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First Printing — March 1996

Preface

This service and reference manual contains the technical information necessary to set up, and maintain the NEC Versa® 550 Series notebook computer. It also provides hardware and interface information for users who need an overview of the docking station design. The manual is written for NEC-trained customer engineers, system analysts, service center personnel, and dealers.

The manual is organized as follows:

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

Section 2 — NEC Versa 550 Specifications, lists system specifications including dimensions, weight, environment, safety compliance, and power consumption.

Section 3 — Hardware Functional Blocks, 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 — Supported Video Modes, provides a list of video modes available for use with the notebook.

An **Index** is included for convenience.

Abbreviations

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

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

tpi	tracks per inch
UART	universal asynchronous receiver/transmitter
V	volt
Vdc	volts, direct current
VESA	video electronics standards association
VFO	variable frequency oscillator
VGA	Video Graphics Array
VLSI	very large-scale integration
VRAM	virtual RAM
W	watt
µf	microfarad
µPD	microprocessor
µs	microsecond
Ω	ohm

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Section 3 Hardware Functional Overview

Section 4 Field Service Guidelines

Section 5 Troubleshooting and Repair

Appendix A Supported Video Modes

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Section 1

Technical Information

This section focuses on providing the features and operations of the NEC Versa 550 Series including the BIOS Setup program. Refer to the User's Guide for more information on how to operate the notebook. The NEC Versa 550 Series of notebooks are lightweight, compact, and fully IBM compatible computers.

The NEC Versa 550 Series comes with the following model configurations:

Table Section 1-1 Model Configurations

Configuration	Versa 500D (1)	Versa 500D (2)	Versa 550D
CPU	Cyrix 486Dx4-75	Cyrix 486DX4-75	Cyrix 5x86-100
On-Board DRAM	4 MB	8 MB	8 MB
Video Memory	512 KB	1 MB	1 MB
Hard Disk Drive	340 MB	340 MB	540 MB
Color LCD	9.4" DSTN LCD	9.4" DSTN LCD	10.4" DSTN LCD
Battery Pack	A (2400mA NiMH)	A (2400mA NiMH)	B (2800mA NiMH)

NOTE: Models 1 and 2 are European models only.

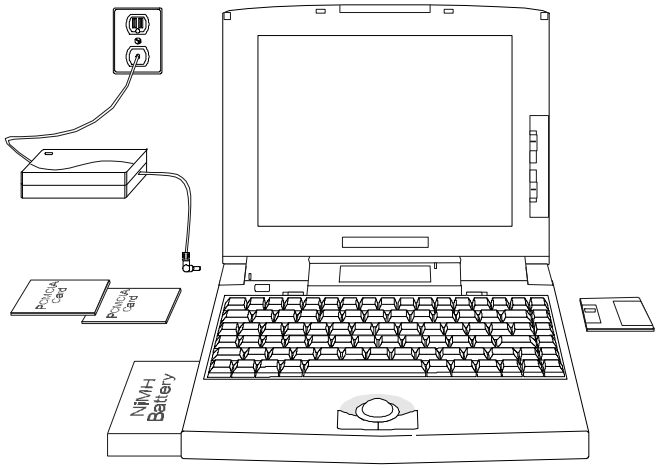


Figure Section 1-1 NEC Versa 550 Series Notebook

FEATURE HIGHLIGHTS

The NEC Versa 550 notebook series includes a variety of innovative features designed to meet the most demanding computing requirements:

Table Section 1-2 Feature Highlights

Features	Description
CPU	Cyrix 486DX4-75MHz (Cyrix 5x86-100MHz for Versa 550D) processor with internal 8KB cache memory (16KB for Cyrix 5x86) and math coprocessor
Memory	On-board 8MB RAM (4MB for Versa 500D1) and can be upgraded to 24MB (20MB for Versa 550D1)
Display	9.4” DSTN VGA Color LCD (10.4” for Versa 550D) at 640 x 480 pixels resolution with 256 colors
VGA	32-bit Video local bus VGA controller / 1MB RAM Video Memory (512KB for Versa 550D1) / Supports up to 1024 x 768 pixels resolution for external CRT monitor with 256 colors (16 colors for Versa 550D1)
HDD	Built-in 2.5-inch IDE high capacity hard drive (19mm / 17mm height)
FDD	Built-in 3.5-inch 1.44MB floppy disk drive
Keyboard	Built-in 85/86-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
Pointing Device	Large integrated 19mm trackball
PCMCIA Slot	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
I/O Port	1 x Serial Port / 1 x Printer Port / 1 x VGA Port / 1 x PS/2 keyboard & mouse port
Power System	Auto-switching AC Adapter (90V - 264V) / Rechargeable NiMH Battery pack / Advanced power management capabilities

SYSTEM CONFIGURATION

The following figure illustrates the Versa 500 Series configuration.

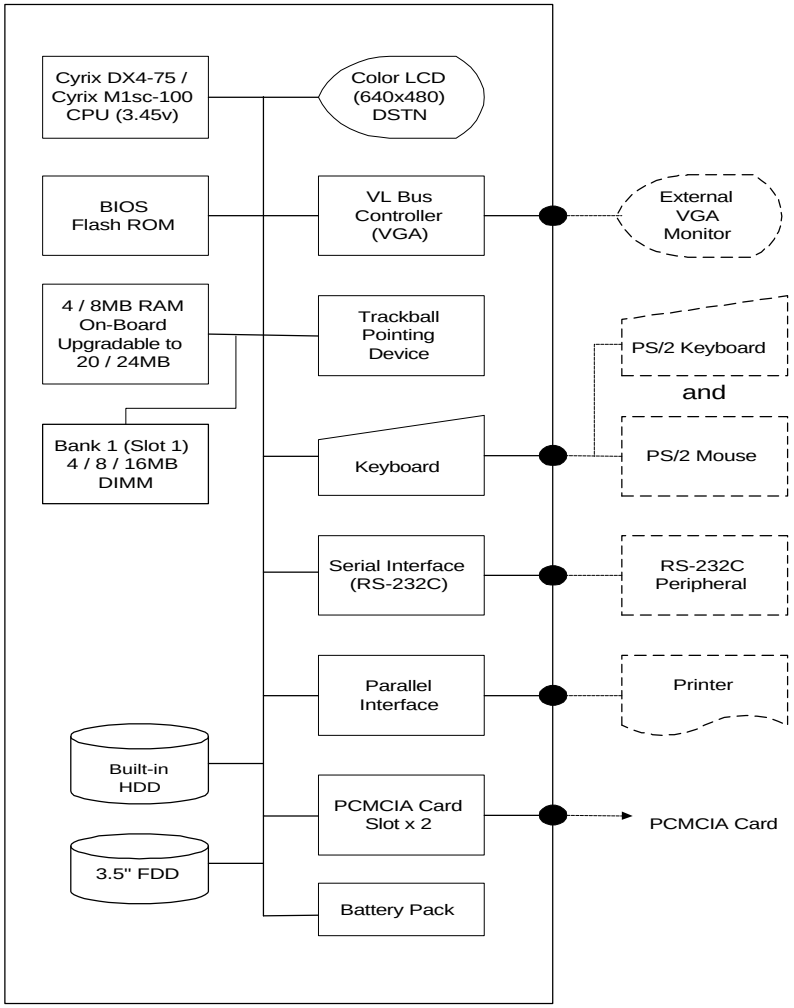


Figure Section 1-2 System Configuration Diagram

QUICK TOUR OF THE NOTEBOOK

Take a moment to become familiar with the location and function of controls, (the LCD status panel, connectors, and ports), illustrated in this section. It is recommended to first go through the NEC Versa User's Guide of the notebook for more added information on how to operate its feature as well as proper installation.

The Front Side of the Notebook

The following figure shows front side features.

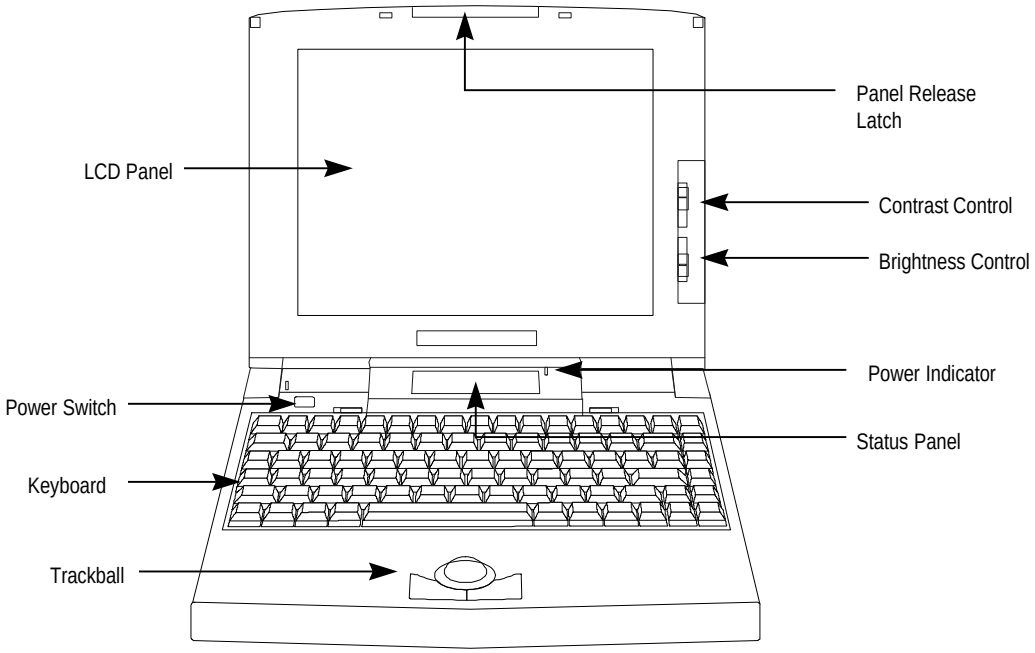


Figure Section 1-3 Front of the Notebook

Color LCD Display Panel

Both the NEC Versa 500D1 and 500D2 have a built-in 9.4" passive matrix dual scan STN (DSTN) color liquid crystal display (LCD) that you could adjust and tilt to your desired viewing position. The LCD provides 640 x 480 pixels resolution at maximum 256 colors and supports simultaneous display with an external VGA monitor. The NEC Versa 550D provides a 10.4" DSTN color LCD that also supports 640 x 480 pixels resolution at maximum 256 colors and simultaneous display with the external monitor.

The LCD screen also uses CCFT (Cold Cathode Fluorescent Tube) backlighting which consumes much of the power of 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 adjust the brightness and contrast level of the LCD by adjusting the Brightness and Contrast controls found on the right side of the LCD panel.

Power Switch/LCD Cover Switch

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

NOTE: Always wait for a few seconds in between turning off and on the power. Check if the power switch is turn off before installing the power supply.

Also just on top of the power button switch found at the edge of the LCD 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, the button will either switch the notebook to Suspend mode or just shuts off the LCD when you close the LCD panel.

NOTE: If the NEC Versa 550 has been left unused for a prolonged period of time with the AC adapter disconnected, it is possible for the battery to become completely discharged. In such case, it is necessary to connect the AC adapter for approximately 30 minutes before the battery begins to recharge normally.

Status Panel and Power Indicator

Right below the LCD panel, just at the center and inclined 45 degrees, is the Status Panel LCD Bar. This LCD bar provides an easier way to distinguish the actual status of the notebook's operation. Different graphic icons will appear on the LCD bar indicating either a device being accessed, an operation being done, or a certain mode being activated. The graphic icons displayed on the LCD bar resembles either their physical characteristics or their primary function.

Also found just on the upper rightmost of the LCD Status Bar is the Power LED Indicator which activates (yellow color) whenever the computer's power is on.

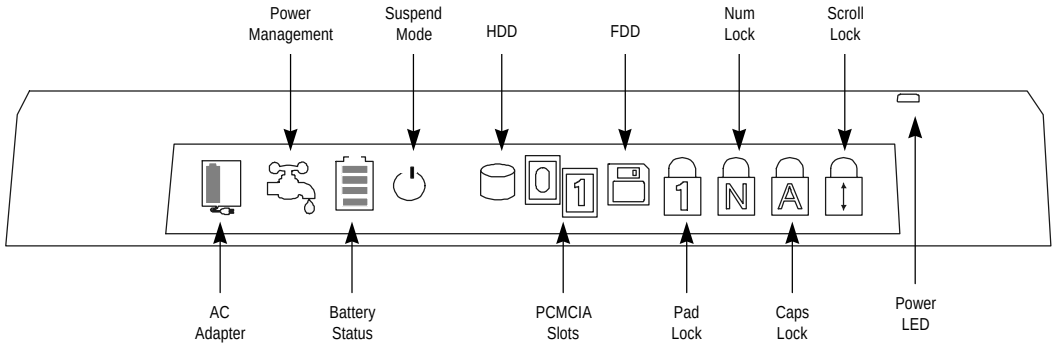
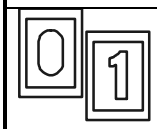
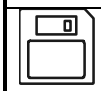
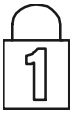
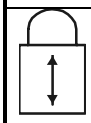


Figure Section 1-4 LCD Status Bar

Table Section 1-3 LCD Status Bar Icons and Description

Graphic Icons	Description
	Activates when system is powered by AC adapter. The battery cell inside indicate that the battery pack is being charged also and will disappear when battery has been fully charged. The icon will blink whenever you first connect the AC adapter and recharging initializes.
	Activates if power management feature is enabled. The power management setup is found on the CMOS SETUP program.
	Activates when battery is in use. When battery is already running low, the icon will start to blink and will generate an intermittent audible beep. This warns you to save your data files and connect an AC adapter or swap battery pack.
	This icon informs you that the system is in “save-to-RAM” suspend mode when blinking. Press any key to resume operation.
	Activates whenever the hard disk drive is being accessed. To avoid any data loss, never turn off the computer when this icon is visible.
	Activates whenever a PCMCIA card is inserted. The “0” icon will appear when a PC card is inserted in the upper slot while the “1’ icon will appear if a card is inserted into the bottom slot.
	Activates whenever the floppy disk drive is being accessed. To avoid any data loss, never turn off the computer when this icon is visible.
	This icon, when visible, informs you that the keyboard Pad Lock function is engaged. The Pad Lock function activates the keyboard’s embedded editing keys, but only if the Num Lock is disengaged.

	This icon activates whenever the Num Lock key is enabled. This allows you to use the embedded numeric keypad. Press the Num Lock key again to disable.
	This icon activates whenever the Caps Lock key is engaged. When activated, the letters entered on the keyboard will be in capital letters (upper case).
	This icon, when visible, informs you that the keyboard Scroll Lock function is engaged. When visible, text scrolls without altering the cursor position on screen.

Keyboard

The notebook has a built-in 85/86-key keyboard that provides complete emulation of a full-sized IBM AT-enhanced keyboard with function keys and screen/cursor control keys.

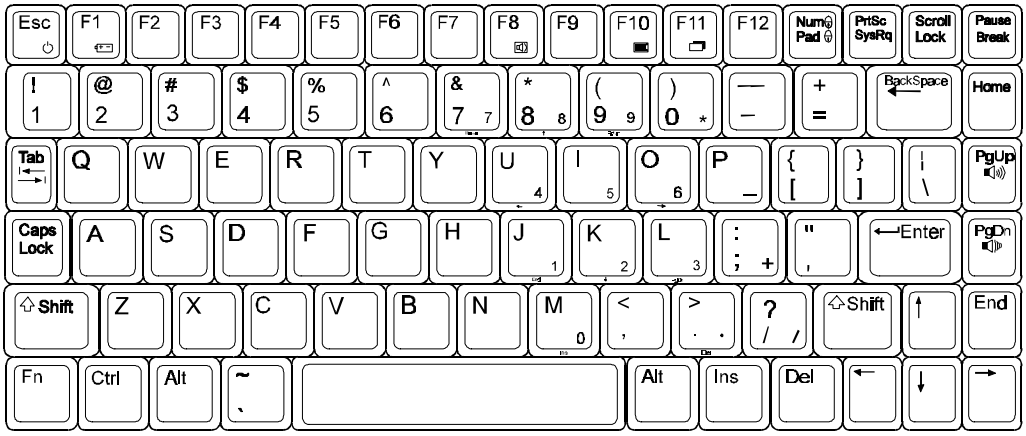


Figure Section 1-5 Standard Keyboard Layout

The notebook keyboard is a little bit different from a standard desktop keyboard. Aside from the normal alphanumeric characters and the standard keyboard function keys, the notebook keyboard includes an embedded numeric keypad, and special function keys that activates by pressing the **<Fn>** key together with another key. These special function keys or more popularly known as “hot keys” allows you to control and adjust some of the notebook’s function like display controls, speaker volume, and power management feature. The embedded numeric keypad is activated by pressing the **<Num Lock>** key. The LCD Status Bar will display the Num Lock graphics icon to indicate that the Num Lock key has been activated.

NOTE: Activating the Num Lock key (embedded numeric keys) will in turn disable the actual alphanumeric keys where the embedded keys are located (i.e. pressing the “K” on the keyboard will show “2” instead). Press the **<Num Lock>** key again to disable the embedded keys and resume normal keyboard operation.

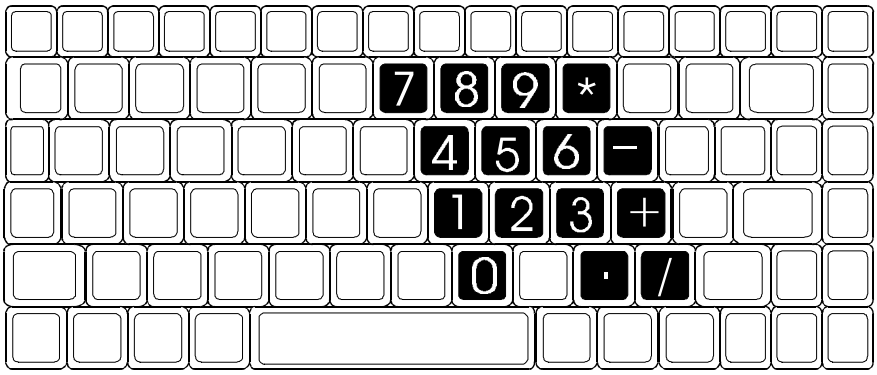


Figure Section 1-6 Embedded Numeric Keypad

Table Section 1-4 Fn Key Combination Summary

Key Combination	Function
<Fn> key + **<Esc>** key	This key combination puts the system in Suspend mode.
<Fn> key + **<F1>** key	This key combination brings up the Power Management menu.
<Fn> key + **<F8>** key	This key combination toggles between enabling and disabling the battery low warning beep.
<Fn> key + **<F10>** key	This key combination toggles between video display output to the LCD display or to an external CRT monitor.
<Fn> key + **<F11>** key	This key combination toggles the LCD display backlighting (CCFT) on and off.
<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 key caps. To engage the editing keys, first press the **Fn + Pad|Lock** key combination and then press the Num Lock key.

When the embedded editing keys are operational, the Pad Lock status icon is activated while the Num Lock status icon is off. To return to normal keyboard operation, press the **Fn + Pad|Lock** key combination again. If both the Pad Lock and the Num Lock status icons are activated, the embedded numeric keypad takes precedence.

You will also find two retaining latches just above the keyboard panel. These latches release the keyboard to give you easy access to the inside of the notebook in performing maintenance and upgrades.

Trackball

In front of the keyboard panel, just right at the center of the palm rest typing surface, is the Trackball pointing device. The button below and to the left of the trackball is configured (by default) as the left button you normally click on the mouse while the button to the right of the trackball is configured as the right button. Moving the pointer on the screen is done by rolling the ball with your finger and directing the pointer to where you want to go. The Trackball is compatible with the standard PS/2 mouse and can be activated using the normal DOS or Windows IBM or PS/2 mouse driver.

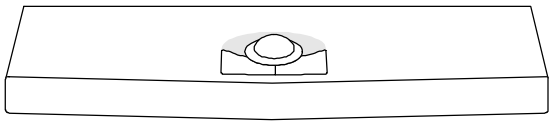


Figure Section 1-7 Trackball

The Right Side of the Notebook

The following figure shows NEC Versa 500 Series right side features.

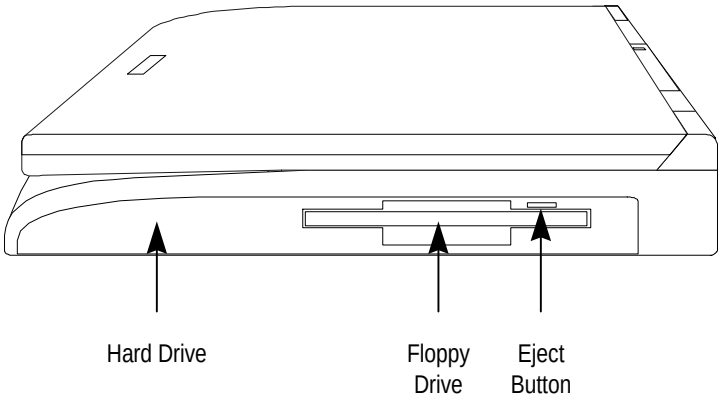


Figure Section 1-8 Right Side of the Notebook

Built-in Floppy Disk Drive

On the right 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.

Hard Disk Drive Compartment

Just beside the floppy disk drive is the notebook's internal hard drive. The NEC Versa 550 provides industry standard 2.5-inch IDE hard disk drive at 340MB and 540MB. The System BIOS of the notebook also includes Auto IDE detection and LBA mode for easy installation as well as later upgrade for higher capacity disk drives.

The Left Side of the Notebook

The following figure shows NEC Versa 500 Series left side features.

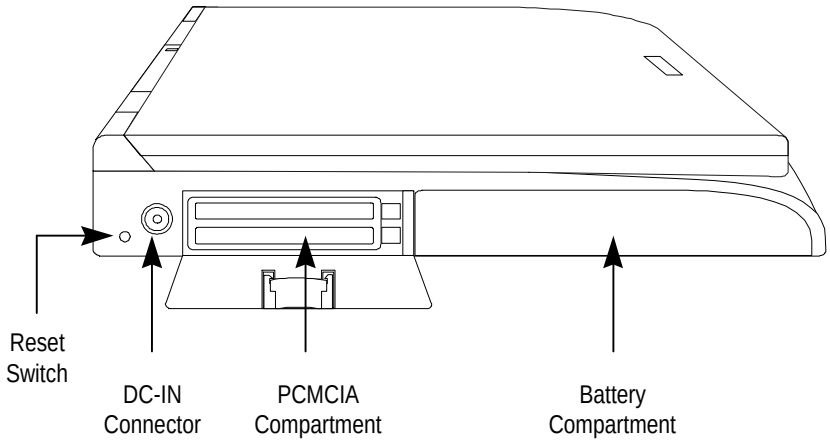


Figure Section 1-9 Left Side of the Notebook

Battery Compartment

To the left corner side of the notebook is the battery compartment which houses the re-chargeable NiMH battery pack. The battery pack is instantly charge 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 and conditioned by the AC adapter. Leaving the battery pack unistalled for a long period would drain the battery cells completely, and may cause deterioration to the entire battery pack.

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

NOTE: There are two types of battery pack for the Versa 550 Series. The two Versa 500 models use Type A battery pack swith 2400mA; while the NEC Versa 550D model uses Type B battery pack with 2800mA. Battery packs are not interchangeable.

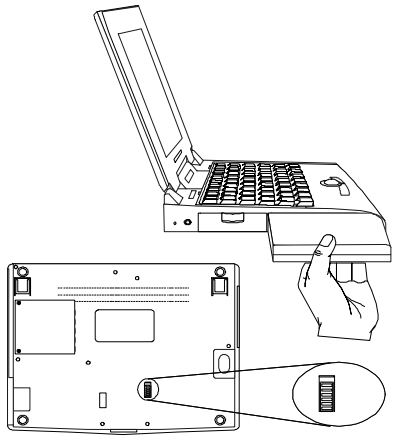


Figure Section 1-10 Removing the Battery Pack

PCMCIA Slot Compartment

The PCMCIA slot compartment houses two card slots that support two PCMCIA Type II devices or one Type III device. For Type III cards, insert into the upper 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 550 Series also comes with DOS/Windows PCMCIA drivers for supporting various PCMCIA cards like modem cards, network cards.

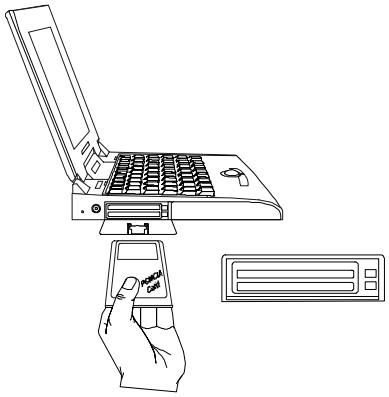


Figure Section 1-11 Inserting a PCMCIA card

DC-IN Connector Jack

To the left of the PCMCIA compartment, you will find a connector jack where you plug in the AC adapter of the notebook. The NEC Versa 550 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 model that comes with the NEC Versa 550 notebook.

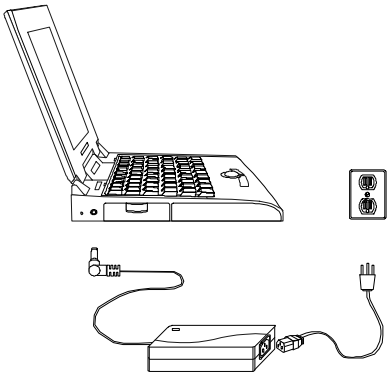


Figure Section 1-12 Connecting the AC Adapter to the Notebook

Hardware Reset Switch

To the left 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 Side of the Notebook

The following figure shows NEC Versa 500 Series rear side features.

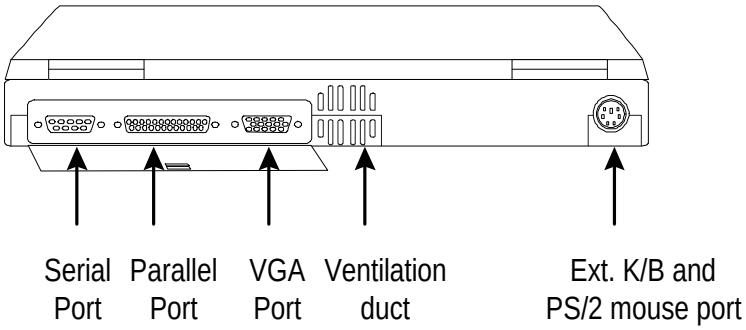


Figure Section 1-13 Rear Side of the Notebook

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 550 also provides an optional Y-connector adapter allowing simultaneous use of external AT-enhanced keyboard and PS/2 mouse. When an external PS/2 mouse is connected using the Y-connector, the built-in trackball will automatically be disabled.

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 disables the built-in trackball device.

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 550D1 and 640x480 at 64K colors, 800x600 at 256 colors, and 1024x768 at 256 colors for both the NEC Versa 500D2 and 550D2.

The NEC Versa 550 series provides 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 640x480 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.

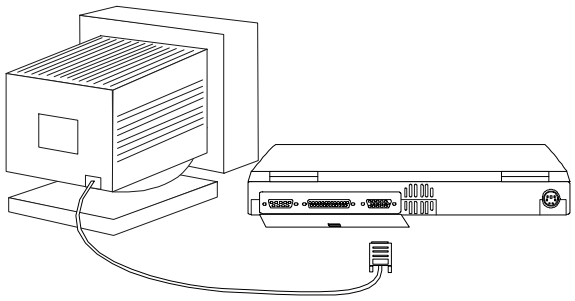


Figure Section 1-14 Connecting an External Monitor

Printer Port (LPT 1)

The 25-pin printer port provides a parallel interface to which you can 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 Bidirectional.

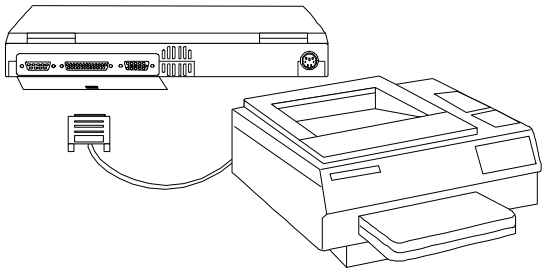


Figure Section 1-15 Connecting to the Printer Port

Serial Port (COM 1)

The 9-pin serial port provides a serial interface to which you can connect an RS-232C device such as external serial pointing device or modem. This port is commonly referred to as COM1.

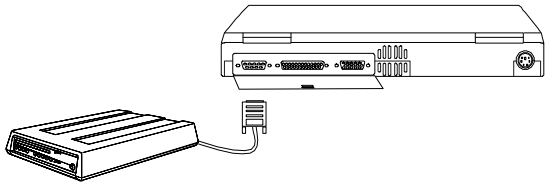


Figure Section 1-16 Connecting to the Serial Port

NOTE: First power off the system before connecting an external serial mouse. After turning on the power again, run the BIOS SETUP program and disable the Trackball.

The Base of the Computer

See the following figure for NEC Versa 500 Series bottom features.

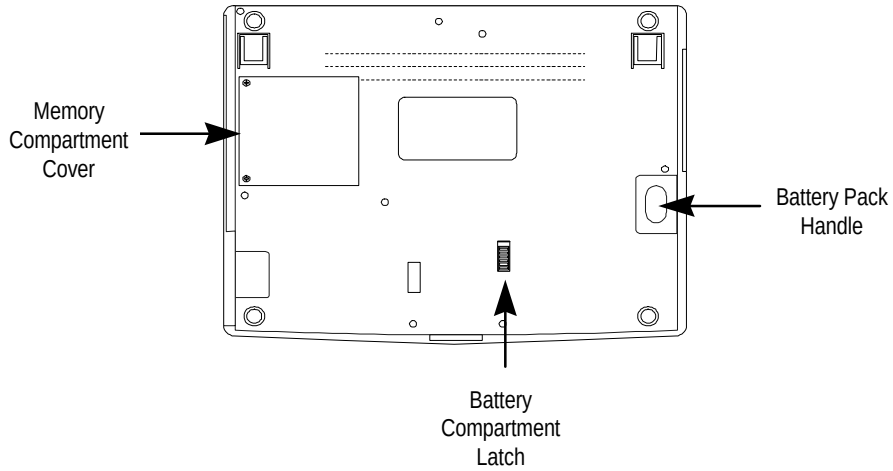


Figure Section 1-17 The Base of the Notebook

Battery Module Handle and Lock

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

Memory Slot Compartment Cover

The memory slot compartment cover is secured with two retaining screws. Inside is a memory slot compartment where you can upgrade the system memory of the notebook using standard single inline memory modules (SIMMs).

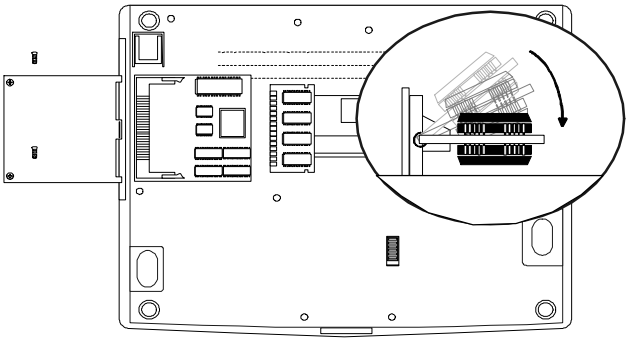


Figure Section 1-18 Memory Slot Compartment

SYSTEM BIOS SETUP PROGRAM

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

Press <Ctrl><Alt><S> to Enter SETUP

Press the **<Ctrl><Alt><S>** key combination to run the BIOS Setup program. The BIOS Setup program is organized into two pages of menu which you can select 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 Bootup Setting Menu

The bootup settings menu allows you to change the following configuration:

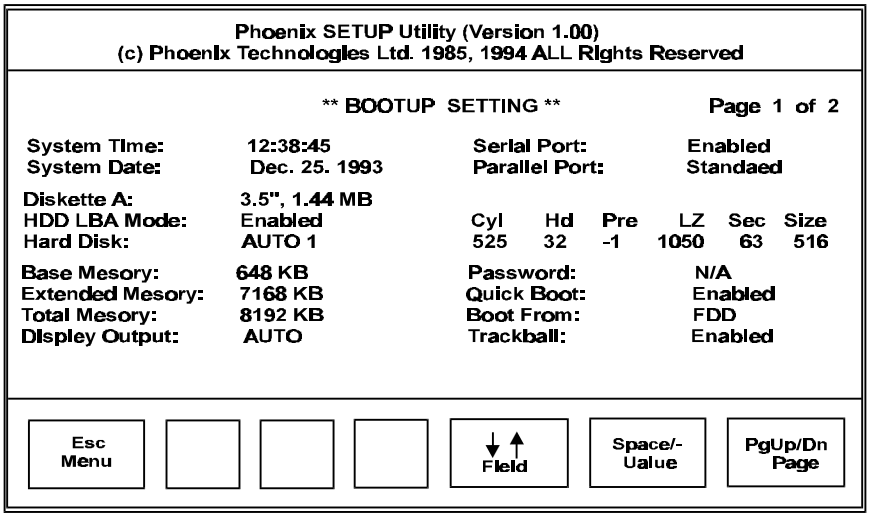


Figure Section 1-19 The Bootup Setting Menu

Table Section 1-5 Bootup Setting Menu

Item	Function
System Time	This option allows you to change the system time, using the format *hour : minute : second*. 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 *month day, year*. 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 *3.5", 1.44MB disk drive*.
HDD LBA Mode	The Versa 550 supports LBA (logical block addressing) mode which is *Enabled* automatically for large capacity hard drives over DOS' limit of 528MB.
Hard Disk	This option allows you to specify the type of hard drive mounted inside the notebook. Always select the *Auto 1* option to instruct the BIOS to automatically detect the relevant parameters of the hard drive. Some hard drive, however, do not respond correctly to the values detected. In such cases, you must select search from the list if the make and model of the drive is listed. Otherwise, select *User 1* and manually enter the manufacturer's recommended drive parameters.
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 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 memory address map. Because all models in the Versa 550

	series ship have a minimum of 4MB/8MB of memory as standard configuration, this value should not be less than 3072KB.
Total Memory	This field reports the total amount of memory found by the BIOS during POST. The value displayed is the sum of the base and extended memory, plus the 384KB of memory reserved to the system for BIOS and BIOS extension addresses. This value should not be less than 4096KB.
Display Output	This option allows you to configure the notebook for video display output between the LCD panel, the external VGA port, or both. Select *Auto* to instruct the notebook to automatically detect connection to an external monitor or display output to the LCD panel. Otherwise, select *SimulScan* for simultaneous output to both LCD panel and external monitor. 550D (2) and 550D models have these two options, but 550D (1) model this field is fixed to “Auto”, can not be configured.
Serial Port	This option allows you to enable or disable the notebook’s serial port as COM1 (at address 03F8h). The default setting is Enabled.
Parallel Port	This option allows you to configure the notebook’s parallel port as a Standard or Bidirectional printer port, or to disable the port altogether. The default setting is Standard.
Password	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. Note: If you forget the password of the computer, the only way to access the system again is to discharge the CMOS battery.
Quick Boot	This option allows you to configure the computer to shorten or skip some non-critical tests during the BIOS POST, and thus speed up the boot process.
Boot From	This option allows you to configure the computer to which drive it will first try to look for the operating system. Select *HDD* only if the hard drive already holds an operating system and all necessary startup file configuration. Select *FDD* when you need to boot the operating system from the floppy diskette. If there is no diskette found on the floppy drive, the computer will then try to load the operating system from the hard drive.
Trackball	This option allows you to enable or disable the built-in trackball. If you need to attach an external serial mouse, you should disable this option so that the system will try to look for the serial mouse.

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

THE POWER MANAGEMENT SETTING MENU

The Power Management Setting menu allows you to configure the power saving controls of the computer.

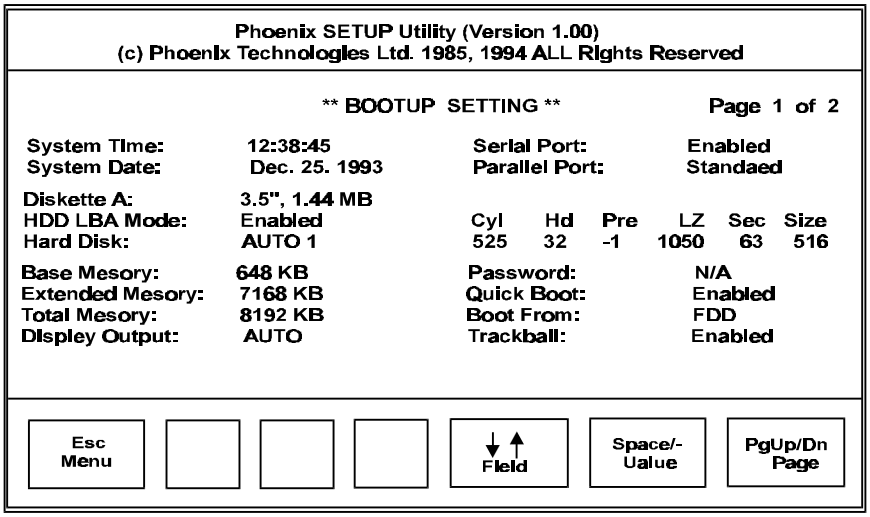


Figure Section 1-20 Power Management Setting Menu

Table Section 1-6 Power Management Setting Menu

Item	Function
Power Saving Mode	This option allows you to enable or disable power management. When this option is *Disabled*, all other power management settings are ignored and disabled as well. When set to *AC Disabled*, the power management is disabled only when the computer is powered by the AC adapter.
HDD Off Timer	This option allows you to select a specific time-out value after which the hard drive is powered down. Possible values include *Disabled*, *1*, *2*, *5*, *10*, or *15 minutes*. When not disabled, the hard drive will power down 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. Set this option to *Disable* if you want the hard drive to be always spinning.

Table 1-6 Power Management Setting Menu

Item	Function
Auto Sleep Timer	This option allows you to specify the time-out value after which the computer goes to Sleep mode. Possible values include *Disabled*, *1*, *2*, *4*, *6*, *8*, *12*, or *16 minutes*. When not disabled, the computer will switch to Sleep mode after the preset time of inactivity. During Sleep mode, the computer operates only at low power level. All devices are in standby, all clocks are set to their lowest state, and the CPU clock slowed down.
Auto Suspend Timer	This option allows you to specify the time-out value after which the computer goes to Suspend mode. Possible values include *Disabled*, *5*, *10*, *15*, *20*, *30*, *40*, or *60 minutes*. When not disabled, the computer will switch to Suspend mode after the preset time of inactivity. During Suspend mode, the computer becomes inactive, all devices are in Suspend mode and the CPU is powered off. Also, before activating Suspend mode, the data needs to be stored first by the computer either to the memory or to the hard disk. Refer to the *Save to* option for more details.
Auto Power Reduction	This option allows you to enable or disable automatic and dynamic microprocessor power reduction during inactivity. If enabled, the available options reflect an inverse relationship between maximum power savings and maximum performance, since the CPU reduces power consumption by clocking down to slower speeds. Possible values include *Disabled*, *Highest Power Saving*, *Medium Performance*, or *Highest Performance*.
Video Monitor	This option allows you to specify if a Sleep or Suspend time-out can occur during video display memory access. For example, if this option is *Enabled*, any attempt by the system to update the display has the effect of a resume event. Note: If you use “screen saver” software, the Video Monitor should be set to *Disabled*.
Cover Switch Activity	This option allows you to effectively program the type of event which occurs when the display panel is closed. When this option is set to *Beep/Suspend* and the LCD panel is closed, the computer issues an audible tone and enters Suspend mode. When set to *Beep/LCD Off*, an audible tone is issued but only power to the LCD display is cut off. When set to *LCD Off*, power is cut to the LCD display, but no audible tone is issued.

Table Section 1-7 Power Management Setting Menu

Item	Function
Save to	This option allows you to select save-to-RAM or save-to-disk when the computer goes into suspend mode. If you set this option to *save-to-RAM*, only the memory is powered on so that stored register information can be retrieved instantly when a resume event occurs. If you set this option to *save-to-disk*, all information in memory is saved to a special partition on the hard drive and the system powers off. It is important to have a save-to-disk partition on the hard drive when enabling this; otherwise an error message will appear on the display screen when the system restarts.
Schedule Resume	This option allows you to enable or disable a specific real clock time at which the computer exits suspend or sleep mode and go back to normal operation. If *Enabled*, the scheduled resume time is determined by the time entered in the Schedule Time option (see next item).
Schedule Time	If the Schedule Resume option is *Enabled*, this item allows you to enter a specific time at which the computer automatically exits from sleep or suspend mode. The value you enter takes the format *hour:minute*. For example, an entry of 7:30 will cause the system to exit from sleep or suspend mode at 7:30 AM.
Battery Gauge	Below the power management control options, you will notice a gauge which allows you to quickly and easily assess the battery power remaining. The battery gauge bar will be displayed in green color when the battery has at least one-fifth of a power remaining. This extent of the gauge across the bar gives an accurate measurement of the battery power remaining. When the battery has less than one-fifth of battery power, the gauge bar will then be displayed in blinking red, warning of a low battery power condition. If the AC adapter is connected to the computer, the battery gauge will disappear and the screen displays “AC Adapter Use”.

NOTEBOOK DRIVERS AND UTILITIES

The NEC Versa 550 Series notebook computers comes with pre-loaded operating system and application software. Aside from these, the notebook comes with three device driver and utility diskettes which must be installed to enable full operation of the built-in capabilities.

The three drive and utility diskettes are:

- Disk 1 - VGA Driver and Utility Diskette
- Disk 2 - PCMCIA Driver and Utility Diskette
- Disk 3 - Mouse Driver and Additional System Utility Diskette

Installing the VGA Driver and Utility

The Disk 1 of the NEC Versa 550 Series notebook diskette contains the ***C&T 65545 VGA Driver and Utility*** installation program for MS-DOS and Windows based application. The VGA driver allows you to run your DOS and Windows application program in enhanced video modes.

To install the VGA drivers to the hard drive:

1. Start the computer by pressing the power switch. Make sure that the hard drive has been installed with the MS-DOS and Windows 3.1 (or higher) program.
2. Insert the Disk 1 (VGA Driver) to the floppy disk drive. The disk contains the installation program called "**SETUP.EXE**" which provides an easy-to-install procedure in loading the VGA mode drivers to the Windows subdirectory of the hard drive.
3. Run the **"A:\SETUP.EXE**" command either from the DOS prompt on drive A: or from the Windows File Manager. This will install primarily the Windows VGA drivers which allows you to set the display to different resolution modes.
4. After installing the Windows VGA drivers, you need to configure the proper display mode you want to have. If you run the installation program on DOS, you need to go to the Windows subdirectory and run the SETUP program. Select the VGA option and select from one of the ***CHIPS GD655XX VL/ISA*** VGA mode drivers. You may also configure the VGA mode drivers under Windows program on the Control Panel.
5. The installation program also includes several DOS VGA drivers and utilities such as drivers for AutoCAD as well as utility programs for VESA and display controls. To install these additional drivers and utilities, run "**SETUP.EXE**" again under the DOS prompt.

NOTE: The NEC Versa 500D(1) with 512KB video memory can only support up to maximum of 256 colors at 640x480. For higher resolution on the external monitor, it can be set to 800x600 at 16 colors or 1024x768 at 16 colors.

The NEC Versa 500D(2) and 550D with 1MB video memory (DSTN LCD) can support up to maximum of 64K colors (high color) at 640x480 on the external monitor. The DSTN LCD can only support up to 256 colors and LCD screen will somewhat flicker when set to 64K colors. For higher resolution on the external monitor, the maximum is 1024x768 at 256 colors.

For Windows 95, you set the C&T VGA driver through the ***Display*** option of the Control Panel. Choose ***the Chips and Technologies VGA Accelerator***.

Installing the PCMCIA Driver

The Disk 2 of the NEC Versa 550 Series notebook diskette contains the ***Phoenix PCM Plus Driver and Utility*** installation program. The Phoenix PCM Plus software program enables the system to use a wide range of PC cards that conform to the standards of PCMCIA. It support a large number of PCMCIA cards like Flash memory, SRAM Memory, Network/LAN, ATA, hard disks, SCSI, and other I/O cards.

To install and setup the PCM Plus program quickly:

1. Insert the Disk 2 in drive A: and type the "**A:\INSTALL.EXE**" command at the DOS prompt.
2. The Phoenix Card Manager Installation screen will appear. Follow the easy-to-understand step by step instructions in completing the installation. Press any key to go into every screen.
3. Choose the "***Quick Mode Installation***" setup to accept all defaults and speed up installation process. You may also choose the Advance Mode if you want to customize the PCM Plus configuration.
4. When asked on the "***Socket Information***" screen menu on the number of sockets, make sure to enter "***2***" as there are two PCMCIA sockets on your computer.
5. For PCMCIA Fax/Modem option, choose ***COM2, COM3*** or ***COM4*** for better results.
6. If you didn't have the APM option or POWER loaded, a power management warning will be displayed. You can ignore this message by pressing the **<Enter>** key.

7. After installation is completed, it will prompt you to reboot your computer in order for the changes to be recognized.

Installing the Mouse Driver

The Disk 3 of the NEC Versa 550 Series notebook diskettes contains the ***Logitech mouse driver and System Utility*** program. The Logitech mouse driver program allows you to enhance the operation of the built-in trackball. Run the "**INSTALL.EXE**" program under the MOUSE subdirectory to automatically install the mouse driver for DOS and Windows environment. Consult the README files inside the diskette for more important information.

Applying the System Utility Programs

The Disk 3 of the NEC Versa 550 Series notebook diskettes also contains two important system utility program under the PHDISK subdirectory: **TIME.SYS** and **PHDISK.EXE**.

TIME.SYS Driver

The **TIME.SYS** device driver included with the NEC Versa 550 Series ensures that the system time is properly updated while the system is in suspend mode. The TIME.SYS driver can be loaded into memory by adding the a device command line to the CONFIG.SYS file on the hard drive:

device=<*PATH*>\time.sys

where PATH represents the drive and directory where the **TIME.SYS** is located.

> **NOTE:** Although an APM driver such as the DOS POWER.EXE utility will also update the system time if loaded, it is highly recommended that the **TIME.SYS** driver be loaded into memory as well. If both the APM driver and the **TIME.SYS** driver are to be loaded into the memory, the **TIME.SYS** should be loaded first before the APM driver.

When using Windows 95, there is no need to load TIME.SYS.

PHDISK.EXE Utility

The **PHDISK.EXE** utility included with the NEC Versa 550 series is used to create a special hard disk partition where the contents of the system memory are saved whenever the Suspend save-to-disk (STD) feature is invoked. The **PHDISK.EXE** utility automatically calculate the size of installed system memory, excluding video memory, and create an appropriately sized partition on the hard drive. Note that save-to-disk partition must be created or reserved when you first configure the hard disk, and that **PHDISK.EXE** can only be run under DOS environment. **PHDISK.EXE** has the following syntax:

PHDISK [options]

where [options] include the following parameters -

/Create [KB]	to create and format a STD partition in KB size
/Reformat	to reformat an existing STD partition
/Delete	to delete the existing STD partition
/Info	to show detailed information about the STD partition
/Vram size	to override the default video ram size of 1024KB

Always reboot the system after you have created or deleted the STD partition so that the NEC Versa 550's PMU (Power Management Unit) can establish the correct suspend mode.

SYSTEM UPGRADES

The NEC Versa notebook is easily upgradable to a faster more powerful microprocessor and higher capacity hard drive. In addition, you can add an optional second memory module to increase the system memory to as much as 24MB. This section provides the settings needed as well as illustration in upgrading the system.

Memory Upgrade Procedure

The NEC Versa notebook allows you to install and expand the on-board 8MB (4MB for NEC Versa 500D1) system memory via the memory compartment found at the base of the notebook. Inside the compartment is an extra memory module socket which can accommodate any standard JEDEC 4MB, 8MB, and 16MB SIMM modules.

For NEC Versa 500D (1) notebooks, the following memory configuration are applicable:

On-Board Memory	Extra Socket	Total Memory
4MB	empty	4MB
4MB	4MB	8MB
4MB	8MB	12MB
4MB	16MB	20MB

For NEC Versa 550D(2) and NEC Versa 550D notebooks, the following memory configuration are applicable:

On-Board Memory	Extra Socket	Total Memory
8MB	empty	8MB
8MB	4MB	12MB
8MB	8MB	16MB
8MB	16MB	24MB

To upgrade the memory on the notebook, follow the steps below:

1. Power off the computer and remove the AC adapter and battery pack.
2. Turn the notebook upside down with the base facing up. Locate the memory compartment cover which is secured with two small retaining screws and remove them. Inside you will find one memory expansion slot.
3. Remove the extra SIMM module from its anti-static wrapping. Make sure that you are properly grounded before handling the memory module. Hold the memory module with its connector pointed towards the memory socket. Hold the module at 60-degrees (see Figure 1-19) and gently connect it to the memory socket by pushing it forward.
4. Slowly push the module downwards until the locking tabs snap into the retaining notches or holes at each corner edge of the module.
5. Replace the cover back and secure retaining screws.
6. Connect the AC adapter and replace battery pack.
7. 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 current CMOS settings. The computer will automatically adjust the memory size to match the installed one.

NOTE: If the notebook has been configured for save-to-disk (suspend mode feature), it may be necessary to re-partition and re-format the hard drive to continue using this feature. The save-to-disk partition must be of a size sufficient to store the content of whole memory size. Consult the NEC Versa user's guide for instructions on how to prepare a save-to-disk partition as well as backup and restoring data.

System BIOS Upgrade Procedure

The NEC Versa 550 Series supports EPROM Flash BIOS that allows you to easily update the system BIOS using the Flash Programming utility program called "**FLASH.EXE**". Update the system BIOS whenever you are upgrading LCD Panel or adding modifications to the computer's hardware function. To upgrade the System BIOS:

1. Copy the **FLASH.EXE** BIOS utility program and the BIOS ROM file to the hard disk subdirectory. You may also choose to run the program from the floppy diskette.
2. Disable EMM386 or other memory manager program before restarting the computer. When booting 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 "**FLASH <*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 auto reboot the computer to activate new system BIOS.

Section 2

NEC Versa 550 Specifications

GENERAL SPECIFICATION OF THE NEC VERSA 550 SERIES

The following table lists NEC Versa 550 Series specifications.

Table Section 2-1 NEC Versa 550 Series General Specification

CPU	Cyrix 486DX4 - 75MHz Cyrix 5x86 - 100MHz PGA Package
System RAM	4MB / 8MB On-board Upgradable to 20MB / 24MB Memory Module: 4MB / 8MB / 16MB
RAM Module Slot	One Slot
System Management	128Kb Flash BIOS: Includes System and VGA BIOS Shadow BIOS Capability
Power Management	Operation Mode: Full Power Mode Doze Mode Sleep Mode 5V Suspend Mode 0-volt Suspend Mode Peripheral Automatic Power Down Cover Switch Support
Hard Disk Drive	Built-in HDD 2.5-inch format / 19mm and 12.7mm high IDE Interface 340MB / 540MB / 810MB / 1GB LBA Mode Support

Table 2-1 NEC Versa 550 Series General Specification

Floppy Disk Drive	Built-in FDD 720KB / 1.44MB Mode Support
Display	9.4” Detachable DSTN Color LCD Module: 640 x 480 in 256 colors 1 CCFT Backlight 10.4” Detachable DSTN Color LCD Module: 640 x 480 in 256 colors 1 CCFT Backlight External CRT Capability: 1024 x 768 in 16 colors (VRAM=512KB) 1024 x 768 in 256 colors (VRAM=1MB) LCD & CRT Display Simultaneously 32-bit VESA Local Bus LCD / CRT Auto-Sense Display Output LCD / CRT Simultaneous Display
Video RAM	512KB/1MB as Standard
PCMCIA Slots	One Type II or Type III on upper slot , and One Type II on lower slot
Pointing Device	19mm Trackball
Keyboard	Keyboard Layout: US Layout - 85 Keys European Layout - 86 Keys Inverted T compatible cursor direction key Overlapped / Embedded Function and Numeric Keypad Internal & External Keyboard simultaneous function
Hot-Key Operation	Fn + Esc = Suspend Control Fn + F10 = CRT / LCD Fn + F11 = Backlight On/Off Fn + Num = Pad Lock Fn + F8 = Battery Low Warning Beep On/Off Fn + F1 = PopUp Menu Fn + PgDn = Decrease Speaker for Battery Low Volume Fn + PgUp = Increase Speaker for Battery Low Volume

Table 2-1 NEC Versa 550 Series General Specification

I/O Port	25-pin Parallel Port x 1 9-pin Serial Port (w/ FIFO) x 1 15-pin VGA Monitor Port x 1 External Keyboard or PS/2 Mouse Port x 1 NEC Y-Cable Support DC-IN Jack x 1
Status Indicator	LCD Status Bar AC In Battery Pack In Battery Low Battery Charge PM Enable 5V Suspend Mode HDD Read / Write PCMCIA Card 0 PCMCIA Card 1 FDD Read / Write Pad Lock Num Lock Caps Lock Scroll Lock LED Indicator Power On

Table 2-1 NEC Versa 550 Series General Specification

Power Supply	AC Adapter AC 90V to 265V, 47/63Hz, 36W (Max) Constant Power Output Dimensions: 120 (L) x 60 (W) x 36 (H) mm Battery Input Battery A: 8 long A-size 2400mA/hr NiMH Battery Cells, 9.6V (Total - 23.04W) Battery B: 8 long A-size 2800mA/hr NiMH Battery Cells, 9.6V (Total - 26.88W) Battery Life: Minimum 2 hours with Cyrix DX4-75 and Battery B option (PC Bench Battery Rundown Test) Battery Fast Charge Machine On: 3 hours maximum Machine Off: 1.5 hours maximum
Dimension	287mm (L) x 227mm (W) x 52.1mm (H)
Weight	With Single Battery Pack: 2.85kgs (w/o AC adapter)

Table 2-1 NEC Versa 550 Series General Specification

Key Components	9.4” Color DSTN LCD: Kyocera KCL 6448HSTT Samsung UG-641 10-CCBN-A 10.4” Color DSTN LCD: Kyocera KCS6448JSTT-X1 HDD: Hitachi 340MB Seagate ST9546 540MB Hitachi DK222A-54 540MB FDD: NEC FD1238H YEDATA YD-702J-6037J-01 TEAC FD-05HG-4661 Keyboard: Jing Mold 85/86 Keys Pointing Device: = Logitech 19mm T/B Battery: Toshiba long A-size NiMH battery 2400mA/hr and 2800mA/hr Core Logic: UMC 8486F Video: C&T 65545 Super I/O: UMC 82C863 PCMCIA Logic: UM8366F, UM8365F BIOS: Phoenix PMU + Keyboard Controller: Motorola G10 (LapKat)

PRODUCT MIX

The following table lists NEC Versa 550 model configurations.

Table Section 2-2 Model Configurations

	500D (1)	**500D (2)**	**550D (RT2)**
CPU	Cyrix 486DX4-75	Cyrix 486DX4-75	Cyrix 5x86 (M1sc)
On-Board DRAM	4 MB	8 MB	8 MB
VGA	C&T 65545	C&T 65545	C&T 65545
Video RAM	512 KB	1 MB	1 MB
HDD	340 MB	340 MB	540 MB
LCD	9.4” DSTN LCD	9.4” DSTN LCD	10.4” DSTN LCD
Pointing Device	19mm Trackball	19mm Trackball	19mm Trackball

MOTHERBOARD

The following table lists motherboard specifications.

Table Section 2-3 Motherboard Specifications

Clock	Clock Synthesizer, AVASEM AV154-04
CPU	PGA Socket
RAM	1M x 4-bit DRAM x 8 1M x 16-bit DRAM x 4
ROM	Flash ROM for BIOS, 128K x 8-bit, 150ns
Video RAM	256K x 16-bit DRAM (5V / 70ns), SOJ x 1 or 2
System Chipset	UMC UM8486F, 208 Pin, PQFP
Super I/O	UMC UM82C863, 100 Pin, PQFP
VGA	C&T 65545, 208Pin, PQFP
PCMCIA	UMC UM8366F, UM8365F
KBC	Motorola G10, 100-Pin SQFP
RTC Battery	VARTA 30mA, 3.6V NiMH Battery

Table 2-3 Motherboard Specifications

Internal Connector & Socket	To CPU: 168-Pin PGA Type Socket To Memory Expansion: 72-Pin SIMM Socket x 1 To Power Board: 8-Pin DIP, 18-Pin DIP, Female, Straight, 2mm Pitch To DSTN LCD: 15-Pin, 14-Pin, 8-Pin, Male, Straight, 1.25mm Pitch To LCD Status Board: 26-Pin, FPC Type, Straight, 1.0mm Pitch, SMT
	To HDD Board: 44-Pin,Male, Straight, 2.0mm Pitch, DIP To Keyboard: 26-Pin, FPC Type, Straight, 2.54mm Pitch, DIP To Trackball: 6-Pin, Male, SMT, Pitch, 1.25mm To Battery Pack: 5-Pin, DIP To FDD: 26-pin, FPC Type, Straight, 1.0mm Pitch, SMT
External Connector	PCMCIA: Type II x 2 or Type III x 1and Type II x 1 SMT Double Decks SIO: 9-Pin, D-Sub, Male DIP Printer: 25-Pin, D-Sub, Female, DIP CRT: 15-Pin, D-Sub, Female, DIP PS/2 Mouse or External Keyboard: 6-Pin, Mini-Din, Female, DIP AC/DC Adapter: 2-Pin Jack, DIP

LCD Status Board

The following table lists LCD status board specifications.

Table Section 2-4 LCD Status Board Specifications

LCD Status Module	5V Static
Connector	To Motherboard: 26-Pin, FPC Type, Right Angle, 1.0mm Pitch, SMT
PCB	Thickness: 1.6mm Layers: 6

Cables

The following table lists cable specifications.

Table Section 2-5 Motherboard Cable Specifications

HDD	44-Pin, Female, 2.0mm Pitch
Trackball	6-Pin, Female, 1.25mm Pitch
LCD	15-Pin, 14-Pin, 8-Pin, Female, 1.25mm Pitch
FDD	26-Pin, FPC, 1.0mm Pitch
System Status LCD	26-Pin, FPC, 1.0mm Pitch

DISPLAY UNIT SPECIFICATION

The following tables list display unit specifications.

LCD

The LCD panel specifications are listed in the following table.

Table Section 2-6 LCD Panel Specifications

9.4" Color DSTN	* 1CCFT, Resolution 640 x 480, 10mm High, 9.4"
10.4" Color DSTN	* 1CCFT, Resolution 640 x 480, 10.4"

Inverter

The following table lists inverter specifications.

Table Section 2-7 Inverter Specifications

Color Inverter	Kyocera 9.4" DSTN 6448 HSTT	Samsung 9.4" DSTN UG-6410-CCBN-A
Input Voltage	8V to 20V	8V to 20V
Output Voltage	550VAC Max.	550 VAC Max.
Contrast Voltage	28V ~ 31V	26V ~ 29V
Output Load Current	6mA (Max.)	6mA (Max.)
Brightness Control	VR Type (Lower)	VR Type (Lower)
Contrast Control	VR Type (Upper)	VR Type (Upper)
Efficiency	70% Min.	70% Min.
Unit Size (L x W x H)	146 (L) x 22.5(W) x 9.5 (H)	Not available

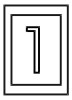
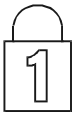
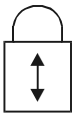
LCD Status Bar Indicator

The following table lists LCD status bar indicator specifications.

Table Section 2-8 LCD Status Bar Indicator Specification

Unit Size	**85mm (L) x 16.7mm (W) x 2.6mm (H)**
AC-IN *- battery shaped symbol appears inside when battery is present. Disappears after battery fully charges. Battery blinks when battery is overcharged.*	
Battery Pack In and Battery Full *(icon blinking)*	
PMU Enabled	
Suspend Mode	

Table 2-8 LCD Status Bar Indicator Specification

PCMCIA Slot 0	
PCMCIA Slot 1	
FDD Read / Write	
Pad Lock	
Num Lock	
Caps Lock	
Scroll Lock	

FDD Unit Specification

The following table lists floppy diskette drive specifications.

Table Section 2-9 FDD Unit Specification

Module	3.5” Removable Module
Mode	2 Mode FDD for the rest (1.44MB / 720KB)
Unit Size	110mm (L) x 96mm (W) x 12.7mm (H)

HDD Unit Specification

The following table lists hard disk drive specifications.

Table Section 2-10 HDD Unit Specification

Module	2.5” Built-in HDD
Capacity	340MB / 520MB / Higher Capacity Upgradable
Interface	IDE Interface
Unit Size	100mm (L) x 70mm (W) x 19 / 12.7mm (H)

NiMH Battery Pack Specification

The following table lists main battery specifications.

Table Section 2-11 NiMH Battery Pack Specification

	Battery Pack A	**Battery Pack B**
Capacity	2400 mA x 8 cells	2800 mA x 8 cells
Cell Type	Long A	Long A
Voltage	9.6V	9.6V
Connector	5-Pin	5-Pin

DC/DC Converter Specification

The following table lists DC/DC converter specifications.

Table Section 2-12 DC/DC Converter Specification

Input Voltage	8V -> 20V
Output Voltage	12V, 5V, 3.3V (Intel DX4), 3.45VV (Cyrix DX4 & M1sc)
Output Current	0.1A, 2A, 2A
Output Ripple Voltage	150mV, 100mV, 100mV
Protection	Short Circuit Protection Input under voltage latch
Efficiency	80% Min.
PCB	1.6mm / 6 Layers

Battery Charger

The following table lists battery charger specifications.

Table Section 2-13 Battery Charger Specification

Input Voltage	20V (Max.)
Support Battery	NiMH Battery (9.6V)
Protection	Max. Temp., Max. Timer, Max. Voltage
Charge Method	Delta T / Delta t: 1°C (min.)
Max. Temperature	53°C ~ 56°C
Timer Setting	180 Min.
Charge Time	Machine On: 3 hours Machine Off: 1.5 hours
Charge IC	BQ2004
Operating Temperature	10°C ~ 50°C

Keyboard Unit Specification

The following table lists keyboard specifications.

Table Section 2-14 Keyboard Unit Specification

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

Pointing Device Specification

The following table lists trackball specifications.

Table Section 2-15 Pointing Device Specification

Type	19mm Trackball PS/2 Type

Switch Specification

The following table lists switch specifications.

Table Section 2-16 Switch Specification

Power Switch	Tact Type
Cover Switch	Tact Type
Mouse Button	Tact Type x 2 pcs
Reset Switch	Tact Type

AC/DC Adapter Specification

The following table lists AC/DC adapter specifications.

Table Section 2-17 AC/DC Adapter Specification

Input Voltage	AC 90V -> 265V, 47 -> 63Hz
Output Voltage	20V Max.
Protection	Short Circuit UVP, OVP
AC Cord	Safety Approval, FCC Shielding AC cord
DC Output Cable	2-pin, 100cm long
Indicator	AC Power On
Unit Size	120mm (L) x 62mm (W) x 36mm (H)

BIOS Specification

The following table lists BIOS specifications.

Table Section 2-18 BIOS Support

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 capacity Support LBA mode for larger capacity
VGA Display	Use 40KB C&T 65545 VGA BIOS to support monitor Sense for Auto Display Super VGA Function Call Emulation Mode C&T 65545 VGA BIOS support following features: Display to CRT/LCD/Simultaneous Text Vertical Stretching Graphic Vertical Stretching Maximum Contrast
Serial Port	Support Standard COM Port Address
Parallel Port	Support Standard Printer Port Address
Shadow & Cache	Always enable the Shadow for VGA and System BIOS Support CPU L1 Cache with write-back function
PCMCIA	Phoenix PCM Plus provided for supported UMC UM8365F and UM8366F chips PCMCIA 2.1 Spec Compliant
External Device Support	Interface of external PS/2 mouse and external keyboard The internal T/B will be disabled while external PS/2 mouse is connected
APM	Supports APM 1.1 Specification
UM8486F Support	Support Auto Power Saving (APR Mode)

Power Management Features (Mode Definition)

The following table lists power management modes.

Table Section 2-19 Power Management Specifications

Full-On Mode	Demand Driven Clock Control Enabled CPU Full Speed Clocked for the Application All Peripherals are in On State
On Mode	Demand Driven Clock Control Enabled CPU in Divided Frequency State (25MHz) All Peripherals are in On State
Doze Mode	CPU in Divided Frequency State (16MHz) Secondary Activity for IRQ0 and IRQ8 Timer Interrupted Enabled All Peripherals are in On State
Sleep Mode	CPU in Divided Frequency State (16MHz) Video Display Off by VGA Controller HDD in Sleep Mode Core Logic in Sleep Mode DRAM Slow in Refresh Secondary Activity for IRQ0 and IRQ8 Timer Interrupted Enabled
Suspend Mode	Enter This Mode via Hot-Key, Time-Out, Cover Switch, Battery Low Suspend to Memory: CPU in Stop Clock State HDD Power Down PCMCIA Power Down Core Logic in Suspend Mode VGA Enters Standby Mode DRAM in Slow Refresh Video Memory in Slow Refresh Suspend to HDD: All System Resources and Current States Will Be Saved to HDD System Will Power Off Automatically

Table 2-19 Power Management Specifications

Resume Mode	* System will resume from suspend state when the following events are detected: * Resume from Memory: • Keyboard Spacebar key input • Power Switch * Resume from HDD: • Power Switch • Schedule Resume

Power Management Features (Mode Transition)

The following tables list mode definitions and actions.

Table Section 2-20 Mode Definitions

H/W Mode	S/W Mode	APM Mode (User)
Fully-On	Full-on	On (CPU-Busy)
On	On	On (CPU-Busy)
Doze	Doze	Idle
Sleep	Sleep	Standby
Suspend	5/0V Suspend	Suspend

Table Section 2-21 Mode Action

Mode	**CPU Clock**	**Timer**	**APR**
Fully-On	Highest	-	Active
On	25 MHz	4 seconds	Active
Doze	16 MHz	4 seconds	Active
Sleep	16	1/2/4/6/8/12/16 min	N/A
Suspend	DC	5/10/15/20/30/40/60 min	N/A

Auto Power Reduction (APR)

The Automatic Power Reduction (APR) works with power management modes. There are three possible combinations, listed in the following table.

Table Section 2-22 APR Times

Highest Performance	32ms/2sec
Medium Performance	128ms/2sec
Highest Power Reduction	512ms/2sec

HotKey Definitions

The following table lists hotkey definitions.

Table Section 2-23 Hotkey Definitions

Function Key	Content	Handler
<Fn> + <Esc>	Suspend	G10 SMI
<Fn> + <F10>	LCD / CRT Display	G10 SMI
<Fn> + <F11>	Panel Backlight Off	G10
<Fn> + <F8>	Battery Low Warning Beep	G10 SMI
<Fn> + <F1>	Popup Menu	G10 SMI
<Fn> + <PgUp>	Speaker Volume Increase	G10
<Fn> + <PgDn>	Speaker Volume Decrease	G10
<Fn> + <Num>	Pad Lock Enable	G10

Environmental Specifications

The following table lists environmental specifications.

Table Section 2-24 Environmental Specifications

Operating Mode	5 ^{o}C ~ 40 ^{o}C (85%)
Non-Operating	-20 ^{o}C ~ 60 ^{o}C (85%)

AC Power Source

The following table lists AC power AC voltage and AC frequencies.

Table Section 2-25 AC Power Specifications

Input	Nominal	Version
AC Voltage	100 ~ 250 V	90 ~ 264 V
AC Frequency	50 / 60 Hz	47 ~ 63 Hz

Vibration

The following table lists vibration specifications.

Table Section 2-26 Vibration Specifications

Operating Mode	Direction of Movement: X, Y, Z Axis Vibration Level: 5 ~ 550 Hz, 0.5 Gs Acceleration Duration Time: 2 Cycles (60 min) for per each axis
Non-Operating	Direction of Movement: X, Y, Z Axis Vibration Level: 5 ~ 550 Hz 0.04 Inch Displacement Hz 2Gs Acceleration Duration Time: 2 Cycles (60 min) for per each axis

Shock

The following table lists shock specifications.

Table Section 2-27 Shock Specifications

Operating Mode	Impact Accelerator: 10g/11ms Based on Half Sine-Wave Number of Shock: 3 Shocks for each of the 6 faces
Non-Operating Mode	Impact Accelerator: 50g/11ms Based on Half Sine-Wave Number of Shock: 3 Shocks for each of the 6 faces

ESD

The following table lists ESD specifications.

Table Section 2-28 ESD Specifications

Contact Discharge	±2, 4, 6 KV
Air Discharge	±2, 4, 8 KV
HCP	±2, 4, 6 KV
VCP	±2, 4, 6 KV

Section 3

Hardware Functional Overview

The NEC Versa 550 Series notebooks consist of several major functions and subsystems including:

- System BIOS - implemented on the Motherboard and EPROM
- System Processor - implemented on the Motherboard
- System Logic Controller - implemented on the Motherboard
- Memory Subsystem - implemented on the Motherboard
- Video Subsystem - implemented on the Motherboard, Display Converter Board, and LCD Display Panel
- I/O Subsystem - implemented on the Motherboard
- Keyboard Subsystem - implemented on part of the Motherboard, and Keyboard Assembly
- PCMCIA Controller and Sockets - implemented on the Motherboard
- Pointing Device Subsystem - implemented on the Motherboard and Keyboard Assembly
- Hard Disk Subsystem - implemented on the Motherboard and the Hard Drive Assembly
- Floppy Disk Subsystem - implemented on the Motherboard 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 in Figure 3-1.

FUNCTIONAL BLOCK DIAGRAM

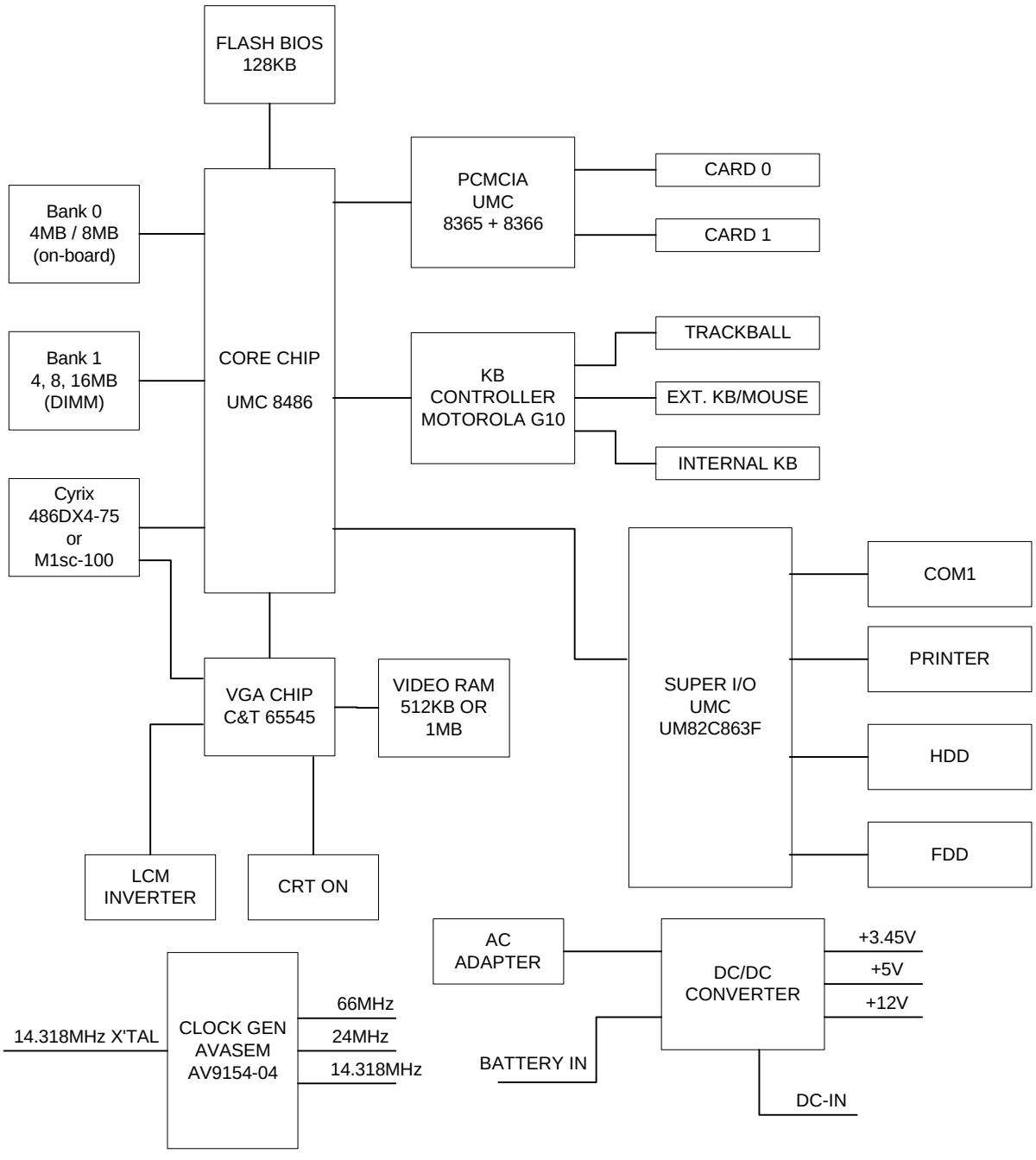


Figure Section 3-1 Functional Block Diagram

System BIOS

In AT-compatible systems, system configuration data must be stored somewhere when the computer is turned off. This data is stored in CMOS RAM. Unlike the DRAM used for standard system memory, 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 values stored in 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, floppy drive, and video subsystem.

The NEC Versa 550 Series uses Phoenix BIOS. The BIOS SETUP program is an easy-to-use system configuration utility that sets system parameters and resides on the EPROM chip with the system BIOS.

The EPROM chip also includes BIOS Power-On Self Test (POST) diagnostic and booting code 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 Motherboard using either the 3.45V Cyrix 486DX4-75MHz (NEC Versa 500D) or the 3.45V Cyrix 5x86 M1sc-100MHz (NEC Versa 550D) Processor Chip. The processor operates in conjunction with RAM and ROM memory and other system control logic (e.g. UMC 8486F) to process software instructions (BIOS, Windows, Applications).

The Cyrix M1sc microprocessor is a high performance 586-class CPU which is compatible with all popular x86 operating systems including DOS, Windows, Windows NT, Windows 95, Unix, Novel, and OS/2. The superpipelined 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 M1sc 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 into and exit from SMM mode allows frequent use of the SMM feature without noticeable performance degradation.

MAJOR FUNCTIONAL BLOCKS

The Cyrix M1sc, in a 168-pin PGA 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 Motherboard using UMC 8486F notebook Chipset. The UM8486F is an advanced 486 compatible single chip specially designed for notebook computers and other portable computer. Aside from supporting almost all 486-based CPUs, the UM8486F 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 AM386/486DXLV, Cyrix 486DLC, M6, M7, TI PotoMAC/D series, Intel P24C, 24D, S-Series, and IBM Blue Lightning up to 33MHz
  - — Supports Intel, AMD, TI and Cyrix SMI
  - — Supports VESA Local Bus-Master mode
  - — Supports 487SX interface
  - — System Operation Voltage from 3V to 5.5V
  - — Three programmable non cacheable regions
  - — Only 4 TTL required

- — Flash ROM Boot block erase protection
- — Supports three general purpose I/O
- — Hybrid Voltage
- — 208 Pins QFP

- Integration
  - — Built-in 206
  - — Built-in 146818A
  - — Built-in Memory Controller
  - — Built-in VESA Bus Controller

- Memory Controller
  - — Supports ROM DOS up to 64MB by XIP, 16MB by EMS
  - — Supports Shadow RAM from C0000-FFFFF
  - — 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 Modes
  - — Full On Mode
  - — ON Mode
  - — DOZE Mode

  - — SLEEP Mode
  - — SUSPEND Mode
  - — AUTO POWER REDUCTION Mode (APR)
  - — WORD PROCESSING Mode (WP)

- 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)
  - — 50mA at FULL ON Mode
  - — 25mA at DOZE Mode
  - — 100uA at SUSPEND Mode
  - — 15uA at POWER-OFF Mode with RTC active

MEMORY SUBSYSTEM

The memory subsystem, implemented on the Motherboard, includes ROM and DRAM memory. Primary control for the memory subsystem is provided by the UMC 8486F System Controller chipset.

DRAM Memory

The NEC Versa 550 notebooks contain 4MB (8MB for NEC Versa 550D1/550D) of 70ns page-interleaved DRAM on the Motherboard. The notebook provides one extra memory slot for upgrading the DRAM memory to 8MB, 12MB, and 20MB (up to 24MB for NEC Versa 550D1/550D) using standard JEDEC single-inline memory modules (SIMMs). Refer to Chapter 1 on System Upgrades to know more about how to upgrade the system memory.

ROM Memory

The NEC Versa 550 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 Motherboard using the UMC 82C863F chipset. The supported I/O interfaces 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 port.

Features summary of the UMC 82C863F:

- 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 Motherboard and on the LCD Panel, controls the display output to both the LCD Panel screen and also to the external VGA port.

The video subsystem utilizes the C&T 65545 High Performance Flat Panel / CRT VGA Controller. It also includes 512KB (1MB for NEC Versa 550D1/550D) 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 65545 achieves superior performance through direct connection to system processor buses up to 32-bits in width. When combined with CHIPS' advanced linear acceleration software driver technology, this device exhibits exceptional performance compared with devices of similar architecture. The 65545 also adds a sophisticated 32-bit graphics hardware engine for 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 (65545)
  - — 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 640x480 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 550 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 800x600 by 256 colors or 1024x768 by 256 colors for NEC Versa 500D2/550D with 1MB video memory (800x600 by 16 colors or 1024x768 by 16 colors for NEC Versa 500D1 with 512KB memory). The 500D2/550D can also provide simultaneous display at 640x480 by 256 colors with the standard VGA DSTN LCD.

KEYBOARD SUBSYSTEM

The Keyboard Subsystem of the notebook is implemented on the Motherboard and Keyboard Assembly using the Motorola G10 Lapkat keyboard controller chip.

The NEC Versa 550 Series keyboard is an 85/86-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 in supporting an external PS/2 keyboard or standard DIN-type AT-keyboard. See Chapter 1 for more information.

PCMCIA CONTROLLER AND SOCKETS

The PCMCIA controller is implemented on the Motherboard using UMC's UM8365F and UM8366F PCMCIA Interface Controller. The UM8365F is an Intel EXCA compatible implementation of ISA bus to PCMCIA 2.0/JEIDA 4.1 Interface controller. It supports two independent 68 pins PC card sockets and is register compatible with Intel's 82365SL. The UM8366F is the buffer chip designed to work with the UM8365F as well as for Intel's 82365SL. It provides Data Buffer and Address Buffer for PCMCIA socket interfaces for two sockets applications.

The NEC Versa 550 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 UM8365F:

- PCMCIA 2.0/JEIDA 4.1 compatible Interface
- Cascadable up to eight sockets in the two sockets mode
- 8/16 Bit ISA 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
- Intel EXCA register compatible
- Supports PCMCIA_ATA Specifications
- Supports Pulse mode interrupt for I/O card
- Supports two independent IC card sockets (no external buffers needed)
- Selectable Interrupt Steering from PC card to System Bus

HARD DISK SUBSYSTEM

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

The NEC Versa 550 Series notebook is equipped with high capacity hard disk drive ranging from 350MB to 1.2GB using IDE controller with LBA (Logical Block Addressing) mode support. The I/O subsystem controller, UMC 82C863F, 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 on the LCD status bar. 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 an 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 built-in trackball device on the system top cover assembly and a pre-programmed Motorola G10 Lapkat 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 where the system automatically detects on system power up and then disables the internal trackball.

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 550 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 includes 8 long A-size battery cells at 2400mA (2800mA for NEC Versa 550D) that provides 9.6V voltage supply. When installed into the notebook, the battery icon LCD automatically appears on the LCD Status Bar and will also start to recharge 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 turn off while it should take around 3 hours maximum when the computer is running.

Powerboard

The Powerboard receives approximately 9.6VDC 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 Motherboard 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 550 Series notebook computers. The first part of the section describes the computer cleaning procedures and preferred handling procedures for sensitive components (e.g. disk drives, batteries).

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

PREVENTIVE MAINTENANCE

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

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

Cleaning the Notebook's Exterior

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

1. Power off the system and remove the primary battery pack. Unplug all cables connected to the system.
2. Wipe the outside of the system unit, keyboard, and display with a soft, clean cloth. Remove stains with a mild, liquid detergent like a common household cleaner. 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, possibly damaging 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, remove dust and other foreign particles from inside the system unit as follows.

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

Protecting the Disk Drives

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

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

- Always back up the data files from the hard disk.
- Run a virus detecting program for possible virus infested area 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, most especially 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 programs. These programs reorganize your hard disk by eliminating fragmentation and improves the 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 oxide build-up.

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

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

Maintaining the LCD Quality

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

Cleaning the Trackball

Use the steps below to clean the ball and roller inside the Trackball Assembly.

1. Power off the system and remove the primary battery pack. Unplug all cables connected to the system.
2. Remove the ball housing cover by turning it counterclockwise. Take out the ball.
3. Clean the ball using tap water and a mild detergent. Dry it thoroughly with a clean, lint-free cloth. Remove remaining dust or lint by blowing into the ball socket.

4. Place the ball back into the trackball socket and then fit the ball housing cover over the ball, turning it clockwise to lock the assembly again.

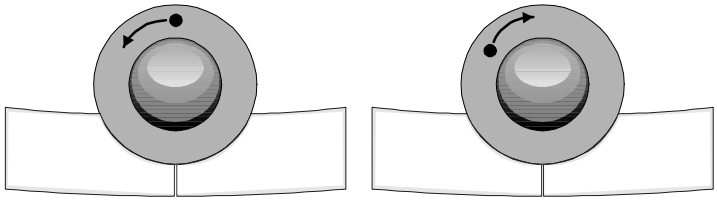


Figure Section 4-1 Removing and Replacing the Trackball Housing Cover

REQUIRED TOOLS AND EQUIPMENT

All NEC Versa 550 corrective maintenance procedures can be performed using the following tools:

- Tweezers
- Small flat-head 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 electricity by using wrist or ankle grounding straps.

Illustrated Parts Breakdown

This section contains the NEC part numbers and illustrated parts breakdown (IPB) figure for the NEC Versa Series 550. Table Section 4-1 lists field-replaceable parts and corresponding part numbers. Figure 4-2 shows the system exploded view, or IPB.

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

Table Section 4-1 NEC Versa 550 Series Field-Replaceable Parts

Item	Part Number
1. AC Power Cord	808-875692-015A
2. AC Adapter	808-875692-010A
3. LCD Front Case, 10.4”	808-875692-009A
4. LCD F-Cable	808-875692-024A
5. LCD Panel, Kyocera, 10.4”	808-875599-001A
6. LCD Latch	808-875692-044A
7. Hinge Cover, Left	808-875692-006A
8. Hinge Cover, Right	808-875692-007A
9. Case Icon LCD Cover	808-875692-005A
10. LCD Status Bar Assembly	808-875692-061A
11. System Top Unit Case, Plastic	808-875692-075A
12. U.S. Keyboard	808-875692-080A
13. Trackball Assembly	808-875692-065A
14. 3.6V 3/V30H CMOS Battery	808-875692-069A
15. Cyrix 5x86/100 CPU	802-149687-003A
16. Powerboard Assembly (DC/DC Converter)	808-875692-060A
17. NEC Logo Nameplate	808-875692-048A
18. Main PCB Assembly	808-875692-064A
19. Floppy Diskette Drive Assembly	808-875692-040A
20. Floppy Diskette Drive Cable	808-875692-042A
21. 540-MB Hard Disk Drive	808-875692-032A
22. Hard Disk Drive Cable	808-875692-034A
23. Bottom Case Assembly, Plastic	808-875692-072A

24. Memory Cover (DRAM)	808-875692-073A

Table 4-2 NEC Versa 550 Series Field-Replaceable Parts

25. Rubber Feet (4)	808-875692-045A
26. Connector Cover I/O Port	808-875692-079A
27. Foot Stand (2)	808-875692-074A
28. Main Battery	808-875692-002A
29. PCMCIA Cover	808-875692-078A
30. Outer Shipping Carton*****	808-875692-095A
31. Left Packaging Foam Cushion*****	808-875692-093A
32. Right Packaging Foam Cushion*****	808-875692-094A
33. NEC Versa 550 Series User's Guide*****	808-875692-092A
34. NEC Versa 550 Series Service and Reference Manual (this guide)*****	819-200088-000 Rev. 00

***** Not Shown in IPB Figure

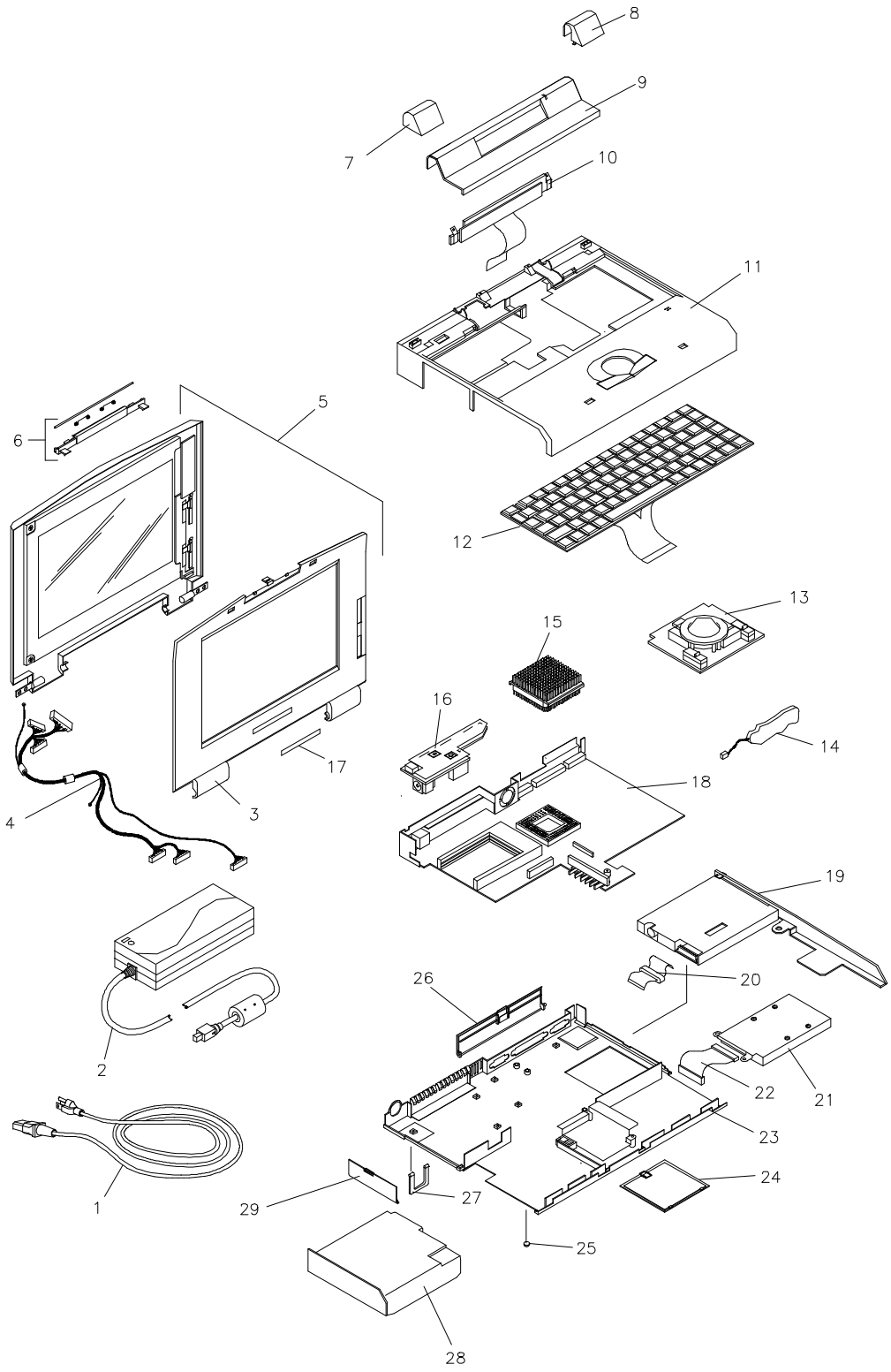


Figure Section 4-2 NEC Versa 550 Series Illustrated Parts Breakdown

FIELD-REPLACEABLE PARTS AND ASSEMBLIES

The NEC Versa 550 Series notebooks contain two major assemblies:

- Cover-Display LCD Assembly
- System Unit Assembly

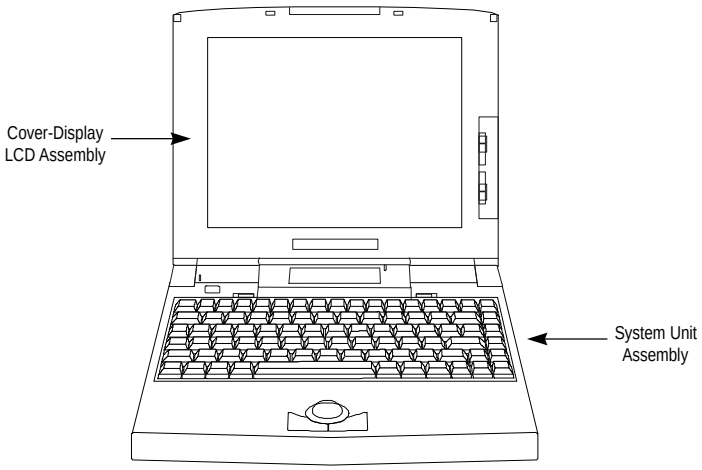


Figure Section 4-3 Notebook Major Assemblies

Cover-Display LCD Assembly

The cover-display LCD assembly includes the following major field replaceable units/parts (FRUs):

- LCD Front and Back Panel Cover

  — These parts are used to cover the whole LCD Panel assembly which includes the LCD Display Screen, the LCD Power Inverter Board, the LCD Cable, and the LCD Frame Shielding Plate.

- LCD Display Screen

  — 9.4”or 10.4” LCD (Liquid Crystal Display) Screen used for output display. This part is assembled together with the LCD Power Inverter Board and the LCD cables contained inside the whole LCD Panel. Handle this part with care against static electricity and accidents that can cause LCD breakage.

- LCD Power Inverter Board

  — This printed circuit board (PCB) provides high voltage to the Cold Cathode Fluorescent Tube (CCFT). It is connected to the right side of the LCD Display Screen. Exercise safety electrical precautions in handling and servicing this part.

- LCD Cable

  — The LCD cable provides the display signals and voltage connection between the LCD panel and the motherboard. There are three sets of wiring cables inside which connects directly to the motherboard - one 15-pin, one 14-pin, and one 8-pin male cable connector.

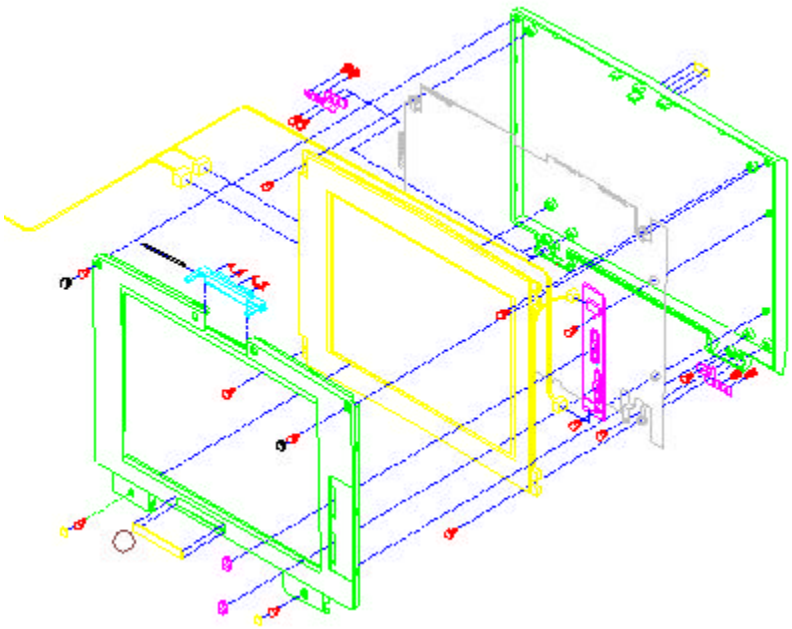


Figure Section 4-4 LCD Assembly

System Unit Assembly

The System Unit Assembly comprise of several sub-assemblies of which can be divided into two major sub-assemblies:

- The System Top Unit Assembly
- The System Base Unit Assembly

The System Top Unit Assembly includes the following major field replaceable units/parts:

- Keyboard Panel Assembly
  - The keyboard is assembled right on top of the system unit and is connected to the Motherboard's 26-pin FPC type connector. The keyboard is also secured to the unit assembly by two retaining latches found on the upper left and right side of the keyboard.
- LCD Hinge Covers
  - These parts are basically to cover the LCD hinges and screws that attached the whole LCD Panel Unit to the System Unit.
- LCD Status Bar
  - This part or PCB is used to reproduce the LCD icons that indicates the status of the system's components. This part is assembled also on top of the system unit found at the upper middle part of the unit. The LCD Status Bar is connected to the Motherboard's 26-pin FPC type connector.
- System Top Unit Cover
  - This part, besides the keyboard, basically covers the top part of the whole system unit. The system top cover also provides a wrist-rest surface to where you can rest your wrist while using the keyboard. The top unit cover is attached to the base unit at the sides which snaps and locks securely.
- Trackball Module Assembly
  - Also assembled underneath the System Unit Cover is the Trackball module. This part is used for controlling the pointing device and comprises of the pointing pad and two button switches. The module is connected to the Motherboard's 6-pin male socket using a long wire cable that also connects to the GlidePad printed circuit board.
- Top Case Frame Shielding Plate
  - This part provides EMI shielding protection to the top unit case and is assembled right below the system top unit case.

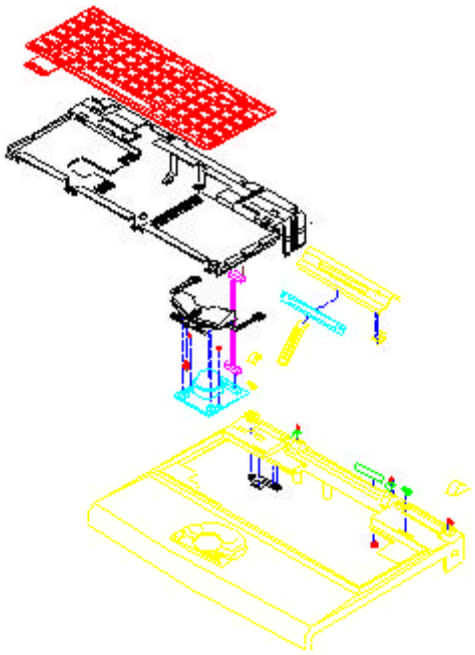


Figure Section 4-5 System Top Unit Assembly

The System Base Unit Assembly is where the Motherboard is found and basically where the major components and modules can be found in running the computer. This includes the following major field replaceable units/parts:

- Internal Battery Pack

  — The battery pack is attached to the left front side of the system base unit. The battery pack is secured to the unit by a clamping latch switch. Do not attempt to open the battery pack and follow handling precautions mentioned at the beginning of this section.

- Hard Drive Module Assembly

  — The built-in hard drive module is attached to the right front side of the system base unit. The hard disk module supports 2.5-inch hard disk drive at maximum 19mm height and is secured with four small flat-head screws on top of the module. The hard drive module is also attached to the system base unit through a flat cable attached to the motherboard and three screws secured to the base unit case.

- Built-in Floppy Drive Module

  — The built-in floppy drive module is assembled on the right rear side of the system base unit. It consists of the floppy drive unit, the FPC cable, the metal frame bracket.

- DC-DC Converter Powerboard Module

  — The Powerboard module basically converts the input 8V-20V DC voltage to several voltage levels needed in powering every components inside the notebook. This PCB module is located on the left rear side of the base unit and is connected to the Motherboard's 8-pin DIP and 18-pin SMT female connector.

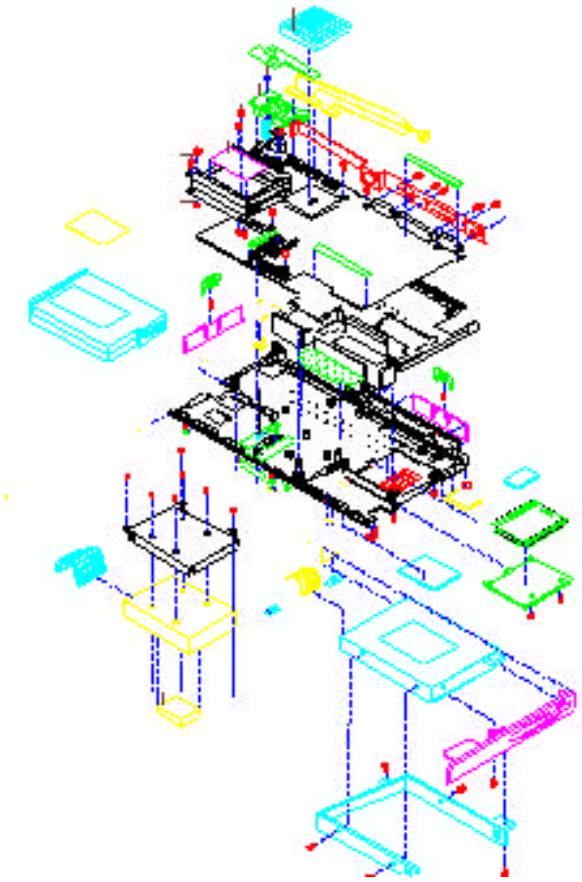


Figure Section 4-6 System Base Unit Assembly

PARTS REMOVAL AND REPLACEMENT PROCEDURES

This section contains field service-level removal/replacement procedures for the notebook. Always refer to the exploded diagram in the previous section to quickly go through the procedures. 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 one clamping latch (lock knob) that secures the internal battery pack. To remove the battery pack, push the lock knob forward with your other hand holding the battery pack handle; then pull the battery pack out. Note that this has to be done simultaneously.
3. To replace the battery pack again, simply slide in the battery pack until you hear the spring latch hook inside snaps to the battery. The battery pack can only be inserted in one direction so there is no danger of improper insertion.

Removing/Replacing the Internal Keyboard

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

1. Open the LCD cover to see the keyboard. Locate the left and right keyboard latches found on the upper corners of the keyboard just above the key caps.
2. Slide the left and right keyboard latches to the left and right respectively. Use your finger to tilt the upper edge of the keyboard towards you. Do not immediately pull the keyboard away, there is still the keyboard ribbon cable connected to the Motherboard. You may rest the keyboard (face down) to the palm rest surface first.
3. The keyboard cable is connected to the Motherboard's FPC type connector. To release the keyboard cable from the connector, gently lift (using your fingernail or thin pointing object) the connector locks on the left and right edge. Pull the keyboard cable entirely and take out the keyboard from the notebook.
4. To replace keyboard, rest the keyboard face-down to the palm rest surface. Insert the keyboard cable to the FPC type connector on the Motherboard and push the lock down to secure the cable.
5. Flip the keyboard back and allow the left and right extending tabs on the keyboard's front edge to fit into the gap area where the keyboard latches are found.

6. Secure the keyboard entirely by sliding the left and right latches to the right and left respectively.

Removing/Replacing the LCD Status Bar Cover, the LCD Panel, and the LCD Status Bar Module

Removing the whole LCD Panel from the System Unit requires removing the LCD Status Bar Cover as well. The following procedure for removing and replacing the LCD Status Bar Cover, the LCD Status Bar module, and the whole LCD Panel is as follows.

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
2. Take out the LCD Status Bar Cover. To do this, first pull the back of the cover using both hands to release the clamp/fastener on the back of the cover. Do this with the LCD cover at open position and the keyboard already removed. You will find inside the LCD Status Bar circuit board.
3. Take out the LCD Status Bar circuit board by removing the screws and the frame lock plate attached secured to the left and right side of the module.
4. You will also find there is a ribbon cable connected to the Motherboard's FPC type connector. Release the cable by lifting the connector locks at the left and right side using your fingernail or thin pointing object. Remove the entire LCD Status Bar assembly from the notebook.
5. To remove the LCD Panel from the System Unit, you also need to remove the three LCD wire cables connected to the motherboard. Gently pull out the cables from the male sockets of the motherboard.
6. Take out the hinge covers found on the left and right upper corners of the system top unit assembly. Do this by sliding the right hinge cover to the right and the left hinge cover to the left. Inside are the screws securing the LCD Panel to the System Unit. Remove the screws and take out the entire LCD Panel from the notebook.
7. To replace the LCD Panel and the LCD Status Bar Assembly, reverse the removal procedure above. Make sure that you properly insert the cables back to motherboard sockets as well as the LCD Status Bar ribbon cable.

Removing/Replacing the System Top Cover Case Assembly and the Trackball Assembly

Most of the troubleshooting and field service done are on the system unit assembly where the Motherboard and other modules are assembled. One important module assembled to the top cover case assembly is the Trackball. The following procedure for removing and replacing the system top cover assembly is as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
2. Turn the System Unit upside down with the bottom facing up. There are 9 screws securing the base unit assembly from the top unit assembly. Remove them. It is not necessary to remove the memory compartment cover.
3. Flip the whole unit back to normal position again. To separate the top cover from the base unit, start at the rear side by pulling up the top cover and at the same time pushing the base cover in. When the rear side is release from its fastener, slowly pull the top case out while pushing the front base cover against you. The front part is a little stiff. Note that there is still the Trackball cable attached from the top case assembly to the Motherboard. Pull the cable out and remove the whole top case assembly.
4. The Trackball module is assembled on the system top cover case. Turn the top cover case at the back and you will find the trackball printed circuit board. Remove the two screws secured to the module and release the trackball assembly.
5. To replace the whole top case assembly, reverse the disassembly procedures above. Make sure to test the trackball buttons first before entirely securing the screws on it. Also on placing the top cover case together with system base unit again, attached the front part of the top case first to the base unit before the rear part.

Removing/Replacing the Hard Disk Drive

After removing the System Top Cover Assembly, you will now find the system Motherboard and other modules. The procedure for removing and replacing the hard disk drive is as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section to remove the battery pack, the LCD panel, and the system top cover case.
2. The hard drive module is assembled on the lower right side of the system base unit. Remove the screws attached to it and lift up the hard drive module.
3. Carefully pull out the hard drive cable attached to the motherboard.

4. To replace the hard disk drive, remove the four flat screws attached to it and take out the hard drive cable and the rubber pad.
5. To replace the hard disk unit back to the computer, reverse the above procedure.

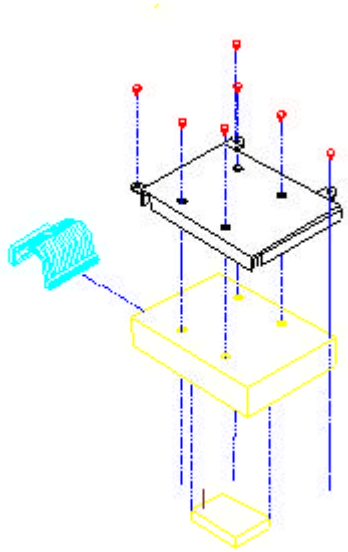


Figure Section 4-7 Hard Drive Module Assembly

Removing/Replacing the Floppy Disk Drive

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

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section to remove the battery pack, the LCD panel, and the system top cover case, and the hard drive module.
2. The built-in floppy drive module is assembled to the right rear side of the system base unit. Release the floppy drive cable connected to the Motherboard's FPC type connector. To release the cable from the connector, gently lift (using your fingernail or thin pointing object) the connector locks on the left and right edge.
3. Remove the screw located near the floppy drive cable. Slowly pull out the whole floppy drive module assembly.
4. To replace the floppy drive unit, remove the four small screws attached to the metal frame bracket. Pull out the cover case and the cable as well.
5. To replace the floppy drive module again, reverse the disassembly procedures mentioned above.

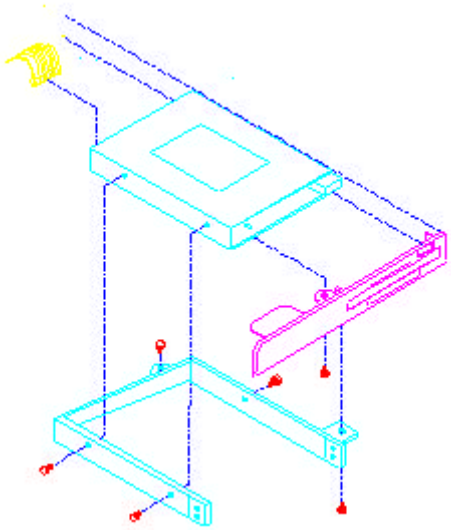


Figure Section 4-8 Floppy Drive Module Assembly

Removing/Replacing the Powerboard

The procedure for removing the Powerboard is as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
2. The Powerboard is located on the left rear side of the system base unit. This part controls the internal power supply of the computer. Remove the aluminum strip on top of the powerboard.
3. Remove the screw found at the left side of the powerboard. Pull out the powerboard slowly until the left and middle pin connectors have come out of the Motherboard female pin sockets.

4. To replace the Powerboard, reverse the disassembly procedures above.

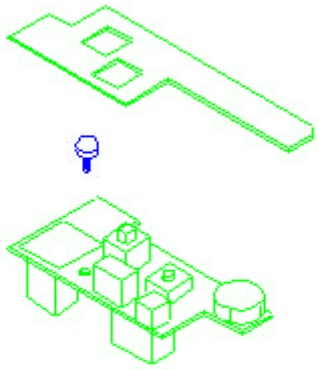


Figure Section 4-9 Powerboard Module Assembly

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 inserted right at the center of the Motherboard using a socket. The Motherboard was designed for allowing the heat generated by the CPU to be released properly from the system. A ventilation duct is near at the back of the CPU to release heat. There is also a hole made on the Motherboard right at the bottom of the CPU to release heat easily out of the notebook.
3. To remove the CPU, you must use a flat-blade screwdriver and slowly lift the CPU at every side little by little. Also do not pull out the CPU heat sink as it is secured to the CPU. Remove the CPU together with the heat sink.
4. To replace the CPU, identifying the pin 1 of the socket and plug the CPU in. Make sure the CPU pins are straight before inserting it. Broken or damage pins on the CPU may totally damage the CPU.

Removing/Replacing the Entire Motherboard

The procedure for removing the entire Motherboard is as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
2. Remove the remaining screws attached to the top side of the Motherboard as well as the hex-bolt attached to the left rear side of the motherboard.
3. Also detach the RTC battery taped on the metal edge of the system base cover casing.
4. Take out the whole Motherboard assembly. If you want to replace the whole Motherboard with a new one for repair, you also have to remove the PCMCIA slots, the I/O Port Metal Plate Cover, and the RTC battery.
5. To remove the PCMCIA slot, take out the four long screws secured at the back of the Motherboard. Make sure not to lose the bolts on top of the PCMCIA slot after removing the screw.
6. To remove the I/O Port Metal Plate Cover, simply remove the hex-bolts and screws attached to it.
7. To replace the whole Motherboard assembly, reverse the entire disassembly procedure.

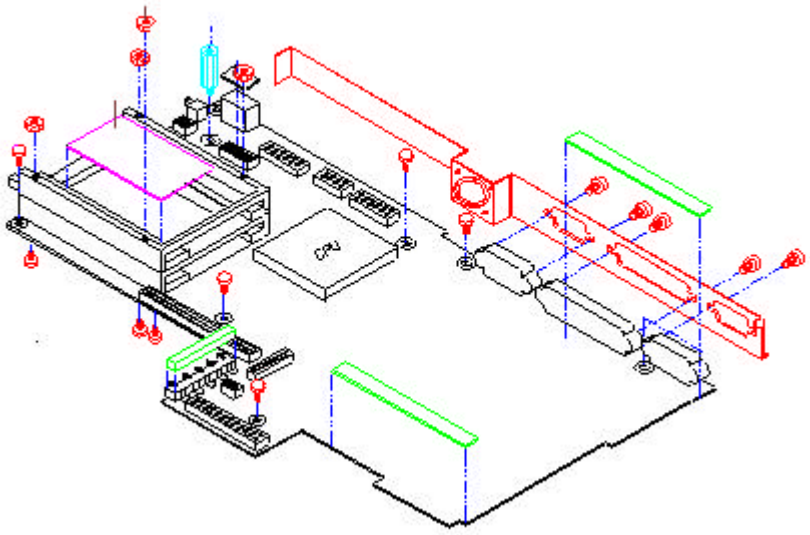


Figure Section 4-10 The Motherboard

Section 5

Troubleshooting and Repair

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

SERVICE INFORMATION

NEC service and information telephone numbers are listed in Table 5-1.

Table Section 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 Technical Service Center (TSC)	In the U.S., call 1-800-632-4525
Listen to the automated attendant and select the appropriate menu to reach one of the following departments: Information Center - literature, dealer locations, sales leads, response to ads NSRC (National Service Response Center) - questions other than products, spare parts or technical support Service Contracts TAC (Technical Assistance Center) - technical support for NASC and NEC sales representatives only TSC (Technical Support Center) - technical support for everyone else	
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) 860-9550 Ext. 2621
Canadian Inquiries	1(416) 795-3554

Appendix A

Supported Video Modes

The C&T 65545 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 following tables list all 65545 CRT monitor video modes.

> **NOTE:** The letter "**I**" under the Hex Mode column for the followinging tables denotes Interlaced monitors while those marked with "*****" are for Versa 500D2 and 550D with 1MB video memory.

VGA STANDARD MODES

The following tables list VGA standard modes.

Table Appendix 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	8 x 14	640 x 350	25.175		
		80 x 25	8 x 8	640 x 200	25.175		
7	Mono	80 x 25	9 x 16	720 x 400	28.322	31.5	70
		80 x 25	9 x 14	720 x 350			
		80 x 25	9 x 8	720 x 350			

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

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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 Appendix A-3 VGA Standard Modes (Planar Mode)

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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 Appendix A-4 Packed Pixel Mode

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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 65545 VGA BIOS supports standard VESA and extended modes, listed in the following tables.

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

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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 Appendix A-6 VGA Extended Modes (4-bit Linear Mode)

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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

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

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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 Appendix A-8 VGA Extended Modes (15-bit Linear Mode)

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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 Appendix A-9 VGA Extended Modes (16-bit Linear Mode)

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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 Appendix A-10 VGA Extended Modes (24-bit Linear Mode)

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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 Appendix A-11 VGA Extended Modes (Planar Mode)

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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 Appendix A-12 VGA Extended Modes (Packed Pixel Mode)

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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 C&T 65545 VGA BIOS supports standard high refresh modes, listed in the following table.

Table Appendix A-13 VGA High Refresh Modes (8-bit Linear Mode)

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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 Appendix A-14 VGA High Refresh Modes (Planar Mode)

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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 Appendix A-15 VGA High Refresh Modes (Packed Pixel Mode)

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Reso-lution	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

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. TSC's fax number is:

(508) 635-4666

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

It would also help to include your telephone number in case TSC can not get their answer to you. TSC will reply to all questions received by Internet of 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 fax the information.

Catalogs that list the documents and the document numbers are available. 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 use, enter the international long distance access number, the U.S. telephone number, and the U.S. extension (01-708-860-9550 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 use, first enter the international long distance access number (011), your country code, area code or city code, then your fax number.

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

HELPFUL QUESTIONS

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

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

POWER ON SELF TEST (POST)

This section provides a PhoenixBIOS 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 PhoenixBIOS startup error messages displayed on the notebook's screen. These messages help you to understand some of the notebook's problems that may be corrected by entering the CMOS SETUP program and checking the original values.

Table Section 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

Message	Possible Cause	Action
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

Message	Possible Cause	Action
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 *hex-value*, read *hex-value*, expecting *hex-value*	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 Section 5-3 BIOS Informational Messages

Message	Meaning
*nnn*K Base Memory	The amount of base memory that tested successfully.
*nnn*K 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.

BEEP CODES

Beep codes are used to identify a POST error that occurs when the screen is not available. Once the screen is operating, diagnostic messages are reported to the screen. There are beep codes for both fatal and non-fatal system board errors.

NOTE: No beep code is generated if a test is aborted while in progress. However, diagnostic cards can be installed in order to display the contents of the diagnostic port 80h and identify the area of failure.

Explanation of Test Terms for Beep Code Table

The following terms are used in the Test Performed column of the beep code table.

1. **Pattern test -** One or more particular patterns are written to a location then read back from the same location. Examples of patterns used are 55h and AAh. If the value read does not match the value written, the test is considered a failure.

2. **Rolling ones test** - Several patterns are constructed. These patterns represent a one rolling through the given location. For example, to roll a one through three bits, the following patterns would be constructed: 001, 010, 011, 100, 101, 110, and 111. The patterns are written to the location and then read back, one by one. If the value read does not match the value written, the test is considered a failure.

3. **Rolling zeros test** - Several patterns are constructed. These patterns represent a zero rolling through the given location. For example, to roll a zero through three bits, the following patterns would be constructed: 011, 001, and 000. The patterns are written to the location and then read back, one by one. If the value read does not match the value written, the test is considered a failure.

4. **Checksum test** - All of the values in a given range of locations are added together. The range includes a location which when added to sum of the ranges, will produce a known result, such as zero.

Beep Codes for System Board Errors

The following table provides system beep codes.

Table Section 5-4 BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
none	01h	CPU registers test in progress or failure	Pattern test of most of the 16-bit CPU registers. Failure will result in a system halt.
1-1-3	02h	CMOS write/read test in progress or failure.	Rolling ones test in the shutdown byte (offset 0Eh) of the CMOS RAM. Failure will result in a system halt.
1-1-4	03h	ROM BIOS checksum test in progress or failure.	The range of ROM that includes the BIOS is checksummed. Failure will result in a system halt.
1-2-1	04h	Programmable interval timer 0 test in progress or failure.	Over a period of time, the current count values in timer 0 are read and accumulated by ORing them into the values read so far. It is expected that during the time period, all bits will be set. Failure will result in a system halt.
1-2-2	05h	DMA channel 0 address and count register test in progress or failure.	Rolling ones and rolling zeros test of the address and count registers of DMA channel 0.

Table 5-4 BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
1-3-1	08h	RAM refresh verification test in progress or failure.	Over a period of time, the refresh bit (bit 4) in port 60h is read and tested. The refresh bit should toggle from 0 to 1, then 1 to 0 within the time period. Failure will result in system halt.
none	09h	First 64K RAM test in progress.	No specific test is performed - just indicates that the test is beginning .
1-3-3	0Ah	First 64K RAM chip or data line failure, multi-bit.	The first 64K of RAM is tested with a rolling ones test and a pattern test. If any of the pattern tests fail, then the BIOS reports that multiple data bits failure. Failure results in a system halt.
1-4-2	0Dh	Parity failure first 64K RAM	At the completion of the rolling ones and pattern tests of the first 64K, the BIOS checks the parity error bits (bits 7 and 6) of port 60h. Failure results in a system halt.
2-1-1 2-1-2 2-1-3 2-1-4 2-2-1 2-2-2 2-2-3 2-2-4 2-3-1 2-3-2 2-3-3 2-3-4 2-4-1 2-4-2 2-4-3 2-4-4	10h-1Fh	First 64K RAM chip or data line failure on bit x	The first 64K of RAM is tested with a rolling ones test and a pattern test. If any of the rolling ones tests fail, then the BIOS reports the specific bit that failed. To determine the bit number from the diagnostic code, subtract 10h. For example, if 12h is displayed at the diagnostic port, bit 2 failed. Failure results in a system halt.
3-3-1	20h	Slave DMA register test in progress or failure.	Pattern test of channels 1 through 3 of the slave controller (starting port address = 02h). Failure results in a system halt.

Table 5-4 BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
3-1-2	21h	Master DMA register test in progress or failure.	Pattern test of channels 1 through 3 of the master DMA controller (starting port address = C4h). Failure results in a system halt.
3-1-3	22h	Master interrupt mask register test in progress or failure.	Rolling ones and zeros tests of the mask register of the master programmable interrupt controller (port 21h). Failure results in a system halt.
3-1-4	23h	Slave interrupt mask register test in progress or failure.	Rolling ones and zeros tests of the mask register of the master programmable interrupt controller (port A1h). Failure results in a system halt.
none	25h	Interrupt vector loading in progress.	No specific test is performed - just indicates that the Interrupt Vector table is being initialized.
3-2-4	27h	Keyboard controller test in progress or failure.	The self-test command (AAh) is issued to the 8042 (keyboard controller) and the results are monitored. Failure results in a system halt.
None	28h	CMOS RAM power failure and checksum calculation test in progress.	The power-fail bit in CMOS RAM is tested and the lower CMOS RAM area is being checksummed. A failure does not result in system halt.
None	29h	CMOS RAM configuration validation for video in progress.	No specific test is performed - just indicates that the configuration specified in CMOS for video is being matched against the actual installation. A failure does not result in a system halt.
3-3-4	2Bh	Screen memory test in progress or failure.	The video buffers (B0000h and B8000h) are tested with a pattern test and a rolling ones test. Failure will result in a beep code but not a system halt.
3-4-1	2Ch	Screen initialization in progress.	Until the video installation is confirmed, any calls to INT 10h Function 0 (set mode) will be prefaced with the diagnostic code. There is no expected failure from this.

Table 5-4 BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
3-4-2	2Dh	Screen retrace test in progress or failure.	Over a period of time, the retrace bit (bit0) in the appropriate CRT controller status register (either port 3BAh or 3DAh) is read and tested. The retrace bit should toggle from 0 to 1, then 1 to 0 within the time period.
None	2Eh	Search for video ROM in progress.	No specific test is performed by the system BIOS - just indicates that the BIOS is about to jump to the initialization code in the video option ROM.
none	30h	Screen running with video ROM.	No specific test is performed - just indicates that a video option ROM was found and believed to be operating.
none	31h	Monochrome monitor operable.	No specific test is performed - just indicates that the BIOS believes a monochrome monitor is installed and is operating.
none	32h	Color monitor (40-column) operable.	No specific test is performed - just indicates that the BIOS believes a color monitor is installed and is operating. The mode has been set to 40-column as selected by the user in CMOS RAM.
none	33h	Color monitor (80-column) operable.	No specific test is performed - just indicates that the BIOS believes a color monitor is installed and is operating. The mode has been set to 80-column as selected by the user in CMOS RAM.
4-2-1	34h	Timer-tick interrupt test in progress or failure.	All interrupts expect the timer-tick interrupt are masked off at the interrupt controllers. If a timer-tick interrupt does not occur during a specific time period, an error message is displayed on the screen. The system does not halt.
4-2-2	35h	Shutdown test in progress or failure.	A return address is stored in 40:67h and the processor is reset via the keyboard controller. If a timer tick occurs during this time period, an error message is displayed on the screen. Other failures are hard to detect. If possible, the BIOS will continue with POST, skipping the memory tests.

Table 5-4 BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
4-2-3	36h	Gate A20 failure.	To test extended memory, the processor must be placed in protected mode and the A20 line must be enabled. For the memory tests, the BIOS generally uses the keyboard controller to enable A20. If the A20 line is not properly set during the memory test, an error message is displayed on the screen and the memory test are suspended. The system does not halt.
4-2-4	37h	Unexpected interrupt in protected mode.	During the memory tests, the processor is placed in protected mode. All interrupts in the interrupt descriptor table are initialized to point to special handler that displays a message on the screen. All hardware interrupt are disabled. The system does not halt when an unexpected interrupt occurs.
4-3-1	38h	RAM test of memory above 64K in progress or failure.	The memory above the first 64K is tested with a rolling ones test and a pattern test. All success and failure messages are displayed on the screen and POST will continue.
4-3-2	3Ah	Programmable interval timer channel 2 test in progress or failure.	Over a period of time, the current count values in timer 2 are read and accumulated by ORing them into the values read so far. It is expected that during the time period, all bits will be set. If an error is detected, an error message will be displayed on the screen and POST will continue.
4-3-4	3Bh	Real-time clock test in progress or failure.	Over a period of time, the Update-In-Progress bit of Status Register A of the real-time clock is read and tested. The bit should toggle from 0 to 1 within the time period.
4-4-1	3Ch	Serial port test in progress or failure.	Pattern test of one or more of the installed serial ports. If a failure is detected, an error message will be displayed and POST will continue.
4-4-2	3Dh	Parallel port test in progress or failure.	Rolling ones test is done to one of the installed parallel ports. If a failure is detected, an error message displays.

Table 5-4 BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
4-4-3	3Eh	Math coprocessor test in progress or failure.	An integer load and store is performed with the math coprocessor. If the values do not match, an error message will be displayed and POST will continue.

RUN-TIME ERROR MESSAGES

The following table lists run-time error messages.

Table Section 5-5 BIOS Run-time Error Messages

Message	Cause	Action
I/O card parity interrupt at *address*. 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 *address*. Type (S)hut off NMI, (R)eboot, other keys to continue	A memory chip(s) has failed.	Check the memory on the system board.
Unexpected HW interrupt *interrupt at address*. 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 *interrupt at address*. 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 *xxxxh*. 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 Section 5-6 Quick Troubleshooting

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

Table 5-6 Quick Troubleshooting

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

Table 5-6 Quick Troubleshooting

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

Glossary

AC Adapter

A device that connects a Versa portable computer and an AC wall outlet to provide AC power for running the system or recharging the battery.

A/D Conversion

The process of converting an analog signal into a digital signal.

animation

The art of making things appear to move in two-dimensional (2-D) or three-dimensional (3-D) space and making events happen over time.

applications programs

Software designed to perform specific functions, like solving business or mathematical problems.

audio

The range of frequencies that humans hear.

base RAM

Area of system memory between 0 and 640 kilobytes available to the user for operating system and application programs.

BIOS

Basic Input Output System. A collection of primitive computer routines, usually burnt into ROM, that controls the real-time clock, keyboard, disk drives, video display, and other peripheral devices.

bit

Binary digit. The smallest unit of computer data.

bits per second

(bps) A unit of transmission. Also called baud rate.

board

Printed circuit board. Board onto which computer components are soldered and thin wires are printed to connect the components.

boot

To start up a computer. See cold boot and warm boot.

bus

An electronic circuit within a computer used for transmitting data or electrical power from one device to another.

byte

Group of eight contiguous bits.

CD audio

Also called digital audio, uses the same format as conventional music CDs. CD audio sounds have been digitized at a high sampling rate.

CD-ROM reader

A computer-controlled device that reads high-capacity optical discs and sends the output to the computer.

clock

Electronic timer used to synchronize computer operations.

CMOS

Complementary Metal Oxide Semiconductor. A chip that contains nonvolatile memory in the Versa. CMOS is backed up by an internal lithium battery that preserves clock/calendar data and system configuration parameters stored in CMOS.

cold boot

Process of starting up the computer by turning on the power. If power is already on, the process means to turn off the computer and turn it on again. A cold boot reinitializes all devices.

crt

Cathode-Ray Tube. A type of display screen used in desktop monitors. It forms the screen image using tiny dots called pixels. See also LCD.

cursor

A movable image on the display screen that indicates where the next entered data appears.

default

A value, option, or setting that the computer automatically selects until you direct it otherwise.

diskette

A thin flexible platter coated with a magnetic material for storing information.

diskette drive

A magnetic drive that writes on and retrieves data from a diskette.

digital audio

Recorded sounds such as speech and sound effects. These are played back by the sound card's Digital-to-Analog Converter (DAC).

digital sound

A description of a sound wave that consists of binary numbers.

digitizing

The process of converting an analog signal into a digital representation.

DSTN

Double-Scan Super-Twisted Nematic. A type of technology used in some Versa LCD screen displays.

enhanced VGA

A video interface that offers more colors or higher resolution than VGA.

extended RAM

The area of RAM above the first megabyte of memory in the system available for enhancing system performance.

FM synthesis

A technique for synthesizing sound that uses a combination of modulated sine waves to produce different waveforms.

function key

The set of keys on the keyboard (usually F1 through F12) that let you get help and error message information or quickly select frequently used commands.

hard disk

A rigid magnetic storage device that provides fast access to stored data.

hardware

The electrical and mechanical parts from which a computer is made.

hertz

(Hz) A unit of frequency equal to one cycle per second.

hot key

Combination of two or three keys (such as **Ctrl-Alt-D**) that you press simultaneously for a particular function.

input/output

(I/O) The process of transferring data between the computer and external devices.

IDE

Intelligent Drive Electronics. A hard disk drive type that has controller electronics built into the drive and delivers high throughput.

interface

A connection that enables two devices to communicate.

interrupt

A special control signal from an I/O device that diverts the attention of the microprocessor from the program to a special address.

kilobyte

(KB) 1024 bytes.

LAN

Local Area Network.

LCD

Liquid Crystal Display. An LCD consists of a thin sandwich of two glass plates with sealed edges, containing nematic liquid-crystal material that forms the screen image. Versa displays are LCD type.

load

To copy a program into the computer's memory from a storage device.

megabyte

(MB) 1,048,576 bytes.

memory

Electronic storage area in a computer that retains information and programs. A computer has two types of memory — read-only memory (ROM) and random access memory (RAM).

menu

A video display of programs or options.

microprocessor

A semiconductor central processing unit that is the principal component of a microcomputer. Usually contained on a single chip that includes an arithmetic logic unit, control logic, and control-memory unit.

MIDI

Musical Instrument Digital Interface. A standard serial bus, digital interface designed to connect electronic musical devices. MIDI has no innate sound of its own.

mode

A method of operation; for example, the Versa operates in either normal or power-saving modes.

modem

MOdulator-DEModulator. A device that links computers over a telephone line.

multimedia

Computer technology that integrates different forms of media such as sound, text, graphics, and video.

nonvolatile memory

Storage media that retains its data when system power is turned off. Nonvolatile memory in the Versa is a complementary metal oxide semiconductor (CMOS) chip which is backed up by an internal battery. The backup battery
preserves the clock/calendar data and system configuration parameters stored in CMOS. See volatile memory.

operating system

Set of programs that manage the overall operation of the computer.

overwrite

Storing information at a location where information is already stored, thus destroying the original information.

page

A type of message transmission in which a message is sent or received via modem to a paging device from a computer (with paging communications software) or telephone.

parallel interface

Interface that communicates eight bits at a time.

parallel printer

A printer with a parallel interface.

parameter

A characteristic of a device or system.

password

A string of characters that the user must enter before the system allows access or system privileges.

PCMCIA

A credit card sized peripheral interface standard for portable devices. Types of PCMCIA cards currently offered by major vendors include fax/modems, LAN, storage cards, and wireless communications devices.

peripheral

Input or output device not under direct computer control. A printer is a peripheral device.

pixels

Picture elements. Tiny dots that make up a screen image.

port

Provides the means for an interface between the microprocessor and external devices. A cable connector is usually plugged into the port to attach the device to the computer.

processor

In a computer, a functional unit that interprets and executes instructions.

prompt

A special symbol indicating the beginning of an input line. Also a message that appears on the screen indicating that the user must take a certain action.

RAM

Random Access Memory. A storage device into which data is entered and from which data is retrieved in a nonsequential manner.

read

To extract data from a storage device such as a diskette.

ROM

Read-Only Memory. Memory in which stored data cannot be modified by the user except under special conditions.

reset

The process of returning a device to zero or to an initial or arbitrarily selected condition.

resolution

The degree of screen image clarity. Video display resolution is determined by the number of pixels on the screen. Resolution is usually specified in pixels by scan lines, for example, 640 by 480. See pixels.

RS-232C

Standard interface for serial devices. This port is sometimes referred to as the serial port.

scanner

An optical device that reads printed material and converts it to a computer screen image.

serial interface

An interface that communicates information one bit at a time.

serial printer

A printer with a serial interface.

software

Programs that run on a computer such as operating systems, word processors, and spreadsheets.

system board

The main printed circuit board inside the system unit into which other boards and major chip components, such as the system microprocessor, are connected.

TFT

Thin Film Transistor. A type of Versa LCD color screen that supports 256 colors and provides exceptional screen display.

VGA

Video Graphics Array. Graphics technology that supports up to 256 colors and a graphics resolution of 640 by 480 pixels.

volatile memory

Storage media that loses its data when system power is turned off. Standard memory and memory that you add to the Versa are volatile memory. See nonvolatile memory.

warm boot

Process of resetting the computer without turning off the power through keyboard input (pressing **Ctrl**, **Alt**, and **Del** keys simultaneously) or the reset button. The system returns to an initial or arbitrarily selected condition.

waveform

A graphic representation of a sound wave as displayed on an oscilloscope, which converts sound waves into electronic signals.

write

To record or store information to a storage device.

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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 àu Règlement sur le brouillage radioélectrique, C.R.C., ch.1374.