particles proceed as follows:

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

## **Protecting the Disk Drives**

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

Here are some preventive maintenance tips that we recommend you use when handling the hard disk:

- Periodically back up the data files from the hard disk.
- Run a virus detection program to identify possible viruses on the hard disk.
- Use SCANDISK 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, importantly don't jar the hard disk, as this may cause a hard disk crash.
- Use hard disk maintenance programs like DEFRAG under DOS or Norton Utilities SPEEDISK to reorganize your hard disk by eliminating fragmentation and improving hard disk access time.

## **Handling the Computer 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/or oxide build-up.

To ensure that the battery packs endure a 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.
- 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**

Heat is the most common problem associated with the screen. After a lengthy work session, the typical routine is to shut down the machine and close the cover, but the display surface (no matter what type it is) and the components inside the computer radiate heat. So, when you close the cover, you will then trap this heat up against the screen. Leaving the computer cover open for about ten minutes while the heat disperses will eliminate this potentiality damaging situation.

### **REQUIRED TOOLS AND EQUIPMENT**

All NEC Versa 2400 corrective maintenance procedures can be performed using the following tools:

- tweezers
- small flat-blade screwdriver
- small Phillips screwdriver
- small Hex-bolt screwdriver.

---

**NOTE:** All boards, options and peripherals contain components that are sensitive to static electricity. When handling any of these items, protect against static discharge by using wrist or ankle grounding straps and grounded working mats. When moving or storing items, use the anti-static bags supplied with the items.

---

## **PARTS REMOVAL AND REPLACEMENT PROCEDURES**

This section contains field service-level removal/replacement procedures for the notebook. Refer to the exploded diagram later in this section to identify all relevant parts. The NEC Versa notebook is designed for optimum modularity in order to make field replacement maintenance easy and efficient.

### **Removing/Replacing the Notebook Battery Pack**

The procedure for removing and replacing the battery pack is as follows:

- 1.** Turn off the computer. Close the LCD cover and turn the whole unit over.
  - 2.** You will find a clamp latch (lock knob) that is securing the internal battery pack to the system unit. To remove the battery pack, push the lock knob sideways with one hand and with the other hand pull the battery pack out. Note that this has to be done simultaneously.
  - 3.** To replace the battery pack again, simply slide the battery pack into the system unit until you hear the spring latch hook snap into place. The battery pack can only be inserted in one direction so there is no danger of improper insertion.
-

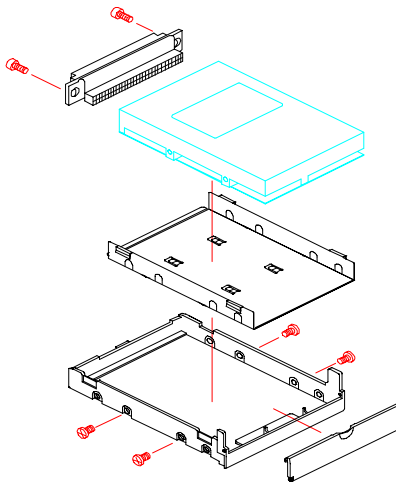


---

## Removing/Replacing the Hard Disk Drive Module

The procedure for removing and replacing the hard disk drive module is as follows:

1. Turn off the computer. Close the LCD cover and turn the whole unit over.
2. You will find a clamp latch (lock knob) that is securing the hard disk drive module to the system unit. To remove the hard disk drive module, push the lock knob sideways with one hand and with the other hand pull the hard disk drive module out. Note that this has to be done simultaneously.
3. To replace the hard disk drive, remove the four flat screws attaching it to the null hard disk assembly and remove the hard disk drive cable.
4. To replace the hard disk drive module, reverse the above procedure.



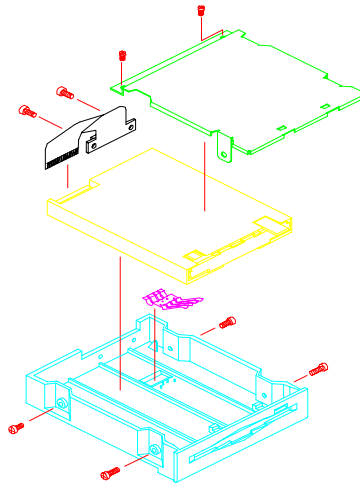
**Figure 4-1 Hard Drive Module Assembly**

## Removing/Replacing the Floppy Disk Drive Module

The procedure for removing and replacing the floppy disk drive is as follows:

1. Turn off the computer. Close the LCD cover and turn the whole unit over.
  2. You will find a clamp latch (lock knob) that is securing the floppy disk drive module to the system unit. To remove the floppy disk drive module, push the lock knob sideways with one hand and with the other hand pull the floppy disk drive module out. Note that this has to be done simultaneously.
  3. To replace the hard disk drive, remove the four flat screws attaching it to the null hard disk assembly and remove the hard disk drive cable.
-

4. To replace the floppy drive unit, remove the four small screws attaching it to the null floppy disk drive assembly and remove the floppy disk drive cable.
5. To replace the floppy disk drive module, reverse the above procedure.



**Figure 4-2 Floppy Drive Module Assembly**

## **Removing/Replacing the LCD Status Bar Cover and Hinges**

Remove the LCD Status Bar Cover and Hinge Covers are as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
2. Slide the left and right hinge covers out to remove them.
3. Lift the status bar cover out.
4. To replace the LCD Status Cover and Hinge Covers, reverse the removal procedures mentioned above.

## **Removing/Replacing the Keyboard**

The procedure for removing and replacing the keyboard is as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
  2. Lift the keyboard out and tilt the upper edge of the keyboard towards you, but do not lift the keyboard away. Rest the keyboard (face down) on the palm rest area.
-

3. Remove the keyboard cable from the system board's FPC type connector. To release the keyboard cable from the connector, gently lift (using your fingernail or a thin pointed object) the connector locks on the left and right edge. Pull the keyboard cable out and remove the keyboard from the notebook.
4. To replace the keyboard; rest the keyboard face-down on the palm rest area. Insert the keyboard cable into the FPC type connector on the system board and tilt the keyboard back into place.

## Removing/Replacing the Heat Plate

This is a heat shield for the CPU and power board. Remember, the CPU is in contact with this part, so be careful when removing it from the unit.

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
2. Remove the six screws and carefully lift the heat pipe from the unit.
3. You do not need to remove this part if you are removing/replacing the LCD.

---

**WARNING:** The CPU is sometimes attached to the heat pipe, so be careful not to damage the pins or the CPU may be inoperable.

---

## Removing/Replacing the CPU

The procedure for removing the CPU is as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
  2. The CPU is located at the left rear of the system base assembly under the heat pipe. The system board has been designed to allow the heat generated by the CPU to be released from the system.
  3. Slowly remove the CPU, moving around each side, little by little. Avoid damaging the CPU pins by forcing the CPU out of its slot immediately. Also, do not pull out the CPU heat sink as it is part of the CPU. You must remove the CPU and the heat sink together.
  4. To replace the CPU, align it with pin 1 of the socket and plug in the CPU. Make sure that the CPU pins are straight before inserting it. Broken or damage pins on the CPU may totally damage the CPU. To remount the CPU, reverse the disassembly procedure mentioned above.
-

You do not need to remove this part if you are removing/replacing the LCD.

### **Removing/Replacing the Cover-Display LCD Assembly Module**

The procedure for removing the Cover-Display LCD Assembly Module is as follows:

1. Turn off the computer. Follow all disassembly procedures for removing the Hinge Covers, Status Bar Cover, and Keyboard as mentioned earlier in this section.
2. Remove the center screw on both hinge mounts, the grounding screw to the left of the connector on the LED Board assembly, and remove the connector from the LED board.
3. Lift the Cover-Display LCD Assembly Module from off of the unit and set aside.
4. To remount the Cover-Display LCD Assembly Module, reverse the disassembly procedure mentioned above.

### **Removing/Replacing the System Top Cover Assembly and the NEC VersaGlide Assembly**

The procedure for removing and replacing the system top cover assembly and VersaGlide is as follows:

---

**NOTE:** If you plan to continue removing/replacing modules from the notebook you must follow all of the disassembly procedures mentioned from the start of this section.

---

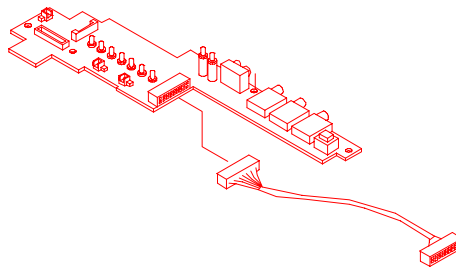
1. Turn off the computer and remove the Battery, Hard Disk Drive, and Floppy Disk Drive Modules. Follow all disassembly procedures mentioned from the start of this section.
  2. Turn the System Unit upside down with the bottom facing up. Remove the nine screws securing the base unit assembly from the top unit assembly.
  3. Return the back to the normal position. Remove the screw located between the hinges above the LEDs. Next remove the screw located just under the speaker on the left side, the screw just to the right of the LEDs and the screw located to the right of the LCD cable connector. Lift the top cover from the base cover. Note, that the LCD, speaker, and the VersaGlide cables are all still attached to the system board. Pull these cables out and remove the whole top cover assembly.
  4. The VersaGlide module is assembled to the system top cover case. Turn the top cover case over and locate the VersaGlide printed circuit board. Remove the six screws securing the module and remove the VersaGlide assembly.
-

5. To replace the whole top case assembly, reverse the removal procedures mentioned above. We recommend that you do the top cover screws first, then the bottom cover screws. Make sure to test the VersaGlide before entirely securing it to the top cover case.
6. You do not need to remove the CPU unless you are going to replace it.

## Removing/Replacing the LED Board

The procedure for removing the LED board is as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
2. The LED Board is located in the center rear of the system base unit. This board alerts you to the processes presently in use on the computer.
3. Remove the two screws and lift the board carefully out of the connections to the system board.



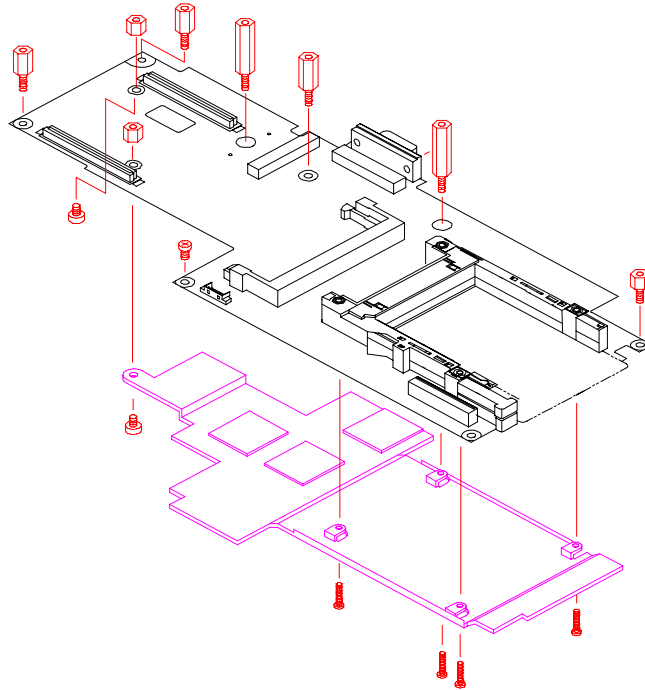
**Figure 4-3** *The LED Board Module Assembly*

## Removing/Replacing the System Board and I/O Board

The system board and the I/O board are assembled together as one unit and must be removed from the base unit before being separated from each other. The procedure for removing the system board and I/O board is as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
  2. Remove the two large posts from the center of the system board and the two screws from the lower leg of the I/O Board.
  3. From the back of the unit remove the six spacers and two screws around the four plug-in connectors.
-

4. Since the system board is the main unit of the notebook, all of the other boards are connected to this electronic module either by connector or by cable. Special care should be taken when removing this module, so as not to damage any of these connectors and/or cables.

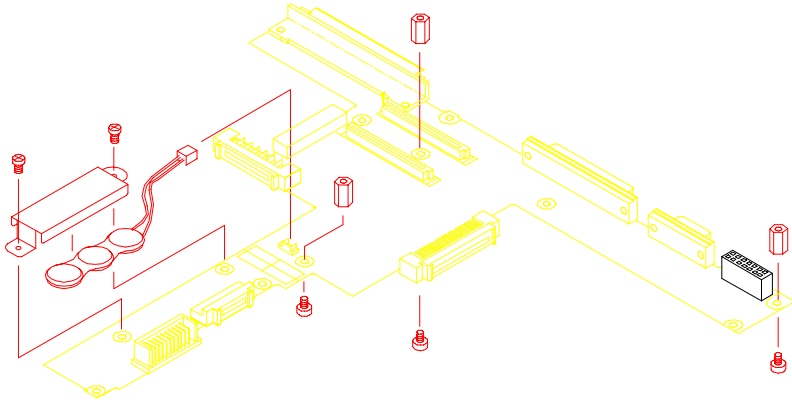


**Figure 4-4** *The System Board and I/O Boards*

### **Separating the System Board and I/O Board**

The system board is attached directly to the I/O board. The following procedure should be taken to separate the two boards:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
  2. Remove the four medium spacers located along the top and left side edge and the one screw located at the center bottom of the system board.
  3. Slowly separate the I/O Board and system board, being cautious about the connectors coupling the two boards together.
  4. To reattach the I/O Board and system board, reverse the separation procedures mentioned above.
-

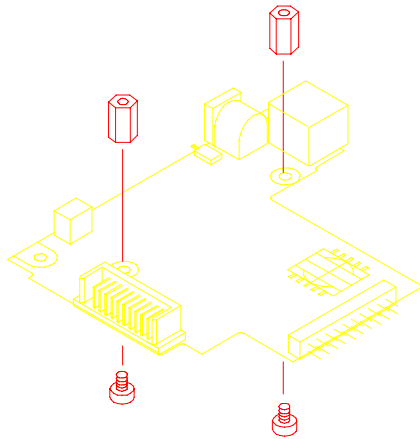


**Figure 4-5** *The I/O Board Module Assembly*

## Removing/Replacing the Power Board

The procedure for removing the power board is as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
2. Remove the two hex spacers from the center of the board and lift the module from the unit.
3. To replace the power board module, reverse the removal procedures mentioned above.



**Figure 4-6** *Power Board Module Assembly*



## ILLUSTRATED PARTS BREAKDOWN

This section contains the illustrated parts breakdown (IPB) and NEC part numbers for the NEC Versa 2400 Series computer. Table 4-1 lists field-replaceable parts and corresponding part numbers. Figure 4-7 shows the field-replaceable parts for the docking station.

**Table 4-1 NEC Versa 2400 Series Field-Replaceable Parts\***

Item	Description	Part Number
1	Main Battery (NiMH)	21-90128-31
2	TEAC CD-ROM Assembly	25-00242-00
3	AC Adapter	12-00118-30
4	AC Power Cord	22-30031-00
5	CMOS Battery	TBD
6	AC/DC Board Assembly	51-70187-10
7	VersaGlide Assembly	51-70185-11
8	Cover, Left Hinge	24-40827-00
9	U.S. Keyboard	71-30335-00
10	LCD Cable Assembly, 11.3"	22-20286-00
11	NEC Model Nameplate, NEC Versa 2400	25-41033-00
	NEC Model Nameplate, NEC Versa 2400CD	25-41034-00
12	LCD Front Panel Assembly, 11.3"	24-40818-00
13	LCD, Hitashi, 11.3"	71-10469N00
14	LCD Inverter	12-00146-00
15	LCD Rear Cover, 11.3"	24-40819-0
16	NEC Logo	25-40851-00
17	Cover, Right Hinge	24-40828-00
18	Status Cover	24-408822-00
19	Top Cover Assembly	24-40821-00
20	CPU, Pentium, 100 MHz	51-90022-10
	CPU, Pentium, 133 MHz	51-90024-10
21	I/O Port Casing	24-40810-10
22	Audio Cover	24-40826-00
23	LED Board Assembly	51-70184-00
24	System Board	51-70182-00

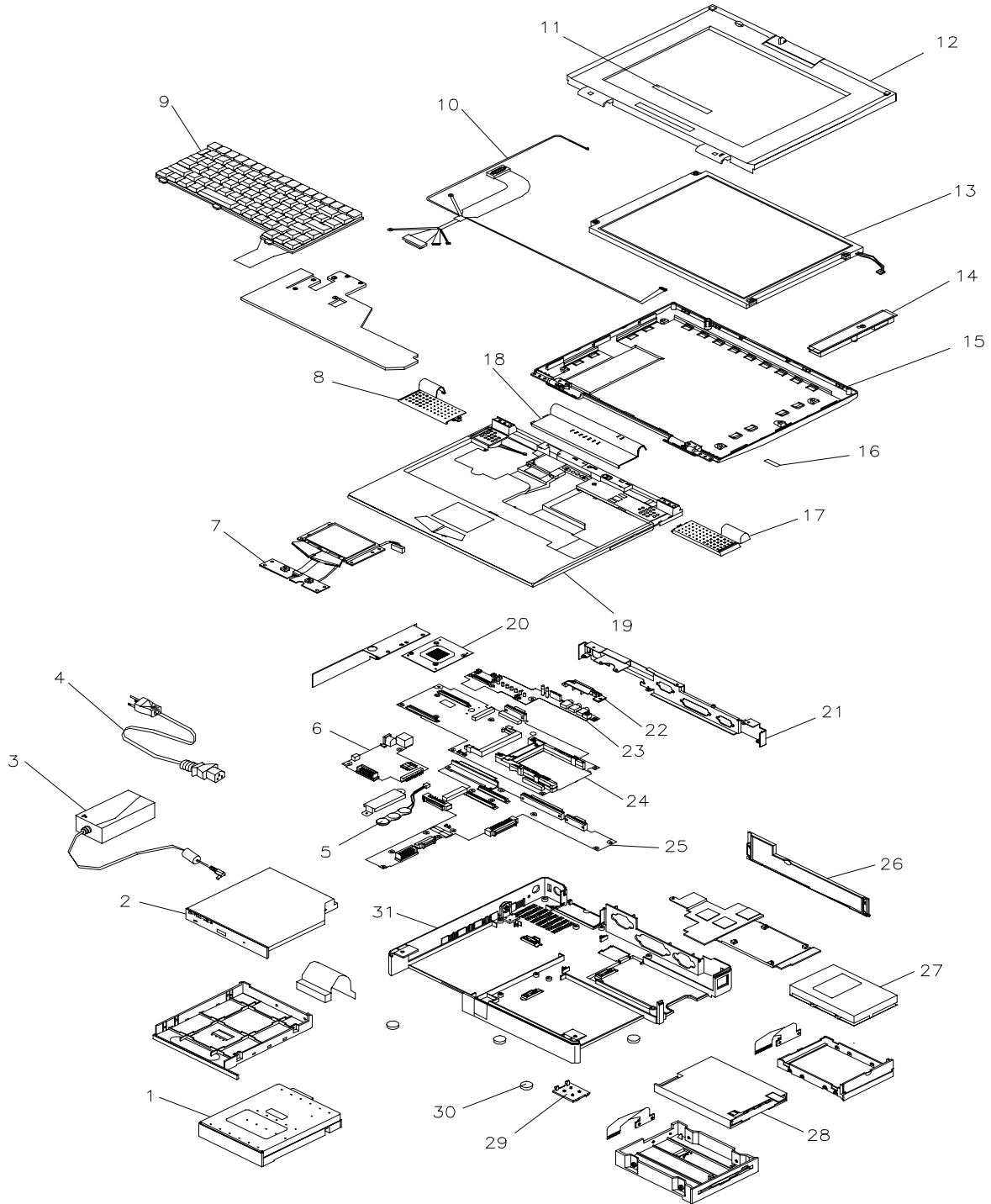
\* This data was prepared September, 1996. For an up-to-date listing of spare parts, please call FastFacts (800) 366-0476 and order document number 42200167

**Table 4-1 NEC Versa 2400 Series Field-Replaceable Parts\***

<b>Item</b>	<b>Description</b>	<b>Part Number</b>
25	I/O Board	51-70183-00
26	I/O Bracket	24-50204-00
27	810 MB Hard Disk Drive Assembly	25-00237-00
	1 GB Hard Disk Drive Assembly	25-00238-00
28	Diskette Drive Assembly	24-70006-00
29	ROM Door	24-40810-10
30	Rubber Foot	24-80631-10
31	Bottom Cover Assembly	24-40793-10
32*	Speaker	24-80620-00
33*	Left Speaker Cable	22-20279-00
34*	Right Speaker Cable	22-20280-00
35*	Speaker Holder	24-50226-00
36*	Keyboard Bracket	24-50227-00

\* Not shown in IPB figure.

---



**Figure 4-7 NEC Versa 2400 Series Illustrated Parts Breakdown**

## Packaging and Documentation

Packaging and documentation part numbers are listed in Table 4-2.

**Table 4-2 Packaging and Documentation Part Numbers**

<b>Description</b>	<b>Model Number</b>
<i>NEC Versa 2400 Series User's Guide</i>	819-200134-000 Rev. 00
<i>NEC Versa 2400 Series Service and Reference Manual (this guide)</i>	819-200167-000 Rev. 00
Shipping Carton	158-041012-000
Foam Insert	158-041014-000
Foam Insert	158-041014-001

---

## Section 5

---

# Troubleshooting and Repair

This section focuses on providing you with some information on notebook basic troubleshooting as well as the BIOS POST error codes and messages.

### SERVICE INFORMATION

NEC service and information telephone numbers are listed in the following table.

**Table 5-1 NEC Service and Information Telephone Numbers**

Service	Call
To order NEC spare parts	In the U.S., call 1(800) 632-4525
To order options in the U.S.	Local Sales Office
To access the NEC Electronic Bulletin Board System (BBS)	1(508) 635-4706
To download files - provides software drivers and the latest ROM BIOS	1(508) 635-4706
NEC Service	In the U.S., call 1(800) 632-4525
<b>Listen to the automated attendant and select the appropriate menu to reach one of the following departments:</b>  <b>Information Center</b> - literature, dealer locations, sales leads, response to ads <b>NSRC (National Service Response Center)</b> - questions other than products, spare parts or technical support <b>Service Contracts</b> <b>TSC (Technical Support Center)</b> - technical support for everyone else	
FastFacts™ - automated service that sends the latest information about NEC products to the fax machine 24 hours a day	In the U.S., call 1(800) 366-0476 Outside U.S., 1(708) 860-9500 Ext. 2621
Canadian Inquiries	1(416) 795-3554
Technical Support	<b>1-800-632-4525</b>

### TECHNICAL SUPPORT

NEC Technologies Technical Support Center (TSC) provides an E-mail service for Internet users besides the support listed in Table 5-1. Technical questions regarding NEC products can be sent over the Internet system to TSC. The Internet address is as follows:

**tech-support@nectech.com**

---

If it is more convenient, questions may also be faxed to TSC. The TSC fax number is:

**(508) 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 your question(s).

It would also be helpful to include your telephone number in case TSC can not get their answer to you through the Internet or by fax. TSC will reply to all questions received by Internet or fax within one business day.

## **PRODUCT INFORMATION**

NEC FastFacts 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 FastFacts service 24 hours a day, 7 days a week. Using a touch-tone telephone, call the FastFacts number, order the desired information through the automated attendant, and FastFacts will automatically send the information to you.

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

- Catalog 1 - Monitors, Graphics Boards, and Data Projector Products
- Catalog 2 - CD ROM Hardware and Software, Printers, and Disk Drive Products
- Catalog 3 - Laptop, Desktop, and Server Computer Products
- Catalog 9 - Price and Configuration Index

## **Ordering Information from FastFacts**

Order information from FastFacts as follows:

1. Check that the fax machine is on.
2. Locate the document part number.
3. Using a touch-tone telephone, call 1-800-366-0476 (U.S. and Canada only).

For international; enter the international long distance access number, the U.S. telephone number, or the U.S. extension (01-708-860-9500 ext. 2621).

---

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

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

Press **2** for an introduction to FastFacts, 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; first enter the international long distance access number (011), your country code, area or city code, and then your fax number.

The information requested will be automatically sent to your fax machine. If FastFacts attempts to send the second order before the first order is completed, the order may be canceled. After three tries, FastFacts assumes that the line is busy and will not process the order.

## HELPFUL STARTERS

Here are some helpful items to check before troubleshooting the notebook:

- Is there any external power source connected to the computer?
  - Has the battery been fully charged?
  - Is the computer turned on and the POWER LED activated?
  - Is the LCD display control switch moved to its minimum level?
  - Is the LCD display switched to the external monitor?
  - Are all cables and devices connected properly and securely?
  - Have all needed device drivers been 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 wake system up again.
-

## POWER ON SELF TEST (POST)

This section provides you with the Phoenix BIOS POST errors and messages summary. Refer to this whenever you encounter error messages or beep codes generated by the computer during startup.

### POST Messages

The following is a summary of the Phoenix BIOS startup error messages that are displayed on the notebook's display. These messages will help you to understand many of the notebook's problems that may be corrected by entering the CMOS SETUP program and checking the original values.

**Table 5-2 POST Error Messages**

Message	Possible Cause	Action
Diskette drive A failure	The drive failed or is missing.	Check the drive to determine the problem.
Diskette read failure - press F1 to retry boot, F2 for SETUP utility	The diskette is either not formatted or is defective.	Replace the diskette with a bootable diskette and retry.
Display adapter failed, using alternate	The primary video adapter failed.	Check the primary video adapter.
Gate A20 failure	The keyboard controller is not accepting command, specifically, the enable and disable A20 command.	Check the keyboard controller and system board. Turn the power off, then back on again. If the problem persists contact qualified NEC service personnel.
Fixed disk configuration error	The specified configuration is not supported or doesn't match the actual hardware installed.	Correct the fixed disk configuration.
Fixed disk controller failure	The fixed disk may be defective.	Try rebooting. If that doesn't work, replace the fixed disk.
Fixed disk read failure-press F1 to retry boot, F2 for SETUP utility	The fixed disk may be configured incorrectly or is defective.	Check the drive type selected in SETUP. Try rebooting. If that does not work, replace the fixed disk.
Pointer device failure	The PS/2-style mouse failed.	Try rebooting. If problem persists, check the mouse, it's cable and connector.

---



**Table 5-2 POST Error Messages**

<b>Message</b>	<b>Possible Cause</b>	<b>Action</b>
No boot device available - press F1 to retry boot, F2 for SETUP utility	Either diskette drive A:, the fixed disk, or both the diskette and fixed disk are defective.	Try rebooting. If problem persists, replace the diskette or the fixed disk.
No boot sector on fixed disk - press F1 to retry boot, F2 for SETUP utility	The C: drive is not formatted or is not bootable.	Format the C: drive and make it bootable.
Not a boot diskette - press F1 to retry boot, F2 for SETUP utility	The diskette in drive A: is not formatted as a bootable diskette.	Replace the diskette with a bootable diskette and try rebooting.
No timer tick interrupt	The timer chip has failed.	Check the system board, Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Shutdown failure	Either the keyboard controller is not accepting the reset command or the associated reset logic has failed.	Check the keyboard controller and system board. Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Time of day not set - run SETUP program	Real Time Clock not set.	Run SETUP utility.
Timer 2 failure	The timer chip has failed.	Check the system board. Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
F2 to enter ROM-based SETUP	Invalid configuration information must be changed.	You must run SETUP utility and correct configuration information.
Invalid configuration information - please run SETUP	Display adapter is configured incorrectly. Memory size is incorrect. Wrong number of diskette drives.	Run the SETUP utility.

**Table 5-2 POST Error Messages**

<b>Message</b>	<b>Possible Cause</b>	<b>Action</b>
Keyboard clock line failure	The keyboard, the keyboard cable connection, or the keyboard controller is defective.	Make sure the keyboard cable and keyboard are connected properly. Check the keyboard controller and the system board. Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Keyboard data line failure	The keyboard controller firmware has failed.	Check the keyboard controller and system board. Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Keyboard stuck key failure	A key is jammed.	Locate the jammed key and fix it. Make sure the keyboard cable and keyboard are connected properly. Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Memory failure at <i>hex-value</i> , read <i>hex-value</i> , expecting <i>hex-value</i>	Circuitry associated with the memory chips has failed.	Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Unexpected interrupt in protected mode	Hardware interrupt or NMI occurred while in protected mode.	Check the timer chip or the interrupt controller on the system board.
Real time clock failure	The RTC or battery failed.	Run SETUP and turn the power off and on. If the problem persists, replace the RTC battery. If the problem remains, contact qualified service personnel.

---

## Informational Messages

This section lists the messages that provide information to the user but require no action.

**Table 5-3 BIOS Informational Messages**

Message	Meaning
<i>nnnK</i> Base Memory	The amount of base memory that tested successfully.
<i>nnnK</i> Extended	The amount of extended memory that tested successfully.
Memory tests terminated by keystroke	The message indicate that a user pressed the spacebar while memory tests were running and stopped the memory tests.
Press the F1 key to continue	This message indicates that an error was found during POST. Pressing the F1 key allows the system to attempt to reboot.
Beginning memory test Press the SPACEBAR to terminate the memory test	A user can stop the memory tests by pressing the spacebar.
Press the F1 key to continue, F2 to run the Setup utility	This message indicates that an error was found during POST. Pressing the F1 key allows the system to attempt to boot. Press F2 allows users to run the ROM-based SETUP utility to correct configuration information.

## Run-time Error Messages

The following table lists run-time error messages.

**Table 5-4 Run-time Error Messages**

Message	Cause	Action
I/O card parity interrupt at <i>address</i> . Type (S)hut off NMI, (R)eboot, other keys to continue	Memory on a peripheral card has failed.	Check the memory cards installed in the system.
Memory parity interrupt at <i>address</i> . Type (S)hut off NMI, (R)eboot, other keys to continue	A memory chip(s) has failed.	Replace the system board.
Unexpected HW interrupt, <i>interrupt at address</i> . Type (R)eboot, other keys to continue	Hardware problem. Not displayed if the expected interrupt handler is not enabled.	Check all hardware in the system.
Unexpected SW interrupt, <i>interrupt at address</i> . Type (R)eboot, other keys to continue	Error(s) in the software program. Not displayed if the extended interrupt handler is not enabled.	Turn the machine off and then on again. If doesn't work, check the program.
Unexpected type 02 interrupt at <i>xxxxh</i> . Type (S)hut off NMI, (R)eboot, other keys to continue	A parity error occurred, but the source can not be determine.	Turn the power off and then on again.

---

## QUICK TROUBLESHOOTING

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

**Table 5-5 Quick Troubleshooting**

Problem	Corrective Actions
No power	<p>Check that the AC adapter is plugged into the power connector of the system. Also, that the AC adapter is plugged into a properly grounded AC power outlet.</p> <p>If using the battery as main power source, check if the battery pack is of the right type, charged and is inserted correctly.</p> <p>Check the power board of the system. Is it inserted into the system board connector properly? Otherwise, replace the power board.</p>
Data on the LCD is unreadable	<p>Adjust the brightness and contrast display controls found on the right side of the LCD panel.</p> <p>Check if the LCD cables are inserted properly. Check also connections inside the LCD panel.</p> <p>Check if installed VGA driver is correct.</p> <p>Check VGA controller chip on the system board if there is any cold or loosed soldering.</p> <p>Replace the system board.</p>
LCD screen does not show data	<p>Check the LCD Status Bar if Suspend mode is activated. Press any key or press the power button to resume operation and display.</p> <p>Check if LCD cables are disconnected or loosed.</p> <p>Check if the display output is switched to the external monitor.</p> <p>Check if the Contrast level is set to minimum.</p> <p>Check if there is power.</p> <p>Replace LCD Inverter board found inside the LCD Panel.</p>

**Table 5-5 Quick Troubleshooting**

<b>Problem</b>	<b>Corrective Actions</b>
Battery Power does not last	<p>Make sure that the power management features are enabled.</p> <p>Recharge the battery pack for 1½ hour before using again.</p> <p>Replace the battery pack.</p>
System halts during boot sequence	<p>Check condition of selected bootload device (diskette or hard disk) for bad boot track or incorrect OS files.</p> <p>Try booting from a new bootable diskette and recopy or repartition hard disk.</p> <p>Check for any BIOS error messages on the display screen.</p> <p>Replace system board.</p>
I/O processing malfunctions	<p>Check the connections of all internal devices.</p> <p>Replace system board.</p>
Diskette drive does not work	<p>Check if floppy drive cable is connected properly.</p> <p>Check diskette type if correct and not faulty.</p> <p>Replace diskette drive.</p> <p>Replace system board.</p>
Hard disk drive malfunction	<p>Check if hard disk drive is set properly on CMOS SETUP.</p> <p>Check drive cables and connections.</p> <p>Check if disk drive is good.</p> <p>Replace the system board.</p>
Memory malfunction	<p>Check if the memory module is inserted properly.</p> <p>Replace the memory module.</p> <p>Replace the system board.</p>
External keyboard or PS/2 mouse doesn't work	<p>Check if keyboard or mouse are connected properly. Check Y-cable if it is being used. Power off system first before plugging in the device.</p> <p>Replace the keyboard or mouse.</p> <p>Replace the system board.</p>

**Table 5-5 Quick Troubleshooting**

<b>Problem</b>	<b>Corrective Actions</b>
PCMCIA card does not work	<p>Check the PCMCIA driver installation for any IRQ or IO address conflict.</p> <p>Check if the PCMCIA card is inserted properly and all connections are set.</p> <p>Replace the PCMCIA card.</p> <p>Replace the system board.</p>
Trackball doesn't work	<p>Check if trackball is enabled under CMOS Setup.</p> <p>Check if PS/2 mouse driver is properly installed.</p> <p>Check trackball cable inside the system if it is inserted properly.</p> <p>Remove trackball ring cover and clean the ball and the rollers inside.</p> <p>Replace trackball module.</p> <p>Check the keyboard controller chip for any cold or loosed soldering.</p> <p>Replace the system board.</p>
Serial device does not work	<p>If using serial mouse, check if trackball option is disabled under CMOS Setup.</p> <p>Check if mouse driver is installed properly.</p> <p>Check if serial device is connected properly.</p> <p>Replace serial device.</p> <p>Check the I/O controller chip on the system board for any cold or loosed soldering.</p> <p>Replace the system board.</p>
Parallel device does not work	<p>Check if all connections are properly set.</p> <p>Check if external device is turned on.</p> <p>Check I/O controller chip on the system board for any cold or loosed soldering.</p> <p>Replace the system board.</p>

## Appendix A

---

# Video Modes

The C&T 65548 VGA chipset supports high resolution fixed frequency and variable frequency analog monitors in interlaced and non-interlaced modes of operation. Digital monitor support is also built-in. The tables in this section list all 65548 CRT monitor video modes.

---

**NOTE:** The letter “I” under the Hex Mode column for the succeeding tables denotes Interlaced monitors.

---

### VGA STANDARD MODES

The following table lists VGA standard modes.

**Table A-1 VGA Standard Modes (Text Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
0, 1	16	40 x 25	9 x 16	360 x 400	28.322	31.5	70
		40 x 25	8 x 14	320 x 350	25.175		
		40 x 25	8 x 8	320 x 200	25.175		
2, 3	16	80 x 25	9 x 16	720 x 400	28.322	31.5	70
		80 x 25	16	640 x 350	25.175		
		80 x 25	8 x 14	640 x 200	25.175		
7	Mono	80 x 25	9 x 16	720 x 400	28.322	31.5	70
		80 x 25	16	720 x 350			
		80 x 25	9 x 14	720 x 350			
			9 x 8				

---



**Table A-2 VGA Standard Modes (Graphics Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
4	4	40 x 25	8 x 8	320 x 200	25.175	31.5	70
5	4	40 x 25	8 x 8	320 x 200	25.175	31.5	70
6	2	80 x 25	8 x 8	640 x 200	25.175	31.5	70

**Table A-3 VGA Standard Modes (Planar Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
D	16	40 x 25	8 x 8	320 x 200	25.175	31.5	70
E	16	80 x 25	8 x 8	640 x 200	25.175	31.5	70
F	Mono	80 x 25	8 x 14	640 x 350	25.175	31.5	70
10	16	80 x 25	8 x 14	640 x 350	25.175	31.5	70
11	2	80 x 30	8 x 16	640 x 480	25.175	31.5	70
12	16	80 x 30	8 x 16	640 x 480	25.175	31.5	70

**Table A-4 VGA Standard Modes (Packed Pixel Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
13	256	40 x 25	8 x 8	320 x 200	25.175	31.5	70

---

## VGA EXTENDED MODES

The C&T 65548 VGA BIOS supports standard VESA and extended modes, listed in the following table.

**Table A-5 VGA Extended Modes (Text Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
60	16	132 x 25	8 x 16	1056 x 400	40.0	30.5	68
61	16	132 x 50	8 x 16	1056 x 400	40.0	30.5	68

**Table A-6 VGA Extended Modes (4-Bit Linear Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
20	16	80 x 30	8 x 16	640 x 480	25.175	31.5	60
22	16	100 x 37	8 x 16	800 x 600	40.0	37.5	60
24	16	128 x 48	8 x 16	1024 x 768	65.0	48.5	60
24I					44.9	35.5	43

**Table A-7 VGA Extended Modes (8-Bit Linear Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
30	256	80 x 30	8 x 16	640 x 480	25.175	31.5	60
32	256	100 x 37	8 x 16	800 x 600	40.0	37.5	60
34*	256	128 x 48	8 x 16	1024 x 768	65.0	48.5	60
34I*					44.9	35.5	43

**Table A-8 VGA Extended Modes (15-Bit Linear Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
40*	32K	80 x 30	8 x 16	640 x 480	50.350	31.5	60

**Table A-9 VGA Extended Modes (16-Bit Linear Mode) - 1MB Video Memory Only**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
41	64K	80 x 30	8 x 16	640 x 480	50.350	31.5	60

**Table A-10 VGA Extended Modes (24-Bit Linear Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
50*	16	80 x 30	8 x 16	640 x 480	65.0	27.1	51.6

**Table A-11 VGA Extended Modes (Planar Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
6A, 70	16	100 x 37	8 x 16	800x 600	40.0	38.0	60
72, 75	16	128 x 48	8 x 16	1024 x 768	65.0	48.5	60
72, 75I					44.9	35.5	43

**Table A-12 VGA Extended Modes (Packed Pixel Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
78	16	80 x 25	8 x 16	640 x 400	25.175	31.5	70
79	256	80 x 30	8 x 16	640 x 480	25.175	31.5	60
7C	256	100 x 37	8 x 16	800 x 600	40.0	37.5	60
7E*	256	128 x 48	8 x 16	1024 x 768	65.0	48.5	60
7EI*					44.9	35.5	43

## VGA HIGH REFRESH MODES

The following tables list VGA high refresh modes.

**Table A-13 VGA High Refresh Modes (Packed Pixel Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
30	256	80 x 30	8 x 16	640 x 480	31.5	37.5	75
32*	256	100 x 37	8 x 16	800 x 600	49.5	46.9	75

**Table A-14 VGA High Refresh Modes (Planar Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
12	16	80 x 30	8 x 16	640 x 480	31.5	37.5	75
6A, 70	16	100 x 37	8 x 16	800 x 600	49.5	46.9	75

**Table A-15 VGA High Refresh Modes (Packed Pixel Mode)**

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
79	256	80 x 30	8 x 16	640 x 480	31.5	37.5	75
7C*	256	100 x 37	8 x 16	800 x 600	49.5	46.9	75

## **Battery Replacement**

A lithium battery in your computer maintains system configuration information. In the event that the battery fails to maintain system configuration information, NEC recommends that you replace the battery.

**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.

## **Battery Disposal**

Your bridge battery (not your main battery) is made of Nickel Metal Hybrid (NiMH). The bridge battery must be collected, recycled, or disposed of in an environmentally-approved manner.

Your main battery, made of Lithium Ion (Li-Ion), and your CMOS lithium battery are not recyclable.

The incineration, landfilling, or mixing of Li-ION and NiMH batteries with the municipal solid waste stream is prohibited by law in most areas.

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

---

# Index

## A

- AC adapter
  - connecting, 1-10
- AC power adapter, 3-11
- AC/DC adapter specifications, 2-16

## B

- Battery
  - discharged, 1-5
  - removing, 1-9
- Battery charger specifications, 2-15
- Battery compartment latch, 1-14
- Battery compartment release lock, 1-9
- Battery features, 3-11
- Battery packs
  - handling, 4-2
- Battery specifications, 2-14
- Battery types, 1-9
- BIOS, 3-3
- BIOS informational messages, 5-7
- BIOS Setup utility, 1-15, 3-3
- BIOS upgrade procedure, 1-21
- Bottom features, 1-14

## C

- CD-ROM reader specifications, 2-14
- Cleaning the notebook
  - exterior, 4-1
  - interior, 4-2
- CMOS battery
  - discharging, 1-17
- COM 1, 1-13
- Connecting an external PS/2 mouse, 1-11
- Converter board specifications, 2-8
- CPU, 1-2
  - P54CSLM, 3-3
  - removing, 4-7

## D

- DC/DC converter specifications, 2-15
- DIMM module, 1-20

## Disassembly

- battery pack, 4-4
  - CPU, 4-7
  - diskette drive, 4-5
  - hard disk drive, 4-5
  - heat plate, 4-7
  - I/O board, 4-9
  - keyboard, 4-6
  - LCD, 4-8
  - LCD status bar cover, 4-6
  - LED board, 4-9
  - Power board, 4-12
  - required tools, 4-3
  - system board, 4-9
  - top cover, 4-8
  - VersaGlide, 4-8
- Disassembly procedures, 4-4
- Diskette drive
  - standard, 1-8
- Diskette drive specifications, 2-13

## E

- Embedded numeric keyboard, 1-5
- Environmental specifications, 2-21
- EPROM chip, 3-3
- External keyboard, 1-11
- External monitor
  - connecting, 1-12
- External VGA, 3-8

## F

- FastFacts, 5-2
- Features, 1-2
- Field service guidelines, 4-1
- Field-replaceable parts list, 4-13
- Floating point unit, 3-4
- Fn keys, 1-6
- Functional block diagram, 3-2

## H

- Hard disk drive compartment, 1-9
  - Hard disk drive specifications, 2-14
-

Hard disk drives

protecting, 4-2

Hard disk subsystem, 3-10

Hardware reset switch, 1-10

HDD LED, 3-10

Hot key descriptions, 2-21

**I**

I/O board specifications, 2-10

I/O subsystem, 3-6

Illustrated Parts Breakdown (IPB), 4-13

Intel P54CSLM, 3-3

**K**

Keyboard, 1-5

Keyboard controller, 3-8

Keyboard specifications, 2-16

**L**

LCD cover switch, 1-4

LCD inverter board, 3-11

LCD quality

maintaining, 4-3

LED indicator board specifications, 2-9

LED status indicators, 2-13

**M**

Memory

DRAM, 3-6

ROM, 3-6

upgrading, 1-19

Memory compartment, 1-7

Memory compartment cover, 1-14

Memory configurations, 1-19

Memory controller, 3-5

Memory subsystem, 3-6

Microprocessor, 3-3

Model configurations, 1-1

**N**

NEC service telephone numbers, 5-1

NiMH battery, 1-9

features, 3-11

Num lock key, 1-6

**P**

Packaging and documentation

part numbers, 4-16

Part numbers, 4-13

PCMCIA controller, 3-9

PCMCIA slot

using, 1-8

PCMCIA sockets, 3-9

PHDisk utility, 1-21

POST messages, 5-4

Power board, 3-11

Power connector, 1-10

Power management modes, 2-19

Power specifications, 2-22

Power subsystem, 3-10

Power switch, 1-4

Power-on self test (POST), 1-15

Preventive maintenance, 4-1

Printer

connecting, 1-13

Product information

Using FastFacts, 5-2

PS/2 mouse, 1-11

**Q**

Quick troubleshooting, 5-9

**R**

Resolution, 3-8

Run-time error messages, 5-8

**S**

SCANDISK, 4-2

Separating the system and I/O boards, 4-10

Serial port, 1-13

Service information, 5-1

Setup utility, 1-15

menu, 1-15

Shock specifications, 2-23

Specifications

system, 2-1

Status indicators, 2-13

Status panel LEDs, 1-5

Subsystems, 3-1

System BIOS, 3-3

System board specifications, 2-7  
System configuration diagram, 1-3  
System faetures, 1-2  
System logic controller, 3-4  
System processor, 3-3  
System specifications, 2-1  
System upgrades, 1-19

## **T**

Technical support  
    contacting, 5-1  
Transfer board specifications, 2-8  
Troubleshooting checklist, 5-3

## **V**

VersaGlide, 1-7  
VersaGlide subsystem, 3-10  
VGA extended modes, A-3  
VGA high refresh modes, A-5  
VGA port, 1-12  
VGA standard modes, A-1  
VGA VESA driver diskette, 1-12  
Vibration specifications, 2-22  
Video controller, 3-7  
    features, 3-7  
Video modes, A-1

## **Y**

Y-adapter, 1-11

---