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Preface

This service and reference manual contains the technical information necessary to set up and maintain the NEC Versa[®] 2700 Series notebook computer. It also provides hardware and interface information for users who need an overview of the system's design. The manual is written for NEC-trained customer engineers, system analysts, service center personnel, and dealers.

The manual is organized as follows:

Section 1 — Technical Information, provides an overview of the hardware and interface components.

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

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

Section 4 — Troubleshooting and Repair, lists technical support phone numbers, error messages and their meanings, and ways to troubleshoot problems users encounter with the notebook.

Section 5 — Field Service Guidelines, provides system disassembly procedures, and an exploded-view diagram with corresponding part numbers.

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

An **Index** is included for convenience.

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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.



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

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

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

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

Canadian Department of Communications Compliance Statement

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

Avis de conformité aux normes du ministère des Communications du Canada

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

European Community Directive Conformance Statement

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

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Section 1

Technical Information

This section focuses on describing features and operations of the NEC Versa 2700 Series notebook computer, including the BIOS Setup program. (Refer to the user's guide for more information on operating the notebook.) The NEC Versa 2700 Series notebooks are light-weight, compact, and fully IBM compatible.

The NEC Versa 2700 Series notebook comes in the following model configurations.

Table 1-1 Model Configurations*

Configuration	Versa 2730M Versa 2730MT	Versa 2750MT Versa 2760MT	Versa 2770MT Versa 2780MT
CPU	Intel™ P55C - 133MHz (MMX)	Versa 2750MT Intel P55C - 150MHz (MMX) Versa 2760MT Intel P55C - 166MHz (MMX)	Versa 2770MT Intel P55C - 200MHz (MMX) Versa 2780MT Intel P55C - 233MHz (MMX)
L2 Cache	256 KB	256 KB	256 KB or 512 KB
On-Board Memory	None	None	None
SO-DIMM Memory	16 MB	16 MB	16 MB or 32 MB
Video Memory	None	None	None
LCD - Unit	Versa 2730M 12.1" DSTN SVGA EDMGR68KCF / Panasonic Versa 2730MT 12.1" TFT SVGA NL80060BC31-02 / NEC	12.1" TFT SVGA NL80060BC31-02 / NEC	12.1" TFT SVGA NL80060BC31-02 / NEC
Hard Disk Drive	1.44 GB MK1403MAV/ Toshiba	2.10 GB DK225A-21/Hitachi	2.10 GB DK225A-21/Hitachi
Diskette Drive	3.5" (3 mode) FD1238T-002 / NEC	3.5" (3 mode) FD1238T-002 / NEC	3.5" (3 mode) FD1238T-002 / NEC

Table 1-1 Model Configurations* (cont'd)

Configuration	Versa 2730M Versa 2730MT	Versa 2750MT Versa 2760MT	Versa 2770MT Versa 2780MT
CD-ROM	16X CD-316E / TEAC	16X CD-316E / TEAC	20X CD-220E / TEAC
Keyboard Unit	85 Keys (Windows® 95) US, UK, GR, FR/ ALPS	85 Keys (Windows 95) US, UK, GR, FR/ ALPS	85 Keys (Windows 95) US, UK, GR, FR/ ALPS
Pointing Device	Touchpad KGDDDH/ALPS	Touchpad KGDDDH/ALPS	Touchpad KGDDDH/ALPS
PCMCIA	2 x Type II/ 1 x Type III	2 x Type II/ 1 x Type III	2 x Type II/ 1 x Type III
ECP / ECP Parallel Port	Yes	Yes	Yes
Serial Port	Yes	Yes	Yes
VGA Port	Yes	Yes	Yes
PS/2 Port	Yes	Yes	Yes
DC-In Jack	Yes	Yes	Yes
Fax/Modem (USA, JP, and Aus. Only)	56 K, SW DSVD/ Venus	56 K, SW DSVD/ Venus	56 K, SW DSVD/ Venus
Audio Port	Yes	Yes	Yes
FIR Port	Yes	Yes	Yes
USB Port	Yes	Yes	Yes
Expansion Port	Yes	Yes	Yes
Battery Pack	NiMH (3300 mAh) 8HR-4/3AU-YZN/ Sanyo	Li-Ion (2600 mAh) 4UR18650-2-YZN/ Sanyo	Li-Ion (2600 mAh) 4UR18650-2-YZN/ Sanyo
AC Adapter	45 W ADP52 / Astec or Liteon	45 W ADP52 / Astec or Liteon	45 W ADP52 / Astec or Liteon
Power Cord	US/UK/Aus/Ger/JP	US/UK/Aus/Ger/JP	US/UK/Aus/Ger/JP

*NEC also ships a 150 MMX DSTN model outside of the U.S.

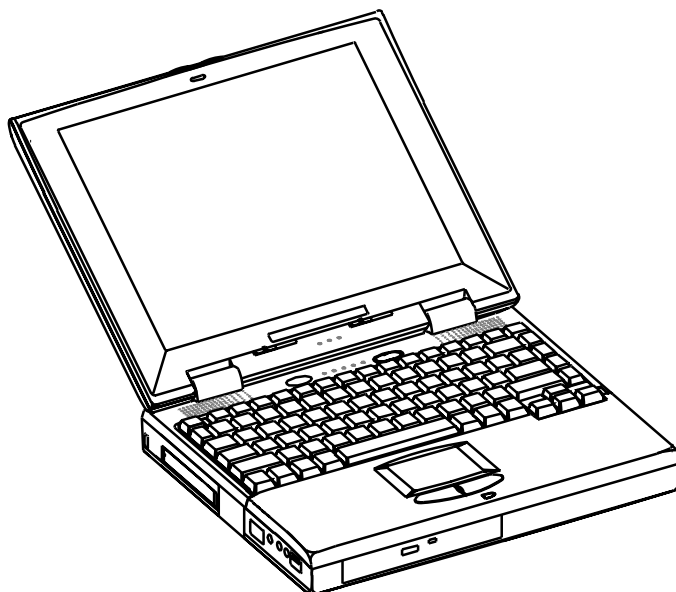


Figure 1-1 NEC Versa 2700 Series Notebook

FEATURE HIGHLIGHTS

The NEC Versa 2700 Series notebook includes a variety of innovative features designed to meet the most demanding computing requirements.

Table 1-2 Feature Highlights

Features	Description
CPU	Intel P55C-133/150/166/200/233 MHz MMX processor with internal 32 KB cache memory and math coprocessor
SO-DIMM Memory	16 MB, 32-MB, or 64-MB of SO-DIMM RAM, can be upgraded to 128 MB
Cache RAM	256 KB/512 KB (Versa 2770MT/Versa 2780MT), L2 cache
Display	12.1" DSTN or 12.1" TFT VGA Color LCD at 800 x 600 pixels resolution with 64K colors
VGA Chip	2 MB DRAM, 24-bit true-color RAMDAC, Graphics/Video Accelerator, Dual clock synthesizer, ZV (Zoomed Video) port, Z-Buffer Data Stripping, PCI Bus Mastering, and a high-speed glueless 32-bit compliance interface
HDD	Removable 2.5-inch IDE high-capacity hard drive (12.7 mm height)
FDD	Built-in 3.5-inch, 1.44 MB diskette drive
Keyboard	Built-in 85-key keyboard with 12 programmable function keys, embedded numeric keypad and special function control keys, dedicated screen control keys, and inverted "T" cursor keys/IBM enhanced 85-key compatible keyboard

Table 1-2 Feature Highlights (cont'd)

Features	Description
Pointing Device	VersaGlide Touchpad
PC Card Slots	Two slots that support two Type II PC cards at the same time, or one Type III
I/O Ports	1 x Serial Port (w/ FIFO)/1 x Printer Port (ECP/EPP)/1 x VGA Port/ 1 x PS/2 keyboard & mouse port/1 x Modem Port/1 x Expansion Port/1 x Infrared Port
Audio System	Headphones, Line-In, Microphone, and manual volume control/ built-in stereo speakers and woofer
Power System	Auto-switching AC Adapter (100V - 240V) / Rechargeable NiMH or Li-Ion Battery pack / Advanced power management capabilities

SYSTEM CONFIGURATION

The following diagram shows the NEC Versa 2700 Series system configuration.

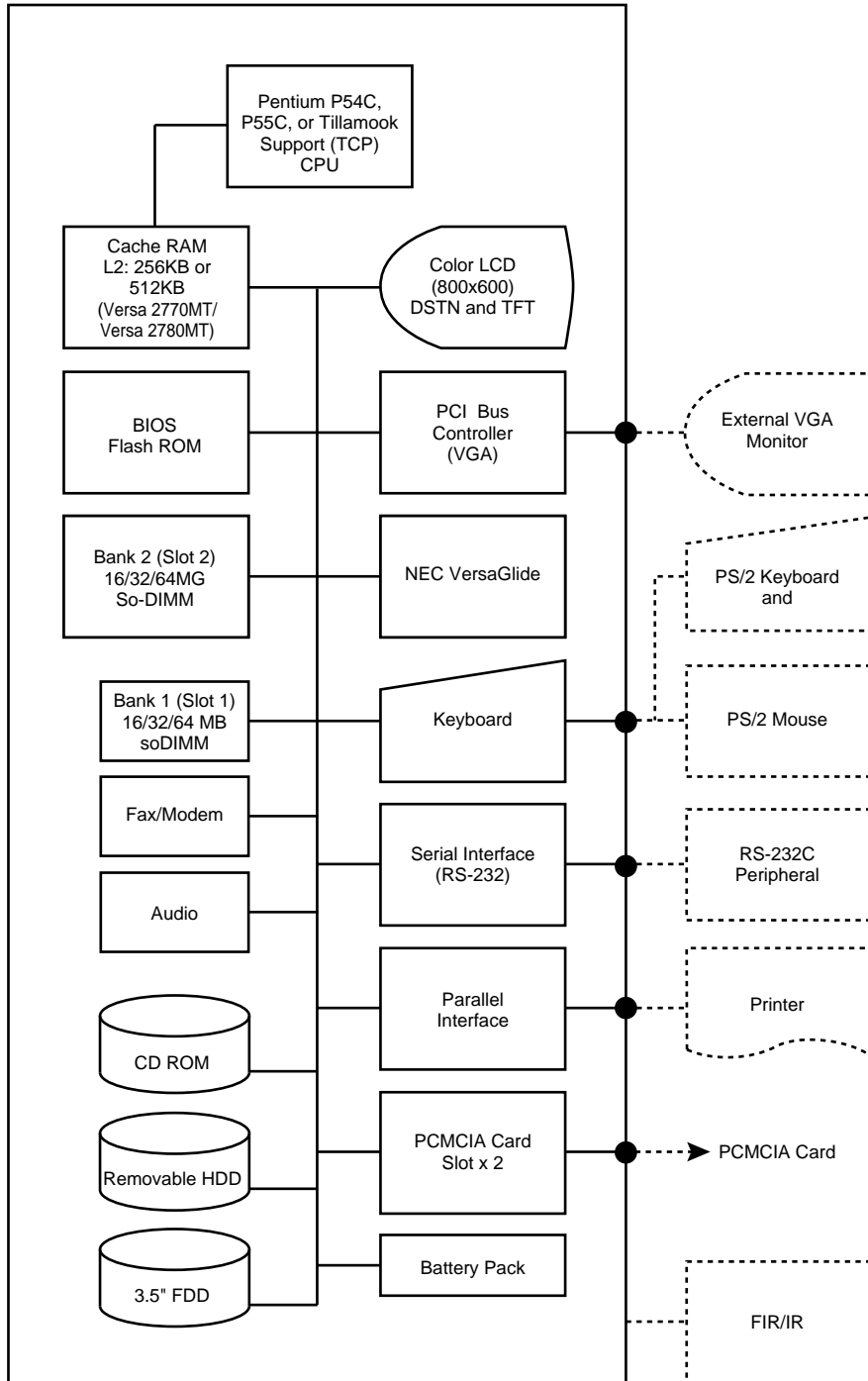


Figure 1-2 System Configuration Diagram

QUICK TOUR OF THE NOTEBOOK

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

Main Components

This section describes the main features of the NEC Versa 2700 Series computer.

Color LCD Display Panel

The notebook has either a built-in 12.1-inch passive-matrix dual scan DSTN or a 12.1-inch active-matrix TFT color liquid crystal display (LCD) which you can adjust and tilt to your desired viewing position. The LCD provides 800x600 pixel resolution with a maximum of 256 K colors, and supports simultaneous display with an external VGA monitor. The system also supports view panning when the resolution of the CRT is greater than 800 x 600.

The LCD screen also uses Cold Cathode Fluorescent Tube (CCFT) backlighting which consumes most of the power from the notebook. To save battery power, the system has an advanced power management feature that powers down the LCD when it has not been used for a predetermined amount of time. You can adjust the brightness and contrast level of the LCD by using the slide bars under the LCD panel on the front of the system.

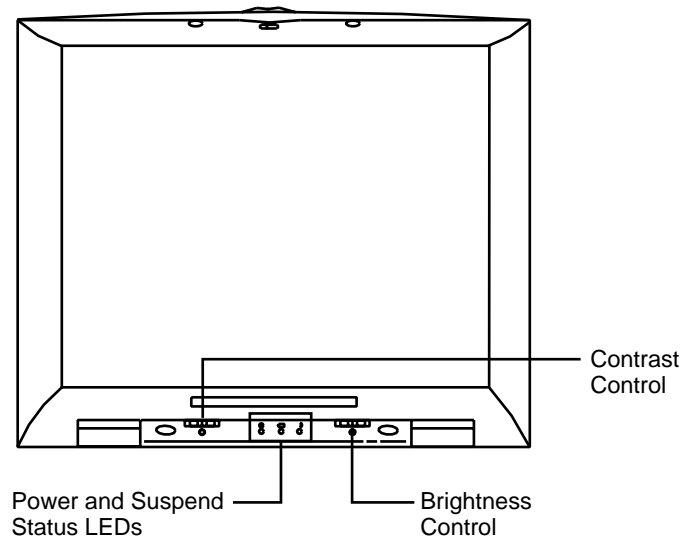


Figure 1-3 LCD Panel

Power Button/LCD Cover Switch

The power button, when pressed, turns on the notebook’s power. Press it again to turn computer power off. Whenever the notebook is in “save-to-file” suspend mode, the power button serves as a manual resume switch, allowing you to continue your application work where you left off.

NOTE: Always wait for a few seconds between turning off and turning on the power.

The LCD cover switch is connected to the right hinge of the LCD Assembly. This switch automatically depresses and releases when you lower or raise the LCD display panel. Depending on your power management settings, this switch either converts the notebook to the Suspend mode or shuts off the LCD when you close the cover.

Status Panel and Power Indicator

Directly below the LCD display, in the center, is the System Status LED panel. These LED’s provide an easy way to determine the current power mode of the unit. Below these two LED’s, on the system unit display, is a row of five (5) more. These LED’s light to indicate whether a device is being accessed, an operation is being done, or if a certain mode is or has been activated.

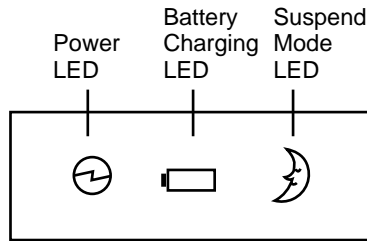


Figure 1-4 System Status LED Panel

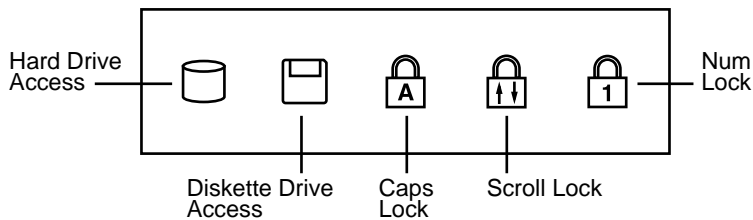


Figure 1-5 Device Status LED Panel

Keyboard

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

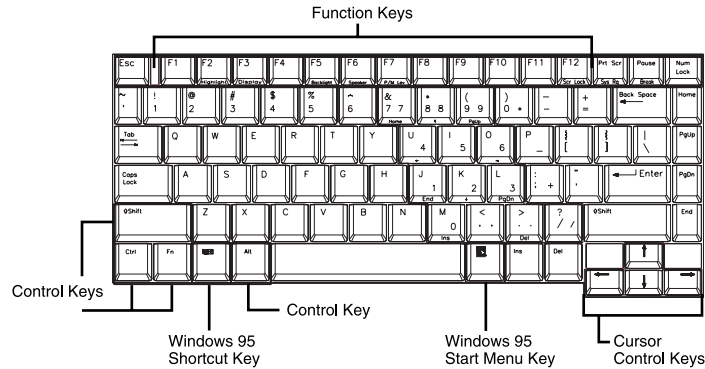


Figure 1-6 Standard Keyboard Layout

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

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

Table 1-3 Fn Key Combination Summary

Key Combination	Function
Fn key + F2 key	This key combination toggles the highlight of DOS text.
Fn key + F3 key	This key combination toggles between video display output to the LCD display, to an external CRT monitor, to a simultaneous display of LCD and CRT.
Fn key + F4 key	This key combination puts the system in Standby mode.
Fn key + F5 key	This key combination toggles the LCD display backlighting (CCFT) between standard and full.
Fn key + F6 key	This key combination sets the system speakers to Low, Medium, or High volume.
Fn key + F7 key	This key combination selects the desired P/M level.
Fn key + F12 key	This key combination enables the Scroll Lock function.
Fn key + Left Ctrl key	This key combination simulates the right Ctrl key functions.
Fn key + Suspend Button	This key combination enables Save-to-Disk on demand.
Power Switch + Suspend Button	This key combination forces the power off.

Table 1-4 Hot Keys Supported by the External Keyboard

External Keyboard Combination	Function
Ctrl key + Alt key + F2 key	This key combination toggles the highlight of DOS text.
Ctrl key + Alt key + F3 key	This key combination toggles between video display output to the LCD display, to an external CRT monitor, or to a simultaneous display of LCD and CRT.
Ctrl key + Alt key + F5 key	This key combination toggles the LCD display backlighting (CCFT) between standard or full.
Ctrl key + Alt key + F6 key	This key combination sets the system speakers to Low, Medium, or High volume.
Ctrl key + Alt key + F7 key	This key combination selects the desired power management level.

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

NOTE: When the Num Lock LED glows the embedded numeric key pads are activated.

VersaGlide

In front of the keyboard panel, in the center of the palm rest typing surface, is the VersaGlide pointing device. The buttons below the touchpad are configured (by default) as the left and right button, respectively. The left button is configured as the left mouse button. The right button is configured as the right mouse button. Moving the pointer on the screen is done by moving your finger over the surface and directing the pointer where you want it to go. The touchpad also supports single and double tap capabilities that mimic the left button.

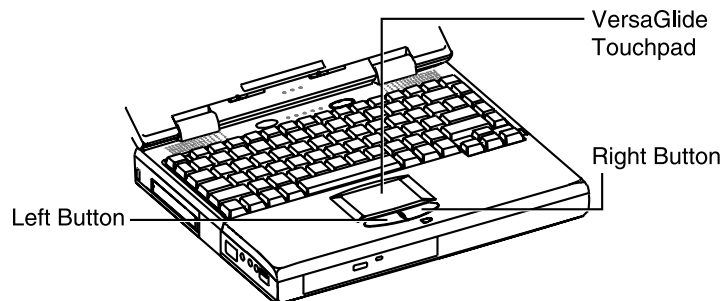


Figure 1-7 VersaGlide

Under the Palm Rest in Front of the Notebook

This section describes the features on the front side of the NEC Versa 2700 Series computer.

Hard Disk Drive

The notebook's internal hard drive is under the palm rest on the right side. The NEC Versa 2700 Series provides an industry standard 2.5-inch, 1.4-GB or 2.1-GB IDE hard disk drive, upgradeable to 3 GB or 4GB. The system BIOS also includes Auto IDE detection and LBA mode for easy installation as well as later upgrades for higher capacity disk drives.

Memory Module Compartment

The memory compartment is located under the palm rest. Inside the compartment are two memory module sockets (Bank 1 and Bank 2) that can accommodate 16-/32-/64-MB SO-DIMM modules. Bank 1 accepts 1.75-inch modules as well as 1-inch modules; Bank 2 only accepts standard 1-inch modules.

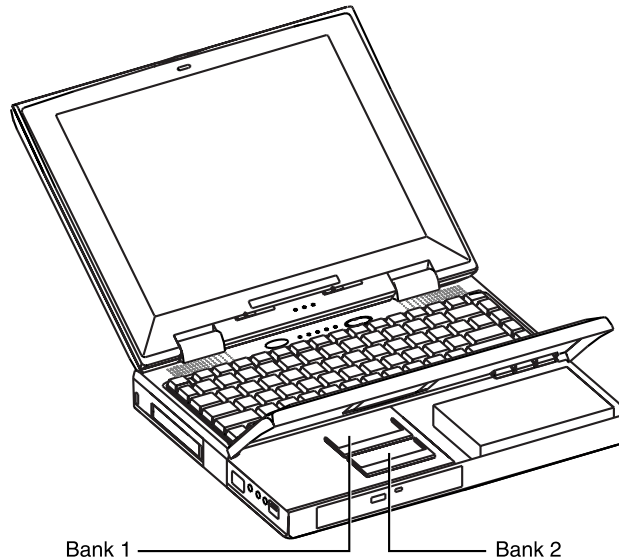


Figure 1-8 Memory Module Sockets

Right Side of the Notebook

This section describes the features on the right side of the NEC Versa 2700 computer.

Non-Removable Floppy Disk Drive

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

Battery Compartment

The battery compartment is on the right side bottom rear of the notebook. It houses the rechargeable NiMH battery pack or Li-Ion battery pack. The battery pack begins charging whenever you connect the AC adapter to the notebook. It is very important to always have the battery installed on the notebook and to have it always charged. Leaving the battery pack out of the unit for a long period of time completely drains the battery cells.

NOTE: The NEC Versa 2700 Series models use Type A battery packs with 3300mAh (NiMH) or 2600mAh (Li-Ion).

DC-IN Connector Jack

The NEC Versa 2700 series provides an universal auto-switching AC adapter which connects the AC power cord into the power outlet. It is important to have the AC adapter connected to the notebook to recharge the battery and keep the notebook working continuously.

NOTE: Use only the AC adapter that comes with the NEC Versa 2700 Series notebook.

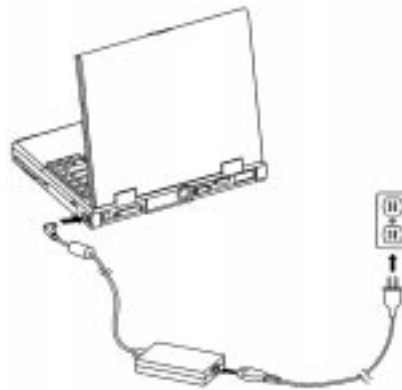


Figure 1-9 *Connecting the AC Adapter to the Notebook*

Left Side of the Notebook

The following details the left side of the NEC Versa 2700 Series computer.

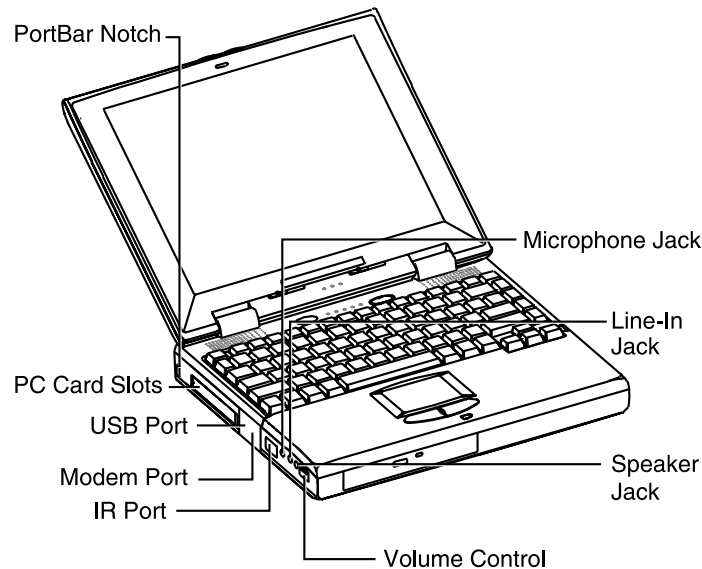


Figure 1-10 Left Side of the Notebook

PC Card Slot Compartment

The compartment houses two card slots that support two Type II devices, or one Type III device. Open the compartment door to view the PC card slots. Insert Type III cards into the lower slot. Insert the card with the pin sockets facing towards the drive and the label facing up. Once the card is inserted, pivot the eject button (which pops out) to the side. To remove the PC card, pivot the eject button out, then push on the Eject button to release the pin connections. Slowly pull out the card.

The NEC Versa 2700 Series also comes with DOS/Windows PC card drivers for supporting various PC cards like modem cards, network cards, and other I/O and memory cards. The upper PC card slot is referred to as “Slot 0” while the bottom slot is referred to as “Slot 1.” Slot 0 always takes precedence over Slot 1 in drive designations.

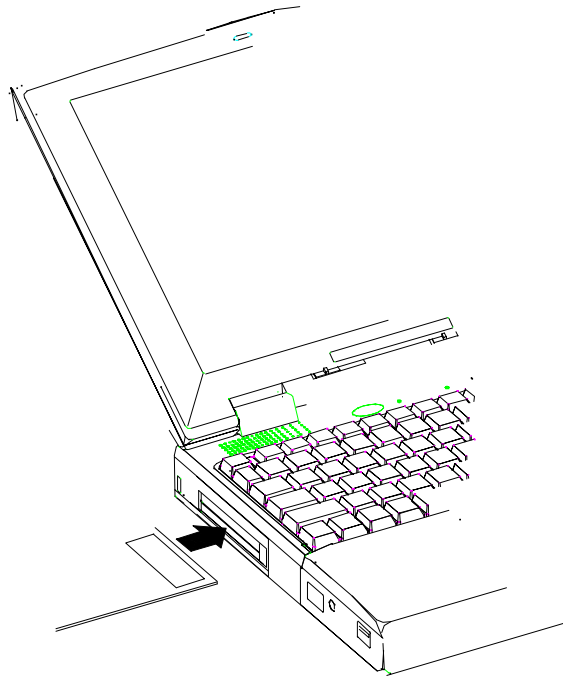


Figure 1-11 *Inserting a PC Card*

The USB Connector

The USB is a cable bus that supports data exchange between a host computer and a wide range of simultaneously accessible peripherals. The attached peripherals share USB bandwidth through a host scheduled token based protocol. The bus allows peripherals to be attached, configured, used, and detached while the host and other peripherals are in operation. This is referred to as dynamic (or hot) attachment and removal.

The FIR Window

This window allows wireless communication with any IrDA compliant device (such as another IrDA computer or printer) without the use of a cord or cable. This port transmits up to 4 M bits per second.

The Audio Jacks and Thumbwheel Volume Control

Microphone Jack — Connects to an external microphone.

Line-In Jack — Connects to a line-in device such as a synthesizer, stereo Walkman, or an audio CD player.

Headphones — Connects to headphones or amplified speakers.

Thumbwheel Volume Control — Allows the user to precisely adjust the sound volume.

The Fax/Modem

All models of the system feature a built-in (56Kbps capable, K56 felx compliant) fax/modem freeing the PC card slots for other uses.

Rear of the Notebook

The following details the rear side of the NEC Versa 2700 Series computer.

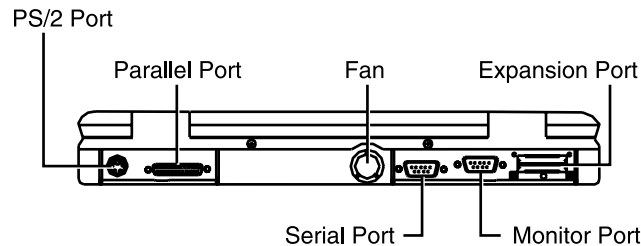


Figure 1-12 Rear Side of the Notebook

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 or a PS/2 mouse. 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 2700 Series also accepts an optional Y-connector adapter allowing simultaneous use of an external AT-enhanced keyboard and a PS/2 mouse. When using DOS or Windows for Workgroups, if an external serial mouse is installed, the VersaGlide is not supported.

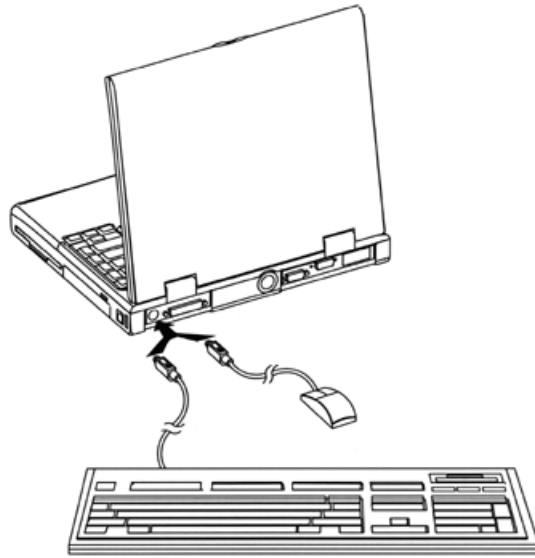


Figure 1-13 *Connecting an External Keyboard and PS/2 Mouse*

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 an external VGA monitor alone, the VGA port supports resolutions up to 1024x768 at 64K colors.

The NEC Versa 2700 Series provides a VGA VESA driver file set for installing different display resolution drivers for Windows Setup. These are on the Product Recovery CD You can also toggle the display between the LCD and the external monitor by pressing **Fn F10** key combination.

NOTE: When set to 1024x768 resolution, the external monitor only shows 800x600 resolution, if the computer is running with Simultaneous display, but the screen image size is reduced. This enables the image to be panned around the screen if wanted. Toggle the display to the external monitor only in order to display a full screen image.

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

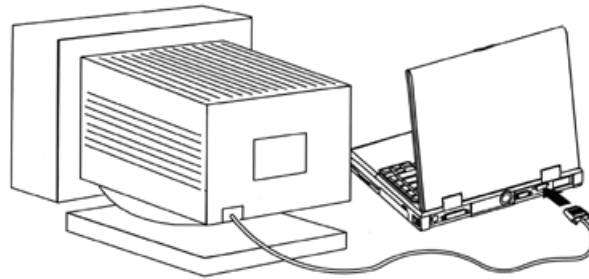


Figure 1-14 *Connecting an External Monitor*

Printer Port

The 25-pin printer port provides a parallel interface to connect a parallel printer or pocket network adapter. Many operating systems and software applications refer to this port as LPT1.

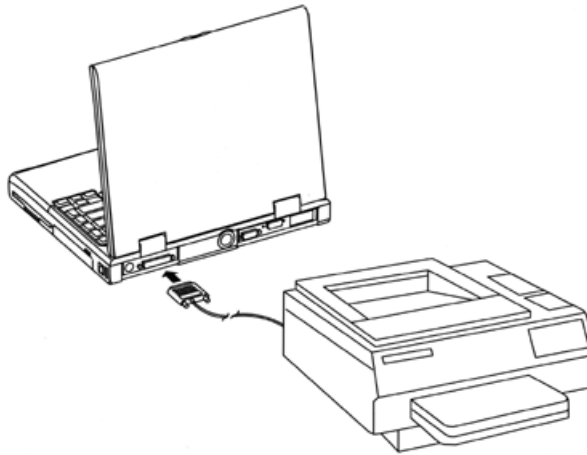


Figure 1-15 *Connecting to the Printer Port*

Serial Port (COM1)

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

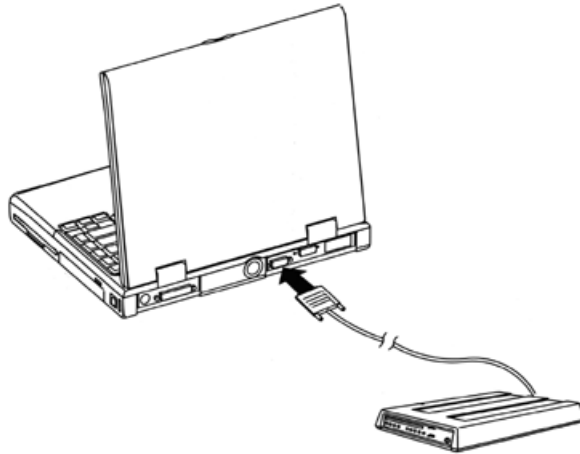


Figure 1-16 Connecting to the Serial Port

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

SYSTEM BIOS SETUP PROGRAM

This section provides the features and operation of the AMIBIOS Setup program used in the NEC Versa 2700 Series. The BIOS (Basic Input-Output System) Setup program lets you change the system configuration settings such as the current date and time, port settings, and power management.

The screens and tables show the basic type of information but may not depict the latest available BIOS settings.

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

Press F2 to Enter SETUP

Press **F2** to run the BIOS Setup program. The BIOS Setup program is organized into five (5) pages of menus. Select the menu you want to change, then press **Enter**. To move from one option to another, you use the **↑** and **↓** keys while using **PgUp** and **PgDn** to modify the settings. To return to the initial menu, press **Esc**.

To exit the BIOS Setup program, move the cursor down (on the Setup Utility page) to either **Save Settings and Exit** or **Exit Without Saving** and press **Enter**.

THE BOOT SETUP MENU

The AMIBIOS Setup Utility menu allows you to select one of the following menus: Standard CMOS Setup, Advanced CMOS Setup, Power Management Setup, or Peripheral Setup. You can also load Default Configurations as well as select to use (or change) the Supervisor and/or User Password from this menu.

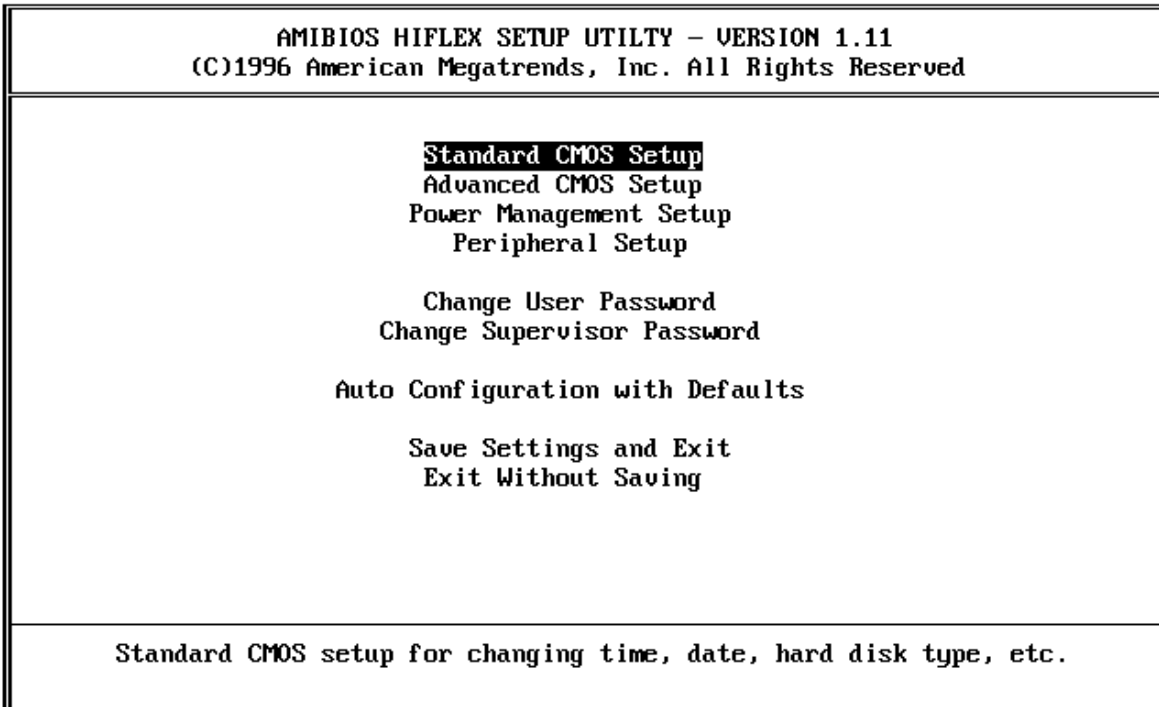


Figure 1-17 The AMIBIOS Setup Utility Menu

Table 1-5 Setup Utility Menu

Item	Function
Standard CMOS Setup	Pressing Enter directs you to the Standard CMOS Setup menu.
Advanced CMOS Setup	Pressing Enter directs you to the Advanced CMOS Setup menu.
Power Management Setup	Pressing Enter directs you to the Power Management Setup menu.
Peripheral Setup	Pressing Enter directs you to the Peripheral Setup menu.
Change Supervisor Password	This option allows you to set the Supervisor Password.
Auto Configuration with Defaults	This option allows you to set the system defaults.
Save Settings and Exit	This option exits CMOS Utility setup and saves all changes.
Exit Without Saving	This option exits CMOS Utility setup without saving any of your changes.

Figure 1-18 shows the standard CMOS setup window.

AMIBIOS SETUP – STANDARD CMOS SETUP										
(C)1996 American Megatrends, Inc. All Rights Reserved										
Date (mm/dd/yyyy): Sat <u>Jun</u> 28,1997					System Memory: 1 MB					
Time (hh/mm/ss): 16:14:46										
Diskette Drive A: Reserved										
	Type	Size	Cyln	Head	WPcom	Sec	LBA Mode	Blk Mode	PIO Mode	32Bit Mode
Pri Master:	Auto						Off	Off	Auto	Off
Sec Master:	Auto						Off	Off	Auto	Off
Month: Jan – Dec					ESC:Exit f1:Sel					
Day: 01 – 31					PgUp/PgDn:Modify					
Year: 1901 – 2099					F3/F4:Color					

Figure 1-18 The Standard CMOS Setup Menu

Table 1-6 Standard CMOS Setup Menu

Item	Function
System Date	This option changes the system date, using the format: month/day/year . You can change the system date here or from your operating system's command prompt.
System Time	This option changes the system time, using the format: Hour/Minute/Second . You can change the system time here or from your operating system's command prompt.
Diskette Drive A: Pri Master	This option specifies the type of diskette drive mounted inside the notebook. The default setting for this option is Reserved . This option specifies the type of primary hard drive mounted inside the notebook. Always select the Auto option to instruct the BIOS to automatically detect the relevant parameters of the hard drive. Some hard drives, however do not respond correctly to the values detected. In such cases, you must select User Defined and manually enter the manufacturer's recommended drive parameters. The default setting for this option is Auto .
Sec Master	This option automatically detects the type of secondary hard disk drive mounted inside the notebook, if you are using one.
32 Bit Mode	This option should be On only if supported by the controller. The default for this option is Off .

Figure 1-19 shows an example advanced CMOS setup window.

AMIBIOS SETUP - ADVANCED CMOS SETUP	
(C)1996 American Megatrends, Inc. All Rights Reserved	
Plug and Play Aware O/S	Auto
BootUp Sequence	A:,C:
Initial Display Mode	Silent
BootUp Num-Lock	Off
LCD Panel View Expansion	Off
Password Check	Setup

Select the AMIBIOS boot configuration. 'Yes' indicates the system will boot to a Plug and Play aware Operating System such as Windows 95(tm). 'Auto' indicates the system will detect there is a Plug and Play aware Operating system automatically.

ESC:Exit ↑↓:Sel
PgUp/PgDn:Modify
F3/F4:Color

Figure 1-19 The Advanced CMOS Setup Menu

Table 1-7 Advanced CMOS Setup Menu

Item	Function
Plug and Play Aware O/S	Selects the AMIBIOS boot configuration. “Yes” indicates the system boots to a Plug and Play aware operating system, such as Windows 95. “Auto” indicates the system automatically detects that there is a Plug and Play aware operating system. The default for this setting is “No.”
Bootup Sequence	<p>Allows you to configure the notebook to which drive it will first try to look for the operating system. The available options are “C:, A:” or “A:, C:”</p> <p>“C:, A:” means that the system first looks at the hard drive and then look at the diskette drive.</p> <p>“A:, C:” means that the system first looks at the diskette drive and then look at the hard drive.</p> <p>The default for the system is “A:, C:”</p>
Initial Display Mode	Selects the start-up logo display. Selecting “BIOS” displays the Windows 95 Logo while selecting “Silent” displays the NEC Logo. The default is “Silent.”
Bootup Num-Lock	Specifies whether NumLock is “On” or “Off” at system startup. The default is “Off.”
LCD Panel View Expansion	Selects the panel view mode. “Off” reduces the panel view in some video modes. “On” expands the panel view, but it may adversely affect the graphic/text quality. The default is “Off.”
Password Check	Specifies a password check level. Selecting “Setup” requires a password for entering this utility. Selecting “Always” requires a password for entering this utility, booting the system, and resuming from Suspend. When “Always” is set, pressing Ctrl+Alt+Backspace locks up the keyboard until the password is entered. The Caps Lock and Scroll Lock LED’s flash in sequence, while waiting for the user to enter a password.

Figure 1-20 shows an example power management setup window.

AMIBIOS SETUP - POWER MANAGEMENT SETUP		
(C)1996 American Megatrends, Inc. All Rights Reserved		
Power Management Under AC	Off	'Off' disables all BIOS Power Management time-outs when AC power is connected, but the function keys still work for immediate power savings. 'On' keeps the current Power Management level regardless of whether AC is connected or not.
Power Savings Level	Longest Life	
Hard Disk Time-out	2 min.	
Video Time-out	2 min.	
Peripheral Time-out	On	
Audio Device Time-out	On	
Standby Time-out	4 min.	
Auto Suspend Time-out	10 min.	
Suspend Option	Suspend	
Auto Save To File	Enable	
Panel Backlight	Auto	
Suspend Warning Tone	On	
Modem Ring Resume	On	
Wake Up Alarm	Off	
Resume Alarm Time	Off	
		ESC:Exit ↑↓:Sel PgUp/PgDn:Modify F3/F4:Color

Figure 1-20 The Power Management Setup Menu

Table 1-8 Power Management Setup Menu

Item	Function
Power Management Under AC	Selecting “ Off ” disables all BIOS Power Management time-outs when AC power is connected, but the function keys still work for immediate power savings. Selecting “ On ” keeps the current power management level regardless of whether AC is connected or not. Default for this option is “ Off .”
Power Savings Level	This option allows you to select the proper power saving mode. “ OFF ” disables all BIOS Power Management time-outs and allows you to set your own customized settings. “ High Perform ” provides improved system performance “ Longest life ” provides the best battery life. The default for this option is “ Longest Life .”

Table 1-8 Power Management Setup Menu (cont'd)

Item	Function
Suspend Option	<p>Selecting “Suspend” allows a fast resume time and is a Power Management mode. To resume, press the Suspend/Resume button. Selecting “STF” (Save to File) saves the system state to the system disk and powers off the notebook. “STF” mode is a Power Management mode. To resume, press the Power button. The default for this option is “Suspend.”</p>
Auto Save To File	<p>If this feature is “Enabled,” the system automatically enters Save To File (STF) mode after thirty (30) minutes of being in the Suspend mode.</p>
Panel Backlight	<p>Selects the LCD screen backlight intensity.</p> <p>“Auto” automatically switches the backlight from “Full” to “Standard” after 15 seconds of keyboard and PS/2 mouse inactivity.</p> <p>“Full” gives the highest level of backlight intensity.</p> <p>“Standard” helps save battery life.</p> <p>The default for this option is “Full.”</p>
Suspend Warning Tone	<p>Specifies whether the system warning tone sounds when Suspend mode starts. Select “On” to enable Suspend warning tone. Default for this option is “On.”</p>
Modem Ring Resume	<p>Chooses whether the system automatically resumes when the modem receives a transmission. The default for this option is “On.”</p>
Wake Up Alarm	<p>Lets you set a resume time from Suspend mode. The default for this option is “Off”. If you select ‘On’ you must designate a “Resume Alarm Time.”</p>

Figure 1-21 shows an example peripheral setup menu window.

AMIBIOS SETUP - PERIPHERAL SETUP (C)1996 American Megatrends, Inc. All Rights Reserved		
Serial Port	Auto	'Auto' lets AMIBIOS automatically assign a conflict free resource to this device. 'Disabled' frees the resources for other devices and prevents a PnP OS from using this device. The 'PnP OS Setup' option is displayed if the device was configured by a PnP Operating System such as Windows 95(tm).
Parallel Port	Auto	
Parallel Mode	ECP	
IR Serial Port	Disabled	
Sound	Auto	
Sound IRQ	N/A	
SB-Compatible DMA	N/A	
Full Duplex Mode DMA	N/A	
Port Bar Joystick	Enable	
		ESC:Exit ↑↓:Sel PgUp/PgDn:Modify F3/F4:Color

Figure 1-21 The Peripheral Setup Menu

Table 1-9 Peripheral Setup Menu

Item	Function
Serial Port	Selecting “ Auto ” lets AMIBIOS automatically assign a conflict free resource to this device. Selecting “ Disabled ” frees the resources for other devices and prevents a PnP operating system from using this device. The “ PnP OS Setup ” option appears if the device was configured by a PnP operating system, such as Windows 95. The default for this option is “ Auto. ”
Parallel Port	Selecting “ Auto ” lets AMIBIOS automatically assign a conflict free resource to this device. Selecting “ Disabled ” frees the resources for other devices and prevents a PnP operating systems from using this device. The “ PnP OS Setup ” option appears if the device was configured by a PnP operating system, such as Windows 95. The default for this option is “ Auto. ”
Parallel Mode	ECP provides the best performance and is recommended. Certain devices may only work properly with a specific Parallel mode. Please refer to that device’s documentation. The default for this option is “ ECP. ”
IR Serial Port	Selecting “ Auto ” lets AMIBIOS automatically assign a conflict free resource to this device. Selecting “ Disabled ” frees the resources for other devices and prevents a PnP operating system from using this device. The “ PnP OS Setup ” option appears if the device was configured by a PnP operating system, such as Windows 95. The default for this option is “ Disabled. ”
Sound	Selecting “ Auto ” lets AMIBIOS automatically assign a conflict free resource to this device. Selecting “ Disabled ” frees the resources for other devices and prevents a PnP OS from using this device. The “ PnP OS Setup ” option appears if the device was configured by a PnP operating system, such as Windows 95. The default for this option is “ Auto. ”
PortBar Joystick	This option allows you to “ Enable ” or “ Disable ” the PortBar joystick.

SYSTEM UPGRADES

The NEC Versa notebook is easily upgradable to a higher capacity hard drive. In addition, you can add an optional second memory module to increase the system memory up to 128 MB. This section provides the settings needed as well as illustrations for upgrading the system.

For NEC Versa 2700 Series notebooks, the following memory configurations are applicable:

Table 1-10 16-MB Memory Configurations

Upper Socket	Lower Socket	Total Memory
16 MB	empty	16 MB
16 MB	16 MB	32 MB
16 MB	32 MB	48 MB
16 MB	64 MB	80 MB

Table 1-11 32-MB Memory Configurations

Upper Socket	Lower Socket	Total Memory
32 MB	empty	32 MB
32 MB	16 MB	48 MB
32 MB	32 MB	64 MB
32 MB	64 MB	96 MB

Table 1-12 64-MB Memory Configurations

Upper Socket	Lower Socket	Total Memory
64 MB	empty	64 MB
64 MB	16 MB	80 MB
64 MB	32 MB	96 MB
64 MB	64 MB	128 MB

Section 2

General Specifications

The following table lists NEC Versa 2700 Series system specifications.

Table 2-1 NEC Versa 2700 Series Specifications

Item	Specification
CPU	Pentium P55C-133/150/166/P55CLM-200/233 MHz with MMX TCP Package
On-Board Memory	16 MB
SO-DIMM Module Slot	Two Slots 16 MB in first slot Upgradeable to 128 MB 256 KB L2 Cache
System Management	2M (256K x 8) Flash BIOS: Includes System and VGA Shadow BIOS Capability
Power Management	Operational Modes: Full On Mode Standby Mode Suspend to DRAM (STR) Suspend to File (STF) Peripheral Automatic Power Down Cover Switch Support Suspend/Resume Button
Hard Disk Drive	Removable HDD Module 2.5-inch format/12.7mm high Enhanced IDE Interface Support IDE PIO mode up to MODE 4 Support IDE MASTER MODE 1.4 GB/Higher Capacity Upgrade
CD-ROM Reader	Built-in CD-ROM Reader 13.7mm High 16X speed (maximum, variable speed support Versa 2730M, Versa 2730MT, Versa 2750MT, Versa 2760MT) 20X speed (maximum, variable speed support Versa 2770MT, Versa 2780MT) Both readers have an IDE Interface
Diskette Drive	Non-Removable Diskette Drive 720 KB/1.2 MB/1.44 MB Mode Support (3 mode)

Table 2-1 NEC Versa 2700 Series Specifications (cont'd)

Item	Specification
Display	12.1" TFT Color LCD Module or 12.1" DSTN Color LCD Module: 800 x 600 in 64K colors External CRT Capability: 640 x 480 in 16M colors 800 x 600 in 16M colors 1024 x 768 in 64K colors LCD/CRT Display Simultaneously 32-bit PCI Bus LCD/CRT Auto-Sense
Video RAM	2 MB embedded in VGA Controller
PCMCIA Slots	Two Type II slots or one Type III slot PCMCIA Socket compatible with CARD BUS standard ZV Support
Pointing Device	ALPS Glide Pad PS/2 Interface
Keyboard	Keyboard Layout: US Layout - 87 Keys European Layout - 88 Keys Support Extra Windows 95 Hot Keys Inverted T Compatible Direction Key Overlapped/Embedded Function and Numeric Keypad Internal and External Keyboard Simultaneous Function
Hot Key Operation	Fn + F2 = Text Highlight Fn + F3 = LCD > CRT > LCD/CRT Simul. Fn + F5 = LCD Backlight On/Off Fn + F6 = PC Speaker L/M/H/Mute Fn + F7 = PMU Level Fn + F12 = Scroll Lock Fn + Left Ctrl = Simulate the right Ctrl key Fn + Suspend = Save-to-Disk on Demand Power Switch + Suspend = Force Power Off
I/O Port	25-pin Parallel Port (W / EPP, ECP) (LPT1) 9-pin Serial Port (W / FIFO) (COM1) 15-pin VGA Monitor Port NEC Y-Cable Support (Keyboard & Mouse) DC-IN Jack FIR Port (COM2 Port) PortBar Expansion Port USB Port - 1

Table 2-1 NEC Versa 2700 Series Specifications (cont'd)

Item	Specification
PortBar	Supports: Game port External Keyboard External PS/2 Mouse Serial Port (COM1) Printer Port (LPT1) DC-In Jack USB Ports (2) Kensington Lock
Audio	Supports external Stereo Headphone Jack Supports external Stereo Line-In Jack Supports external microphone Jack Built-in Stereo speakers and Woofer Built-in microphone
Status Indicators	LED Displays Power Status LED Charge LED Suspend LED HDD LED FDD LED Num Lock - Enable Caps Lock - Enable Scroll Lock - Enable
Power Supply	AC Adapter AC 100V to 240V, 47/63Hz, 45W (Max) Dimensions: 4.1 in. (106mm) (L) x 2.3 in. (60mm) (W) x 1 in. (25.4mm) (H) Battery Input 8 cells long A-size 3300mA/hr Ni-MH Battery, 9.6V (Total - 31.68W) 8 cells 18650-size 2600mA/hr Li-Ion Battery, 14.4V (Total - 37.44W)
Heat Dissipation	Heat Pipe + Fan
Dimension	12.0 in. (306mm) (L) x 9.6 in. (241mm) (W) x 1.9 in. 49mm (H)
Optional Items	Port Replicator (PortBar)

Table 2-1 NEC Versa 2700 Series Specifications (cont'd)

Item	Specification
Key Components	<p>CPU: MMX 133 MHz, TCP Package (Intel) MMX 150 MHz, TCP Package (Intel) MMX 166 MHz, TCP Package (Intel) MMX 200 MHz, TCP Package (Intel) MMX 233 MHz, TCP Package (Intel)</p> <p>LCD: 12.1" Color TFT SVGA - (NEC, NL8060BC31 - 02) 12.1" Color DSTN SVGA - (Panasonic, EDMGR68KDF)</p> <p>CD-ROM: CD-316E (13.7mm) - (TEAC) CD-220E (13.7mm) - (TEAC)</p> <p>Hard Disk Drive: 1.4 GB MK1401MAV (12.7MM) - (Toshiba) 2.1 GB DK225A 21 (12.7mm) - (Hitachi)</p> <p>Diskette Drive: FD1238T - (NEC)</p> <p>Keyboard: KFREBA004A ALPS</p> <p>Glide Pad: KGDDDH Alps</p> <p>Battery: 3300mA/hr / 9.6V NiMH - (Sanyo) 2600mA/hr / 14.4V Li-Ion - (Sanyo)</p> <p>Core Logic: (Intel, MT2)</p> <p>Super I / O: (NS, PC87338VJG)</p> <p>VGA Chip: (Neo Magic, NM2160)</p> <p>Keyboard Controller: (Mitsubishi, M38813M4)</p> <p>PCMCIA Controller: (TI, PCI1131)</p> <p>FIR Chip: (HP, HSDL1100-07)</p> <p>Audio Chip: (Yamaha, 715B) Audio Amplifier: (TI, TPA0102)</p> <p>Clock Generator: (IMI, IMICS671) Micro Controller: (Micro Chip, PIC16C62A + PMU-03) Flash ROM: (ATMEL, AT29C020)</p> <p>RS232 Driver: (Maxium, MAX3243)</p> <p>Regulator: (NS, LP2952)</p> <p>PCMCIA Power Switch: (TI, TPS2206)</p> <p>MOSFET: (NS, 9410) MOSFET: (NS, 9947)</p>

SYSTEM BOARD SPECIFICATIONS

The following table lists system board specifications.

Table 2-2 System Board Specifications

Item	Specification
Clock	Crystal 8 MHz SMD Type x 1
	Crystal 14.318 MHz SMD Type x 1
	Crystal 32.768 MHz SMD Type x 1
	Crystal 4 MHz SMD Type x 1
	Crystal 4.19 MHz SMD Type x 1
	Clock Generator (ICWORKS 48569-02, 48 pin) Buffer included in Clock Generator
ROM	Flash ROM for BIOS 256 K x 8, 120 ns 32-pin PLCC Package
System Chipset	430 TX (Intel) 320-pin BGA (MTXC) 320-pin BGA (P11X4)
Super I/O	100-pin TQFP (NS87338)
Keyboard Controller	64-pin QFP (Mitsubishi 38813-M4)
Micro Controller	28-pin SOIC (PIC16C62A)
RTC Battery	60mA, 3.0V NiMH Battery (VARTA)
Audio	100-pin TQFP (Yamaha YMF715B-S)
Amplifier	(TI TPA0102)
DRAM	144-pin 2 Slot DIMM x 2
VGA	2 MB Video DRAM (NeoMagic 2160)
PCMCIA	(TI 1131)
	(TI TPS2206)
L2 Cache	32 K x 32 SRAM TQFP (3.3V/6ns) x 2 TAG RAM SOP 32 K x 8
NEC Micro Controller	80 PIN Charge Controller Battery Gas Gauge Controller (NEC D75517G-416)
HP IR Module	4 MB Transfer

Table 2-2 System Board Specifications (cont'd)

Item	Specification
Internal Connectors	To LCD Panel: CN52, 40 pin (HRS)
	To LED Board: CN51, 10 pin (Molex)
	To LCD- LED Board: CN53, 11 pin (Molex)
	To HDD: CN60, 50 pin (Molex)
	To CD-ROM: CN57, 50 pin (Molex)
	To RTC Battery: CN65, 2 pin (Molex)
	To I/O Board: CN70, 120 pin (AMP)
	To LCD Panel: CN52, 40 pin (HRS)
	To LED Board: CN51, 10 pin (Molex)
	To LCD- LED Board: CN53, 11 pin (Molex)
	To HDD: CN60, 50 pin (Molex)
	To CD-ROM: CN57, 50 pin (Molex)
	To RTC Battery: CN65, 2 pin (Molex)
	To I/O Board: CN70, 120 pin (AMP)
	To PCMCIA Socket: CN71, 156 pin (HRS)
	To FAX/MODEM Board: CN66, 80 pin (Molex)
	To CPU Board: CN54, 240 pin (HRS)
	To Glide Pad: CN55, 6 pin (ELCO)
	To Internal Keyboard: CN56, 21 pin (ELCO)
	To Woofer: CN64, 2 pin (Molex)
To Internal Microphone: CN62, 2 pin (Molex)	
To Internal Speaker: CN59, 4 pin (Molex)	
To MODEM Jack: CN58, 2 pin (Molex)	
To FDD: CN63, 26 pin (ELCO)	
External Connector	To CRT: CN68, 15 pin (Suyin)
	To USB: CN72, 4 pin (Berg)
	To PortBar: CN69, 80 pin ((Berg)
	To Headphone Jack: CN78, 5 pin (Hosiden)
	To Line-In Jack: CN75, 5 pin (Hosiden)
	To External Microphone Jack: CN77, 5 pin (Hosiden)
	To Fax/Modem Jack: CN73, 6 pin (Molex)

DC CONVERTER BOARD SPECIFICATIONS

The following table lists the DC converter board specifications.

Table 2-3 DC Converter Board Specifications

Item	Specification																																																																																	
Structure	PUD76: DC/DC Buck Converter 5V/3.3V FM-04: DC/DC Boost Converter CC04: Constant Current Circuit LTC1435: DC/DC Buck Converter Vcore & Vio MAX3243: Transceivers RS-232																																																																																	
Signal Standard	Main Battery: NiMH/Li-Ion AC Adapter: ADP52 Bridge Battery: 6 Cell NiMH																																																																																	
Characteristics	<p>PUD76: DC/DC Converter</p> <table> <tr> <td>Input Rated Voltage: Battery</td> <td>NiMH</td> <td>DC 9.6V</td> </tr> <tr> <td></td> <td>Li-Ion</td> <td>DC 14.4V</td> </tr> <tr> <td>Adapter</td> <td>ADP52</td> <td>DC 19V</td> </tr> </table> <p>Output Rated Current:</p> <table> <tr> <td></td> <td>3VDDS</td> <td>5VDDS</td> </tr> <tr> <td>PEAK</td> <td>3.7A</td> <td>4.5A</td> </tr> <tr> <td>MAX</td> <td>3.5A</td> <td>3.2A</td> </tr> <tr> <td>TYP</td> <td>1.75A</td> <td>1.3A</td> </tr> <tr> <td>MIN</td> <td>0.3A</td> <td>0.5A</td> </tr> <tr> <td>MAX</td> <td>100mA</td> <td>100mA →</td> </tr> <tr> <td>TYP</td> <td>6mA</td> <td>6mA → Suspend</td> </tr> <tr> <td>MIN</td> <td>1mA</td> <td>1mA →</td> </tr> <tr> <td>Voltage</td> <td>3.3V</td> <td>5.0V</td> </tr> <tr> <td>Regulation</td> <td>-2.5%+4.0%</td> <td>-2.5%+4.0%</td> </tr> <tr> <td>Ripple</td> <td>80mV</td> <td>80mV</td> </tr> <tr> <td>Ripple Noise</td> <td>150mV</td> <td>150mV</td> </tr> <tr> <td>Protection Circuit</td> <td>Short Circuit</td> <td>→ Reset by pwr on</td> </tr> <tr> <td></td> <td>Over Current</td> <td>→ Reset by pwr on</td> </tr> </table> <p>Input - Output Interface:</p> <table> <tr> <td>CN1</td> <td>1. DC-In</td> <td>2. DC-In</td> </tr> <tr> <td>DC-In</td> <td>4. 5VON1</td> <td></td> </tr> <tr> <td>NC</td> <td>6. FULPDN0 (Suspend)</td> <td></td> </tr> <tr> <td>GND</td> <td>8. GND</td> <td></td> </tr> <tr> <td>GND</td> <td>10. GND</td> <td></td> </tr> <tr> <td>CN2</td> <td>1. 5VDDS</td> <td>2. 5VDDS</td> </tr> <tr> <td>VAR5</td> <td>4. GND</td> <td></td> </tr> <tr> <td>5. GND</td> <td>6. GND</td> <td></td> </tr> <tr> <td>GND</td> <td>8. VAR3</td> <td></td> </tr> <tr> <td>9. 3VDDS</td> <td>10. 3VDDS</td> <td></td> </tr> </table>	Input Rated Voltage: Battery	NiMH	DC 9.6V		Li-Ion	DC 14.4V	Adapter	ADP52	DC 19V		3VDDS	5VDDS	PEAK	3.7A	4.5A	MAX	3.5A	3.2A	TYP	1.75A	1.3A	MIN	0.3A	0.5A	MAX	100mA	100mA →	TYP	6mA	6mA → Suspend	MIN	1mA	1mA →	Voltage	3.3V	5.0V	Regulation	-2.5%+4.0%	-2.5%+4.0%	Ripple	80mV	80mV	Ripple Noise	150mV	150mV	Protection Circuit	Short Circuit	→ Reset by pwr on		Over Current	→ Reset by pwr on	CN1	1. DC-In	2. DC-In	DC-In	4. 5VON1		NC	6. FULPDN0 (Suspend)		GND	8. GND		GND	10. GND		CN2	1. 5VDDS	2. 5VDDS	VAR5	4. GND		5. GND	6. GND		GND	8. VAR3		9. 3VDDS	10. 3VDDS	
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LED INDICATOR BOARD SPECIFICATIONS

The NEC Versa 2700 uses the following LEDs.

- HDD LED x 1
- FDD LED x 1
- Num Lock LED x 1
- Cap Lock LED x 1
- Scroll Lock LED x 1
- Power Switch x 1
- Suspend Button x 1

The following table lists LED indicator board specifications.

Table 2-4 LED Indicator Board Specifications

Item	Specification
External Connector	To Mother Board : CN101, 10 pin (Molex)
	To Cover Switch : CN102, 2 pin (Molex)

I/O BOARD SPECIFICATIONS

The following table lists I/O board specifications.

Table 2-5 I/O Board Specifications

Item	Specification
CPU Core Voltage:	16 pin, SOP (LTC1435)
+5V Voltage:	NEC Module Board
+3V Voltage:	NEC Module Board
+12V Voltage:	NEC Module Board
Internal Connector	To Mother Board: CN6, 100 pin (AMP)
External Connector	To COM Port: CN1, 9 pin (Suyin)
	To LTP Port: CN3, 25 pin (Suyin)
	To Keyboard Connector: CN4, 6 Pin (Eoxcon)
	To Adapter: CN5, 3 pin (HRS)
	To Battery pack: CN7, 8 pin (AMP)

LCD INVERTER BOARD SPECIFICATIONS

The following table lists the LCD inverter board specifications.






Table 2-6 LCD Inverter Board Specifications

Item	Specification
Ratings	Input Voltage: 8V to 20V DC Tube Current: 2 to 5 mA rms
	VBL-adj: 0 to 4.7V DC
	Working Frequency: 50 to 58 KHz
Detection	No-load OVP clamp: No Connection to LCD
	Constant Current Output: Output Short
Connector	CN1 6 pin Molex (53261-0610)
	1. V+ (8.0V to 20.0V)
	2. V+ (8.0V to 20.0V)
	3. On/Off (H - On, L - Off)
	4. VBL - adj (0.0V to 4.7V)
	5. GND
	6. GND
	CN2 2-pin JST SM02(8.0)H-BHS
	1. HV (High Voltage)
	2. Return
Environment Specification	Temperature Operation : 0° to 45° C Storage : -20° to 60° C
	Humidity Operation : 20%RH to 80%RH Storage : 10%RH to 90%RH
	Altitude Operation : 10,000 ft Storage : 15,000 ft
	Burn-In
	Loading : LCD Module or Dummy Load
	Input : 19V (Max/Adapter In)

LED STATUS INDICATORS

The following table lists NEC Versa 2700 Series LEDs. For example, the Hard Drive Access LED lights to indicate the hard drive is in use and being accessed.

Table 2-7 Status LED Descriptions

Item	LED
Hard Drive Access	
Diskette Drive Access	
Caps Lock	
Scroll Lock	
Num Lock	

DISKETTE DRIVE SPECIFICATIONS

The following table lists the standard diskette drive specifications.

Table 2-8 Diskette Drive Specifications

Item	Specification
Module	3.5" Module
Mode	3 Mode FDD (1.44 MB/ 720 KB)
Unit Size	4.29 in. (L) x 3.74 in. (W) x 0.50 in (H) (110mm x 96mm x 12.7mm)

HDD UNIT SPECIFICATIONS

The following table lists the standard hard drive specifications.

Table 2-9 Hard Disk Drive Specifications

Item	Specification
Module	2.5" Removable HDD Module
Capacity	1.4 GB or 2.1 GB
Interface	Enhanced IDE Interface
Unit Size	3.90 in. (L) x 2.73 in. (W) x 0.50 in. (H) (100mm x 70mm x 12.7mm)

CD-ROM SPECIFICATIONS

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

Table 2-10 CD-ROM Reader Specifications

Item	Specification 16X	Specification 20X
Model Number (TEAC)	CD-316E	CD-220E
Mode	IDE Interface	IDE Interface
Data Transfer (Sustained)	2,400 KB/sec (Max)	3,000 KB/sec (Max)
Data Transfer (Burst)	16.7 MB/sec	16.7 MB/sec
Unit Size	5.48 in. (L) x 5.09 in. (W) x 0.53 in. (H) (140.5mm x 130.5mm x 13.7mm)	5.07 in (L) x 4.99 (W) x 0.50 (H) (130mm x 128mm x 12.7mm)

NIMH BATTERY PACK SPECIFICATIONS

The following table lists the standard battery specifications.

Table 2-11 Battery Specifications

Item	Specification NiMH	Specification Li-Ion
Capacity	3300 mA x 8 cells	2600 mA x 8 cells
Cell Type	Long A	18650
Voltage	9.6V	14.4V
Connector	10-Pin	10-pin

DC/DC CONVERTER AND BATTERY CHARGER SPECIFICATIONS

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

Table 2-12 DC/DC Converter and Battery Charger Specifications

Item	Specification
Input Voltage	6V -> 19V
Output Voltage	5V, 3.3V
Output Current	0.1A, 2.5A
Output Ripple Voltage	150mV, 100mV
Protection	Short Circuit, Over Current
Efficiency	80% Min. (Typ.)
PCB	1.2mm/6 Layers

BATTERY CHARGER SPECIFICATIONS

The following table lists battery charger specifications.

Table 2-13 Battery Charger Specifications

Item	Specification
Input Voltage	20V (Max.)
Support Battery	NiMH Battery (12V) or Li-Ion Battery (12V)
Protection	Max. Temp., Max. Timer
Charge Method	Delta T/Delta t: 1 °C (min.)
Max. Temperature	53 °C ~ 60 °C
Timer Setting	360 Min.
Charge Time	Machine On: 4 hours Machine Off: 2 hours
Charge IC	BQ2005
Connector	To M/B: 10 Pin & 18 Pin, Male, Straight, DIP/SMT

KEYBOARD SPECIFICATIONS

The following table lists keyboard specifications.

Table 2-14 Keyboard Specifications

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

AC/DC ADAPTER SPECIFICATIONS

The following table lists AC/DC adapter specifications.

Table 2-15 AC/DC Adapter Specifications

Item	Specification
Input Voltage	AC 90V -> 265V, 50 -> 63Hz
Ripple Noise	100mvp-P
Output Voltage	20V Max.
Protection	Short Circuit UVP, OVP
AC Cord	Safety Approval, FCC Shielding AC cord
DC Output Cable	2-pin, 100cm long with coil at system end
Indicator	AC Power On
Unit Size	4.68 in. (L) x 2.42 in. (W) x 1.40 in. (H) 120mm x 62mm x 36mm

LCD/LED BOARD SPECIFICATIONS

The NEC Versa 2700 features the following LCD/LED items.

- Charge LED x 2
- Power LED x 2
- Suspend LED x 2
- Contrast VR x 1
- Brightness VR x 1

The following table lists LCD/LED Board specifications.

Table 2-16 LCD/LED Board Specifications

Item	Specification
External Connector	To Mother Board: CN2, 11 pin (Molex) To Inverter: CN1, 6 pin (Molex)

BIOS SPECIFICATIONS

The following table lists BIOS specifications.

Table 2-17 BIOS Specifications

Item	Specification
BIOS Feature	<ul style="list-style-type: none"> • Boot Block/Crisis Rescue • APM 1.2 Compliance • Support PCI 2.1 Specifications • Supports Win95, WFWG, WinNT, Win3.11, and DOS 6.2x
CPU	Auto detects the CPU type and speed
DRAM	Auto sizing and detection
Cache	<ul style="list-style-type: none"> • Level 2 Sync/Async SRAM auto sizing and detection • Supports Panning while LCD display resolution is greater than supported.
Hard Disk	<ul style="list-style-type: none"> • Enhanced IDE Specifications • Supports auto detection • Supports LBA mode for larger capacity HDD • Supports 32-bit PIO transfer • Supports Multi-sector transfer • Supports ultra DMA • Supports Fast PIO mode 1 - 4 transfer
Multi Boot	Allows user to select boot from FDD, HDD, or CD-ROM
Plug and Play	Supports PnP Run Time Service and conflict-free allocation of resource during POST
Intelligent Battery	Supports BIOS interface to pass battery information from the PMU Controller (PMU-03 & PIC16C62) to the application
Keyboard Controller	Supports Fn hot keys, two Win95 hot keys, built-in Glide Pad and external PS/2 mouse/keyboard
PCMCIA	Compliant with PCMCIA 2.1 Specification
CD-ROM	Supports boot from CD-ROM
PortBar	<p>I/O port replicator duplicates the following ports:</p> <p>CRT Port Printer Prot COM1 Port MIDI/Game Port PS/2 Mouse & Standard Keyboard Port DC-In Jack</p>

Table 2-17 BIOS Specifications (cont'd)

Item	Specification
Power Management Support	<p>The power management is compliant with APM 1.2 specifications and supports the following power states:</p> <p>On Mode Doze Mode — Transparent to the user Standby Mode — Also known as the Power On Suspend Mode Suspend to RAM (STR) Mode Suspend To Disk (STD) Mode Soft-Off Mode (Soff) Mechanical Off Mode (Moff) — Transparent to BIOS</p>

POWER MANAGEMENT FEATURES (MODE DEFINITION)

The following table lists power management specifications.

Table 2-18 Power Management Modes

Mode	Mode Definition
Full-On	The system state where no devices are power managed and the system can respond to applications with maximum performance.
Doze Standby (POS)	The CPU clock is slowed down and all other devices are full-on. A suspend state where all system board components are still powered-on except for the system clock generator device. The PCI and CPU buses are driven to the inactive idle state. The system memory is powered and refreshed by the memory bridge, and the graphics frame buffer is powered and refreshed by the graphic chip. The system provides a 32 KHz clock (SUSCLK) in this Suspend mode to support refresh of these memory subsystems. Only an enabled “resume event” can bring the system out of the powered-on suspend (POS) state. The PIIX4 also provides a resume timer that allows the system to resume after a programmed time has elapsed.
Suspend To RAM (STR)	A suspend state where all system board components are powered off. The CPU/L2 and PCI busses are powered off. All devices connected to the CPU/L2 and PCI buses must either be powered-off or isolate their bus interfaces. The system memory is powered and refreshed by the graphics chip. The system provides a 32 KHz clock (SUSCLK) in this suspend mode to support refresh of these memory subsystems. Only an enabled “resume event” can bring the platform out of the suspend to RAM (STR) state.
Suspend to Disk (STD)	A suspend state where the context of the entire system is saved to disk, all system board components are powered-off, and all clocks are stopped. Any enabled “resume event”, such as PowerBTN or RTC, can bring the platform out of the suspend to disk (STD) state.

Table 2-18 Power Management Modes (cont'd)

Mode	Mode Definition
Soft Off: (SOFF)	This is the same as suspend to disk except the context of memory is not saved. The system resumes from a Soft Off as if a hard reset had occurred.
Mechanical Off (MOFF)	All power except the RTC was removed from the system. (This mode is transparent to BIOS.)

Table 2-19 Power Status of Local Devices

Component	Full-On	Doze	POS	STR	STD/Soff
CPU	On	Stop Grant	Stop Clock	Power Off	Power Off
DRAM	On	On	Slow Refresh	Slow Refresh	Power Off
HDD	On	On	Low Power	Power Off	Power Off
FDD	On	On	On	Power Off	Power Off
M#8813 (KBC)	On	On	On	Low Power	Power Off
PIC16C62 (μ P)	On	On	On	Low Power	Low Power
VGA / VRAM	On	On	Low Power	Low Power	Power Off
TI 1131 (PCMCIA)	On	On	Low Power	Low Power	Power Off
Sound	On	On	Low Power	Power Off	Power Off
LCD Panel Backlight	On	On	Power Off	Power Off	Power Off
IR Module	On	On	Low Power	Power Off	Power Off
Super I/O Chip	On	On	Low Power	Power Off	Power Off
Wake-up Events	—	IRQ0~15	IRQ1~15 Ring In	Suspend Button Ring Indicator RTC Alarm	Power Button Ring Indicator RTC Alarm

POWER MANAGEMENT FEATURES (MODE TRANSITION)

The following table lists power management transition modes.

Table 2-20 Mode Definitions

Power State/ Control Pin	SUB_STAT1#	SUB_STAT2#	SUSA#	SUSB#	SUSC#	PWRON
Full-On	1	1	1	1	1	1
Doze	1	1	1	1	1	1
Standby	0	0	0	1	1	1
STR	0	0	0	0	1	1
STD/SOFF	0	0	0	0	0	0
Mechanical Off	0	0	0	0	0	0

HOT KEY DEFINITION

The following table lists hot key definitions.

Table 2-21 Hot Keys

Function Key	Content
Fn + F2	Toggle text highlight (in DOS)
Fn + F3	Toggle Display (CRT/LCD/Simul)
Fn + F4	Enter Standby Mode
Fn + F5	LCD Panel Backlight Standard/Full
Fn + F6	System Speaker On/Off
Fn + F7	P/M Level (Toggle between Highest Performance, Longest Battery, Custom, and Off Power Management Level)
Fn + F12	Scroll Lock
Fn + LeftCtrl	Simulate right Ctrl Key
Fn + Z	Windows key for Windows 95
Fn + X	Application key for Windows 95

HOT KEYS SUPPORTED BY EXTERNAL KEYBOARD DEFINITION

The following table lists external hot key definitions.

Table 2-22 External Hot Keys

Function Key	Content
Fn + F2	Toggle Text Highlight (in DOS)
Fn + F3	Toggle Display (CRT/LCD/Simul)
Fn + F4	Enter Standby Mode
Fn + F5	LCD Panel Backlight Standard/Full
Fn + F6	System Speaker On/Off
Fn + F7	P/M Level (Toggle between Highest Performance, Longest Battery, Custom, and Off Power Management Level)
Fn + Suspend	Save-to-Disk on Demand
Power Switch + Suspend	Force Power Off

ENVIRONMENTAL SPECIFICATIONS

The following table lists appropriate operating temperatures.

Table 2-23 Environmental Specifications

Item	Specification
Operating Mode	5 °C ~ 35 °C (80%)
Non-Operating	-20 °C ~ 60 °C (90%)

POWER SOURCE SPECIFICATIONS

The following table lists system power specifications.

Table 2-24 Power Specifications

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

VIBRATION SPECIFICATIONS

The following table lists vibration specifications.

Table 2-25 Vibration Specifications

Item	Specification
Operating Mode	Direction of Movement: X, Y, Z Axis Vibration Level: 5 ~ 500 ~ 5 Hz, 0.5 Gs Acceleration Duration Time: 60 min. for each axis
Non-Operating	Direction of Movement: X, Y, Z Axis Vibration Level: 5 ~ 500 ~ 5 Hz 2 Gs Acceleration Duration Time: 60 min. for each axis

SHOCK SPECIFICATIONS

The following table lists system shock specifications.

Table 2-26 Shock Specifications

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

ELECTRO-STATIC DISCHARGE (ESD) SPECIFICATIONS

The following table lists static discharge specifications.

Table 2-27 Electro-Static Discharge Specifications

Item	Specification
Contact Discharge	±2, 4, 8, 12.5, 15 kV
Air Discharge	±2, 4, 15 kV
HCP	±2, 4 kV
VCP	±2, 4 kV

Section 3

Hardware Functional Overview

The NEC Versa 2700 Series notebooks consist of several major functions and subsystems including:

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

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

FUNCTIONAL BLOCK DIAGRAM

The following figure shows the NEC Versa 2700 Series functional diagram.

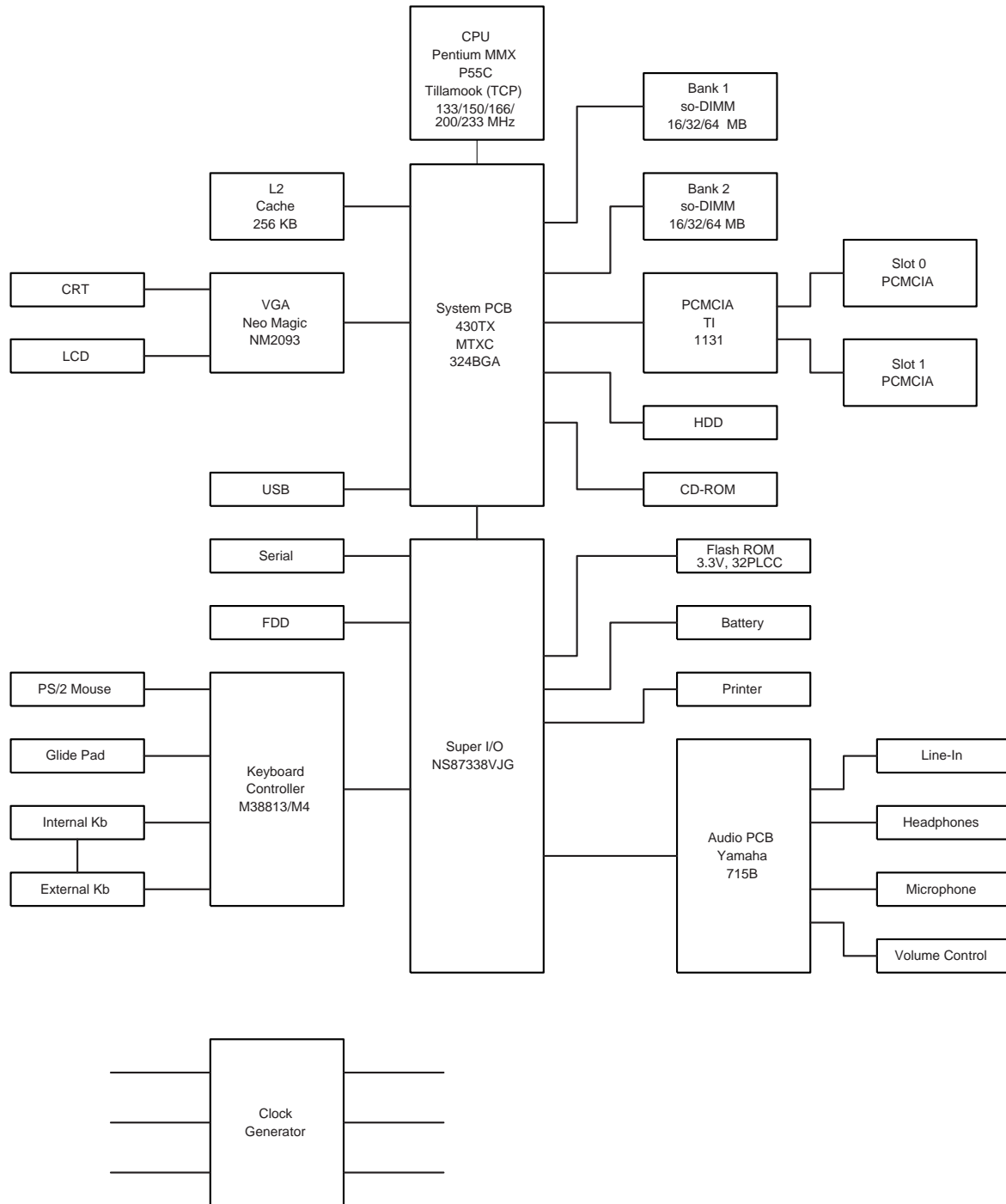


Figure 3-1 Functional Block Diagram

SYSTEM BIOS

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

The NEC Versa 2700 Series uses the AMIBIOS. The BIOS Setup program is an easy-to-use system utility configuration that sets system parameters and copies them on the Flash ROM chip with the system BIOS.

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

System Processor

The system processor function for the notebook is implemented on the system board using an Intel MMX, P55C-133/150/166/200 or P55CLM-233/266 MHz processor chips. These processor operate in conjunction with the RAM and ROM memory plus other system control logic (e.g. Intel 430TX) to process software instructions (BIOS, Windows, applications).

The P55C microprocessor is a 2.8V desktop/2.5V mobile (the P55CLM is 1.8V) (3.3V I/O) version of the Pentium processor (75-200). It is functionally similar to the Pentium processor (75-200) with the following differences: Voltage supplies, maximum bus and core frequency, and performance. The P55C/P55CLM is socket compatible with the Pentium processor (75-200) making it possible to design a flexible motherboard that supports both the Pentium processor (75-200) and the P55C/P55CLM processor. The P55C/P55CLM is manufactured on an advanced CMOS process, which enables the P55C with a reduced core voltage supply to run at up to 200 MHz core frequency (the P55CLM can run at up to 266 MHz core frequency).

The P55C/P55CLM, like the Pentium processor (75-200) has built-in arbitration and cache consistency features for Dual-Processing (DP) which enable a “glueless” dual P55C system design. The P55C/P55CLM can be configured in both modes, DP or uniprocessing.

The P55C/P55CLM has the complete Pentium processor (75-200) feature set, plus the following new features:

- 16 KB 4-way set-associative code cache and 16 KB 4-way data cache, each with improved fully associative TLBs.
 - Pool of 4 write buffers used by both pipes.
 - New Fetch pipeline stage between Prefetch and Instruction Decode with 4-deep instruction FIFO.
 - Enhanced branch prediction algorithm.
-

- Up to 233 Mhz/266 MHz core frequency operation for both desktop and mobile systems.
- Supports the Intel 430 chipset family. Does not support Intel 82497/82492 or 82498/82493 cache chipsets.

SYSTEM LOGIC CONTROLLER

The System Logic Controller function for the notebook is implemented on the system board using Intel 430TX PCI Chipset. The 430TX PCIset consists of the TX System Controller (MTXC) and the PCI ISA IDE Xcelerator (PIIX4). The PCIset forms a Host-to-PCI bridge and provides the second level cache control and a full function 64-bit data path to main memory. The MTXC integrates the cache and main memory DRAM control functions and provides bus control to transfers between the CPU, cache, main memory, and the PCI Bus.

The second level (L2) cache controller supports a write-back cache policy for cache sizes of 256 Kbytes and 512 Kbytes. Cacheless designs are also supported. The cache memory can be implemented with pipeline burst SRAMs. An external Tag RAM is used for the address tag and an internal Tag RAM for the cache line status bits.

For the MTXC DRAM controller, six rows are supported for up to 256 Mbytes of main memory. The MTXC PCIset is highly integrated by including the Data Path into the same BGA chip. Using the snoop ahead feature, the MTXC allows PCI masters to achieve full PCI bandwidth. For increased system performance, the MTXC integrates posted write and read prefetch buffers. The Intel 430TX PCIset integrates many Power Management features that will enable the system to save power whenever the system resources become idle.

Features Summary:

- Supports the Pentium® processor family host bus at 66 MHz at 3.3V and 2.5V.
 - PCI 2.1 compliant
 - Integrated data path
 - Integrated DRAM controller
 - 4 MB to 256 MB main memory
 - 64 Mbit DRAM/SDRAM technology support
 - FPM (Fast Page Mode), EDO and SDRAM DRAM support
 - 6 RAS lines available
 - Integrated Programmable-Strength for DRAM interface
 - CAS-Before-RAS Refresh, extended refresh and self refresh for EDO
 - CAS-Before-RAS and Self refresh for SDRAM
-

- Integrated L2 Cache Controller
 - 64MB DRAM cacheability
 - Direct Mapped Organization - Write Back Only
 - Supports 256K and 512K Pipelined Burst SRAM and DRAM cache
 - Cache Hit Read/Write cycle Timings at 3-1-1-1
 - Back-to-Back Read/Write Cycles at 3-1-1-1-1-1-1-1
 - 64K x 32 SRAM also supported
 - Fully Synchronous, Minimum Latency 30/33 MHz PCI bus interface
 - Five PCI Bus Masters (including PIIX4)
 - 10 DWord PCI-to-DRAM read prefetch buffer
 - 18 Dword PCI-DRAM post buffer
 - Multi-Transaction Timer to support multiple short PCI transactions
 - Power Management Features
 - PCI CLKRUN# support
 - Dynamic Stop Clock support
 - Suspend to RAM (STR)
 - Suspend to Disk (STD)
 - Power On Suspend (POS)
 - Internal Clock control
 - SDRAM and EDO self refresh during suspend
 - ACPI Support
 - Compatible SMRAM (C-SMRAM) and Extended SMRAM (E_SMRAM)
 - SMM Write-Back cacheable in E_SMRAM mode up to 1 MB
 - 3.3/5V DRAM, 3.3/5V PCI, 3.3/5V Tag, and 3.3/2.5V SRAM support
 - Test Features
 - NAND tree support for all pins
 - Supports the Universal Serial Bus (USB)
-

- 324-pin MBGA 430TX PCIset Xcelerated Controller (MTXC) with integrated Data Paths

MEMORY SUBSYSTEM

The memory subsystem, implemented on the system board, includes ROM and DRAM memory. Primary control for the memory subsystem is provided by the Intel 430TX PCIset.

DRAM Memory

The NEC Versa 2700 notebooks provides two memory slots for upgrading the DRAM memory to 32 MB, 48 MB, 64 MB, 80 MB, and 128 MB using standard JEDEC or EDO small-outline DIMM (SO-DIMM) memory modules.

Refer to “System Upgrades” in Chapter 1 to learn more about upgrading system memory.

ROM Memory

The NEC Versa 2700 Series notebooks contains both the main system BIOS and the VGA BIOS with Shadow BIOS capability.

I/O SUBSYSTEM

The PC87338VLJ/PC87338VJG provides the most commonly used ISA, EISA, and MicroChannel® peripherals in a single chip. It includes a Floppy Disk Controller (FDC), two full function UARTs, Universal Infrared support (UIR) (HP-SIR, Sharp-IR, TV-Remote, and Infrared Data Association (IrDA)), a full IEEE 1284 parallel port, two general purpose chip select signals that enable game port control, and a configuration register set. In addition, support for power management and for mixed 3.3V and 5V operation makes this chip particularly suitable for notebook and sub-notebook applications.

The PC87338 provides full Plug and Play support as specified by Microsoft®.

Feature’s summary of the NC87336VLJ:

- A special Plug and Play module includes:
 - Flexible IRQs, DMAs and base addresses
 - General Interrupt Requests (IRQs) that can be multiplexed to the ten supported IRQs
 - A new, high performance, on-chip Floppy Disk Controller (FDC) provides:
 - Software compatibility with the PC8477, which contains a superset of the floppy disk controller functions in the μ DP8473, the NEC μ PD765A and the N82077
 - A modifiable 13-bit address
-

- Ten IRQ channel options
 - Four 8-bit DMA channel option
 - 16-Byte FIFO
 - Burst and non-burst modes
 - Low-power CMOS with enhanced power-down mode
 - A new, high-performance, on-chip, digital data separator that does not require any external filter components
 - Support for standard 5.25" and 3.5" diskette drives
 - Automatic media sense support
 - Perpendicular recording drive support
 - Three mode Diskette Drive (FDD) support
 - Full support for IBM's Tape Drive Register (TDR) implementation
 - Support for new fast tape drives (2 Mbps) and standard tape drives (1 Mbps, 500 Kbps, and 250 Kbps)
 - Two UARTs provide:
 - Software compatibility with the 16550A and the 16450
 - A modifiable 13-bit address
 - Ten IRQ channel options
 - MIDI Baud rate support
 - Four 8-bit DMA channel options on UART2
 - Shadow register support for UART write-only bits
 - A slow infrared mode Universal Infrared (UIR) interface on UART2 supports the following:
 - Data rates of up to 115.2 Kbps (SIR)
 - A data rate of 1.152 Mbps (MIR)
 - A data rate of 4.0 Mbps (FIR)
 - Selectable internal or external modulation/demodulation (Sharp-IR)
 - A bi-directional parallel port that includes:
 - A modifiable 13-bit address
-

- Ten IRQ channel options
 - Four 8-bit DMA channel options
 - An Enhanced Parallel Port (EPP) compatible with version EPP 1.9 (IEEE1284 compliant), that also supports version EPP 1.7 of the Xircom specification
 - An Extended Capabilities Port (ECP) that is IEEE 1284 compliant, including level 2
 - Bi-directional data transfer under either software or hardware control
 - Compatibility with ISA, EISA, and MicroChannel parallel ports
 - Multiplexing of additional external FDC signals on parallel port pins that enables use of an external Floppy Disk Drive (FDD)
 - A protection circuit that prevents damage to the parallel port when an external printer powers up or operates at high voltages
 - 14 mA output drivers
 - Two general purpose pins for two programmable chip select signals can be programmed for game port control
 - An address decoder that:
 - Selects all primary and secondary ISA addresses, including COM1-4 and LPT1-3
 - Decodes up to 16 address bits
 - Clock Source:
 - An internal clock multiplier generates all required internal frequencies.
 - A clock input source 14.318 MHz, 24 MHz, or 48 MHz may be selected
 - Enhanced power management features:
 - Special power-down configuration registers
 - Enhanced programmable FDC command to trigger power down
 - Programmable power-down and wake-up modes
 - Two dedicated pins for FDC power management
 - Low power-down current consumption (typically less than 10 μ A).
 - Reduced pin leakage current
-

- Low power CMOS technology
- The ability to shut off clocks to either the entire chip or only to specific modules
- Mixed voltage support provides:
 - Standard 5V operation
 - Low voltage 3.3V operation
 - Simultaneous internal 3.3V operation and reception or transmission to devices that have either a 3.3V or a 5V power supply
- 100-pin TQFP package - PC87338VJG
- 100-pin TQFP package - PC87338VLJ

VIDEO SUBSYSTEM

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

The NM2160 is a high performance Flat Panel Video Accelerator that integrates in one single chip, 2 Mbytes of high speed DRAM, 24-bit true-color RAMDAC, Graphics/Video Accelerator, Dual Clock Synthesizer, TV-Out support, ZV (Zoomed Video) port, Z-Buffer Data Stripping, PCI Bus Mastering, and a high speed glueless 32-bit PCI 2.1 compliance interface.

By integrating the display buffer DRAM and 128-bit graphics/video accelerator, the NM2160 achieves the leading performance in the smallest footprint available. The NM2160 has sufficient bandwidth to perform full-screen, 30fps video acceleration of MPEG, Indeo, Cinepak, and other video playback CODECs. The bandwidth headroom also allows the NM2160 to deliver the highest quality video playback of any notebook graphics solution, without compromising simultaneous graphics performance.

Feature summary of the NM2160:

- 128 Bit Graphics Acceleration
 - High speed BitBLT Engine
 - Color Expansion
 - Accelerated Text Hardware
 - Clipping
 - X - Y Coordinates Addressing
 - Memory Mapped I/O
-

- Bus Mastering
 - Z - Buffer data stripping
 - VGA I/O Relocatable to MMIO Space

 - Video Acceleration
 - Integrated frame buffer for Video and Graphics
 - 16 M Color video in all modes
 - Color Space Conversion (YUV to RGB)
 - Arbitrary video scaling up to 8X ratio
 - Bilinear interpolation and Filtering
 - Video Overlay capability from on/off screen memory
 - Chroma Key Support
 - Independent Brightness Control for Video Window
 - Supports different color depths between video and graphics
 - Supports RGB graphics and video in YUV format in one Integrated frame buffer

 - Memory Support
 - High Speed 2 Mbytes of integrated DRAM
 - 128 bit Memory Interface

 - Bus Support
 - PCI 2.1 compliance Local Bus (Zero wait states)
 - 3.3Volts or 5Volts operation

 - EMI Reduction
 - Spread Spectrum Clocking technology for reduced panel EMI

 - Hardware Cursor and Icon
 - Relocatable Hardware Cursor and Icon
 - 64 x 64 Hardware Cursor
-

- 64 x 64 or 128 x 128 Hardware Icon
- Green PC Support
 - VESA Display Power Management (DPMS)
 - DAC Power Down modes
 - Suspend/Standby/Clock management
 - VGA disable support
 - PCI Mobile Computing “clockrun” support
- Resolution and Color Support
 - VGA: TFT, DSTN, CRT @ 85Hz (640 x 480 256, 64K, 16M)
 - SVGA: TFT, DSTN, CRT @ 85Hz (800 x 600 256, 64K, 16M)
 - XGA: TFT, DSTN, CRT @ 75Hz (1024 x 768 256, 64K Colors)
 - Simultaneous CRT/Flat Panel operation
 - Simultaneous TV/Flat Panel operation
- Display Enhancements
 - TV Out Support
 - ZV (Zoomed Video) Port
 - 24 Bit Inegrated RAMDAC with Gamma Correction
 - 36 bit panel support
 - Hardware expansion for low-resolution display mode compensation to panels
 - Virtual Screen Panning Support
 - Integrated Dual Clock Synthesizer
 - VESA DDC1 and DDC2b

External VGA Capability

The NEC Versa 2700 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 1024 x 768 by 64K colors for the NEC Versa 2700 Series with 2 MB video memory. The NEC Versa 2700 Series can also provide simultaneous display at 800x600 at 64K colors with the standard VGA DSTN LCD.

KEYBOARD SUBSYSTEM

The Keyboard Subsystem of the notebook is implemented on the I/O Board and Keyboard Assembly using the Motorola M 38813M4 keyboard controller chip.

The NEC Versa 2700 Series keyboard is an 85-key, IBM enhanced-type keyboard with standard characters and function keys plus 12 programmable function keys. The notebook also provides an external PS/2 port for supporting an external PS/2 keyboard or standard DIN-type AT-keyboard. See Section 1 for more information.

PCMCIA CONTROLLER AND SOCKETS

The PCMCIA controller is implemented on the system board using TI's PCI-1131 Interface Controller.

The TI PCI-1131 is a high-performance PCI-to-PCI Card controller that supports two independent PC Card sockets compliant with the 1995 PC Card standard. The PCI-1131 provides a set of features that make it ideal for bridging between PCI and PC Cards in both notebook and desktop computers. The PCI-1131 supports any combination of 16-bit and CardBus PC Card bus-mastering in its two sockets, powered at 3.3V or 5V, as required.

The PCI-1131 is compliant with the PCI local bus specification revision 2.1, and its PCI Interface can act as either a PCI master device or a PCI slave device. The PCI bus mastering is initiated during 16-bit PC Card DMA transfers or CardBus PC Card bus-mastering cycles.

All card signals are internally buffered to allow hot insertion and removal without external buffering. The PCI-1131 is register compatible with the Intel 82365SL-DF ExCA controller. The PCI-1131 internal datapath logic allows the host to access 8-, 16-, and 32-bit cards using full 32-bit PCI cycles for maximum performance. Independent 32-bit write buffers allow fast-posted writes to improve system-bus utilization.

An advanced CMOS process is used to achieve low system-power consumption while operating at PCI clock rates up to 33 MHz. Several low-power modes allow the host power-management system to further reduce power consumption.

Feature summary of the TI PCI-1131:

- 3.3V Core Logic with Universal PCI Interface Compatible with 3.3V or 5V PCI signaling environments
 - Supports PCI Local Bus Specification 2.1
-

- Mix-and-Match 3.3-V/5-V PC Cards and 3.3-V CardBus Cards
 - Supports two PC Card™ or CardBus Slots with Hot Insertion and Removal
 - 1995 PC Card-Standard Compliant
 - Low-Power Advanced Submicron CMOS technology
 - Uses Serial Interface to Texas Instruments (TI) TPS2206 Dual Power Switch
 - System interrupts can be programmed as PCI-Style or ISA IRQ-Style interrupts
 - ISA IRQ interrupts can be serialized onto a Single IRQSER pin
 - Programmable Output Select for CLCKRUN
 - Supports Burst transfers to maximize data throughput on the PCI and CardBus Bus
 - Multifunction PCI Device with separate configuration spaces for each socket
 - Five PCI Memory Windows and Two I/O Windows available to each PC Card 16 Socket
 - Two I/O Windows and Two Memory Windows Available to each CardBus Socket
 - CardBus Memory Windows can be individually selected prefetchable or non-prefetchable
 - Exchangeable Card Architecture (ExCA™)-Compatible registers mapped in Memory or I/O space
 - TI Extension Registers mapped in the PCI Configuration space
 - Intel 82365SL-DF Register compatible
 - Supports 16-bit Distributed Direct Memory Access (DMA) on both PC Card sockets
 - Supports PC/PCI DMA on both PC Card sockets
 - Supports Zoom Video mode
 - Supports Ring Indicate
 - Packaged in 208-pin Thin Plastic Quad Flatpack
-

HARD DISK SUBSYSTEM

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

The NEC Versa 2700 Series notebook is equipped with a high capacity hard disk drive that provides LBA (Logical Block Addressing) mode support. The I/O subsystem controller, NS PC87338CLJ, provides the IDE controller for the hard disk.

The built-in controller can support any industry standard 2.5-inch IDE hard disk drive. Setting up the hard disk type is done automatically by the CMOS Setup program. Setup auto-detects the installed hard disk type settings for optimized performance.

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

DISKETTE DRIVE SUBSYSTEM

The diskette drive subsystem consists of a FDD controller provided by Super I/O PC87338VLG and the built-in diskette disk drive. The diskette disk drive supports standard 3.5-inch; 720 KB and 1.44 MB mini-diskettes.

POINTING DEVICE SUBSYSTEM

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

POWER SUBSYSTEM

The Power Subsystem consists of the following major sections:

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

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 2700 Series notebooks utilizes NiMH (Nickel Metal-Hydride) or Li-Ion (Lithium Ion) batteries that provide DC power for the notebook.

The NiMH battery pack contains eight size A battery cells that provide the system with 9.6V and the Li-Ion battery pack contains eight size A battery cells that provide the system with 14.4V. When installed in the notebook, the battery LED automatically appears and also starts to recharge whenever the AC adapter is connected to the notebook.

Normal charging time for the battery pack is around 2 hours when the computer is turned off while it should take around 4 hours maximum when the computer is running.

Power Board

The power board receives approximately 12VDC from the battery pack and uses this input voltage to generate +12V, +5V, +3.3V, (+3.45V) regulated output voltages to provide power for all internal notebook board assemblies. The output of the +5V regulator also drives the LCD inverter circuit on the LCD inverter board assembly. Refer to Section 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 Power Board module of the system board into a high voltage AC output used to light the CCFT (Cold-Cathode Fluorescent Tube).

Section 3

Hardware Functional Overview

The NEC Versa 2700 Series notebooks consist of several major functions and subsystems including:

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

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

FUNCTIONAL BLOCK DIAGRAM

The following figure shows the NEC Versa 2700 Series functional diagram.

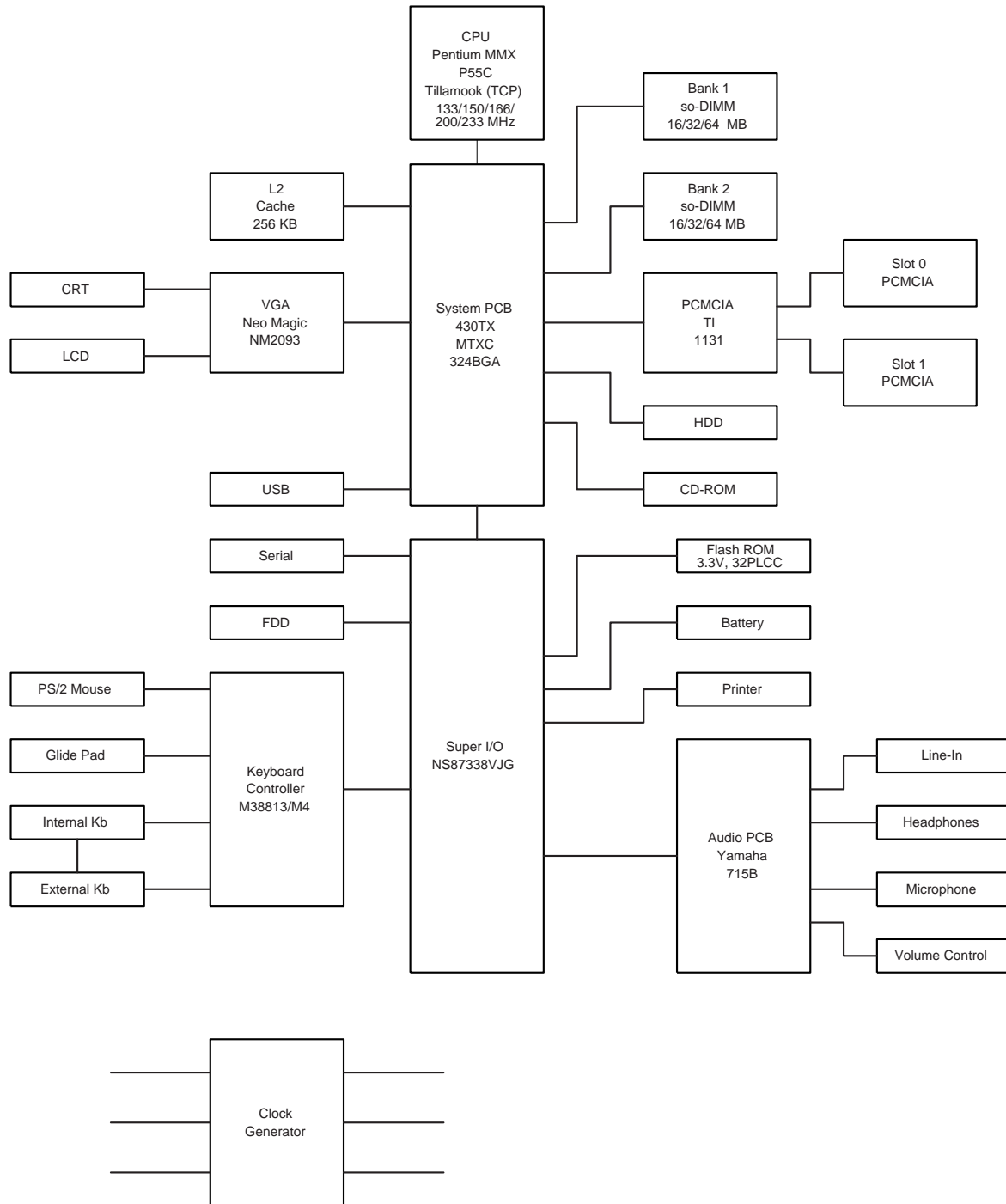


Figure 3-1 Functional Block Diagram

SYSTEM BIOS

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

The NEC Versa 2700 Series uses the AMIBIOS. The BIOS Setup program is an easy-to-use system utility configuration that sets system parameters and copies them on the Flash ROM chip with the system BIOS.

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

System Processor

The system processor function for the notebook is implemented on the system board using an Intel MMX, P55C-133/150/166/200 or P55CLM-233/266 MHz processor chips. These processor operate in conjunction with the RAM and ROM memory plus other system control logic (e.g. Intel 430TX) to process software instructions (BIOS, Windows, applications).

The P55C microprocessor is a 2.8V desktop/2.5V mobile (the P55CLM is 1.8V) (3.3V I/O) version of the Pentium processor (75-200). It is functionally similar to the Pentium processor (75-200) with the following differences: Voltage supplies, maximum bus and core frequency, and performance. The P55C/P55CLM is socket compatible with the Pentium processor (75-200) making it possible to design a flexible motherboard that supports both the Pentium processor (75-200) and the P55C/P55CLM processor. The P55C/P55CLM is manufactured on an advanced CMOS process, which enables the P55C with a reduced core voltage supply to run at up to 200 MHz core frequency (the P55CLM can run at up to 266 MHz core frequency).

The P55C/P55CLM, like the Pentium processor (75-200) has built-in arbitration and cache consistency features for Dual-Processing (DP) which enable a “glueless” dual P55C system design. The P55C/P55CLM can be configured in both modes, DP or uniprocessing.

The P55C/P55CLM has the complete Pentium processor (75-200) feature set, plus the following new features:

- 16 KB 4-way set-associative code cache and 16 KB 4-way data cache, each with improved fully associative TLBs.
 - Pool of 4 write buffers used by both pipes.
 - New Fetch pipeline stage between Prefetch and Instruction Decode with 4-deep instruction FIFO.
 - Enhanced branch prediction algorithm.
-

- Up to 233 Mhz/266 MHz core frequency operation for both desktop and mobile systems.
- Supports the Intel 430 chipset family. Does not support Intel 82497/82492 or 82498/82493 cache chipsets.

SYSTEM LOGIC CONTROLLER

The System Logic Controller function for the notebook is implemented on the system board using Intel 430TX PCI Chipset. The 430TX PCIset consists of the TX System Controller (MTXC) and the PCI ISA IDE Xcelerator (PIIX4). The PCIset forms a Host-to-PCI bridge and provides the second level cache control and a full function 64-bit data path to main memory. The MTXC integrates the cache and main memory DRAM control functions and provides bus control to transfers between the CPU, cache, main memory, and the PCI Bus.

The second level (L2) cache controller supports a write-back cache policy for cache sizes of 256 Kbytes and 512 Kbytes. Cacheless designs are also supported. The cache memory can be implemented with pipeline burst SRAMs. An external Tag RAM is used for the address tag and an internal Tag RAM for the cache line status bits.

For the MTXC DRAM controller, six rows are supported for up to 256 Mbytes of main memory. The MTXC PCIset is highly integrated by including the Data Path into the same BGA chip. Using the snoop ahead feature, the MTXC allows PCI masters to achieve full PCI bandwidth. For increased system performance, the MTXC integrates posted write and read prefetch buffers. The Intel 430TX PCIset integrates many Power Management features that will enable the system to save power whenever the system resources become idle.

Features Summary:

- Supports the Pentium® processor family host bus at 66 MHz at 3.3V and 2.5V.
 - PCI 2.1 compliant
 - Integrated data path
 - Integrated DRAM controller
 - 4 MB to 256 MB main memory
 - 64 Mbit DRAM/SDRAM technology support
 - FPM (Fast Page Mode), EDO and SDRAM DRAM support
 - 6 RAS lines available
 - Integrated Programmable-Strength for DRAM interface
 - CAS-Before-RAS Refresh, extended refresh and self refresh for EDO
 - CAS-Before-RAS and Self refresh for SDRAM
-

- Integrated L2 Cache Controller
 - 64MB DRAM cacheability
 - Direct Mapped Organization - Write Back Only
 - Supports 256K and 512K Pipelined Burst SRAM and DRAM cache
 - Cache Hit Read/Write cycle Timings at 3-1-1-1
 - Back-to-Back Read/Write Cycles at 3-1-1-1-1-1-1-1
 - 64K x 32 SRAM also supported
 - Fully Synchronous, Minimum Latency 30/33 MHz PCI bus interface
 - Five PCI Bus Masters (including PIIX4)
 - 10 DWord PCI-to-DRAM read prefetch buffer
 - 18 Dword PCI-DRAM post buffer
 - Multi-Transaction Timer to support multiple short PCI transactions
 - Power Management Features
 - PCI CLKRUN# support
 - Dynamic Stop Clock support
 - Suspend to RAM (STR)
 - Suspend to Disk (STD)
 - Power On Suspend (POS)
 - Internal Clock control
 - SDRAM and EDO self refresh during suspend
 - ACPI Support
 - Compatible SMRAM (C-SMRAM) and Extended SMRAM (E_SMRAM)
 - SMM Write-Back cacheable in E_SMRAM mode up to 1 MB
 - 3.3/5V DRAM, 3.3/5V PCI, 3.3/5V Tag, and 3.3/2.5V SRAM support
 - Test Features
 - NAND tree support for all pins
 - Supports the Universal Serial Bus (USB)
-

- 324-pin MBGA 430TX PCIset Xcelerated Controller (MTXC) with integrated Data Paths

MEMORY SUBSYSTEM

The memory subsystem, implemented on the system board, includes ROM and DRAM memory. Primary control for the memory subsystem is provided by the Intel 430TX PCIset.

DRAM Memory

The NEC Versa 2700 notebooks provides two memory slots for upgrading the DRAM memory to 32 MB, 48 MB, 64 MB, 80 MB, and 128 MB using standard JEDEC or EDO small-outline DIMM (SO-DIMM) memory modules.

Refer to “System Upgrades” in Chapter 1 to learn more about upgrading system memory.

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I/O SUBSYSTEM

The PC87338VLJ/PC87338VJG provides the most commonly used ISA, EISA, and MicroChannel® peripherals in a single chip. It includes a Floppy Disk Controller (FDC), two full function UARTs, Universal Infrared support (UIR) (HP-SIR, Sharp-IR, TV-Remote, and Infrared Data Association (IrDA)), a full IEEE 1284 parallel port, two general purpose chip select signals that enable game port control, and a configuration register set. In addition, support for power management and for mixed 3.3V and 5V operation makes this chip particularly suitable for notebook and sub-notebook applications.

The PC87338 provides full Plug and Play support as specified by Microsoft®.

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 - General Interrupt Requests (IRQs) that can be multiplexed to the ten supported IRQs
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 - Software compatibility with the PC8477, which contains a superset of the floppy disk controller functions in the μ DP8473, the NEC μ PD765A and the N82077
 - A modifiable 13-bit address
-

- Ten IRQ channel options
 - Four 8-bit DMA channel option
 - 16-Byte FIFO
 - Burst and non-burst modes
 - Low-power CMOS with enhanced power-down mode
 - A new, high-performance, on-chip, digital data separator that does not require any external filter components
 - Support for standard 5.25" and 3.5" diskette drives
 - Automatic media sense support
 - Perpendicular recording drive support
 - Three mode Diskette Drive (FDD) support
 - Full support for IBM's Tape Drive Register (TDR) implementation
 - Support for new fast tape drives (2 Mbps) and standard tape drives (1 Mbps, 500 Kbps, and 250 Kbps)
 - Two UARTs provide:
 - Software compatibility with the 16550A and the 16450
 - A modifiable 13-bit address
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- Ten IRQ channel options
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 - An Enhanced Parallel Port (EPP) compatible with version EPP 1.9 (IEEE1284 compliant), that also supports version EPP 1.7 of the Xircom specification
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 - Clock Source:
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 - A clock input source 14.318 MHz, 24 MHz, or 48 MHz may be selected
 - Enhanced power management features:
 - Special power-down configuration registers
 - Enhanced programmable FDC command to trigger power down
 - Programmable power-down and wake-up modes
 - Two dedicated pins for FDC power management
 - Low power-down current consumption (typically less than 10 μ A).
 - Reduced pin leakage current
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- Low power CMOS technology
- The ability to shut off clocks to either the entire chip or only to specific modules
- Mixed voltage support provides:
 - Standard 5V operation
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 - Simultaneous internal 3.3V operation and reception or transmission to devices that have either a 3.3V or a 5V power supply
- 100-pin TQFP package - PC87338VJG
- 100-pin TQFP package - PC87338VLJ

VIDEO SUBSYSTEM

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

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 - High speed BitBLT Engine
 - Color Expansion
 - Accelerated Text Hardware
 - Clipping
 - X - Y Coordinates Addressing
 - Memory Mapped I/O
-

- Bus Mastering
 - Z - Buffer data stripping
 - VGA I/O Relocatable to MMIO Space

 - Video Acceleration
 - Integrated frame buffer for Video and Graphics
 - 16 M Color video in all modes
 - Color Space Conversion (YUV to RGB)
 - Arbitrary video scaling up to 8X ratio
 - Bilinear interpolation and Filtering
 - Video Overlay capability from on/off screen memory
 - Chroma Key Support
 - Independent Brightness Control for Video Window
 - Supports different color depths between video and graphics
 - Supports RGB graphics and video in YUV format in one Integrated frame buffer

 - Memory Support
 - High Speed 2 Mbytes of integrated DRAM
 - 128 bit Memory Interface

 - Bus Support
 - PCI 2.1 compliance Local Bus (Zero wait states)
 - 3.3Volts or 5Volts operation

 - EMI Reduction
 - Spread Spectrum Clocking technology for reduced panel EMI

 - Hardware Cursor and Icon
 - Relocatable Hardware Cursor and Icon
 - 64 x 64 Hardware Cursor
-

- 64 x 64 or 128 x 128 Hardware Icon
- Green PC Support
 - VESA Display Power Management (DPMS)
 - DAC Power Down modes
 - Suspend/Standby/Clock management
 - VGA disable support
 - PCI Mobile Computing “clockrun” support
- Resolution and Color Support
 - VGA: TFT, DSTN, CRT @ 85Hz (640 x 480 256, 64K, 16M)
 - SVGA: TFT, DSTN, CRT @ 85Hz (800 x 600 256, 64K, 16M)
 - XGA: TFT, DSTN, CRT @ 75Hz (1024 x 768 256, 64K Colors)
 - Simultaneous CRT/Flat Panel operation
 - Simultaneous TV/Flat Panel operation
- Display Enhancements
 - TV Out Support
 - ZV (Zoomed Video) Port
 - 24 Bit Inegrated RAMDAC with Gamma Correction
 - 36 bit panel support
 - Hardware expansion for low-resolution display mode compensation to panels
 - Virtual Screen Panning Support
 - Integrated Dual Clock Synthesizer
 - VESA DDC1 and DDC2b

External VGA Capability

The NEC Versa 2700 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 1024 x 768 by 64K colors for the NEC Versa 2700 Series with 2 MB video memory. The NEC Versa 2700 Series can also provide simultaneous display at 800x600 at 64K colors with the standard VGA DSTN LCD.

KEYBOARD SUBSYSTEM

The Keyboard Subsystem of the notebook is implemented on the I/O Board and Keyboard Assembly using the Motorola M 38813M4 keyboard controller chip.

The NEC Versa 2700 Series keyboard is an 85-key, IBM enhanced-type keyboard with standard characters and function keys plus 12 programmable function keys. The notebook also provides an external PS/2 port for supporting an external PS/2 keyboard or standard DIN-type AT-keyboard. See Section 1 for more information.

PCMCIA CONTROLLER AND SOCKETS

The PCMCIA controller is implemented on the system board using TI's PCI-1131 Interface Controller.

The TI PCI-1131 is a high-performance PCI-to-PCI Card controller that supports two independent PC Card sockets compliant with the 1995 PC Card standard. The PCI-1131 provides a set of features that make it ideal for bridging between PCI and PC Cards in both notebook and desktop computers. The PCI-1131 supports any combination of 16-bit and CardBus PC Card bus-mastering in its two sockets, powered at 3.3V or 5V, as required.

The PCI-1131 is compliant with the PCI local bus specification revision 2.1, and its PCI Interface can act as either a PCI master device or a PCI slave device. The PCI bus mastering is initiated during 16-bit PC Card DMA transfers or CardBus PC Card bus-mastering cycles.

All card signals are internally buffered to allow hot insertion and removal without external buffering. The PCI-1131 is register compatible with the Intel 82365SL-DF ExCA controller. The PCI-1131 internal datapath logic allows the host to access 8-, 16-, and 32-bit cards using full 32-bit PCI cycles for maximum performance. Independent 32-bit write buffers allow fast-posted writes to improve system-bus utilization.

An advanced CMOS process is used to achieve low system-power consumption while operating at PCI clock rates up to 33 MHz. Several low-power modes allow the host power-management system to further reduce power consumption.

Feature summary of the TI PCI-1131:

- 3.3V Core Logic with Universal PCI Interface Compatible with 3.3V or 5V PCI signaling environments
 - Supports PCI Local Bus Specification 2.1
-

- Mix-and-Match 3.3-V/5-V PC Cards and 3.3-V CardBus Cards
 - Supports two PC Card™ or CardBus Slots with Hot Insertion and Removal
 - 1995 PC Card-Standard Compliant
 - Low-Power Advanced Submicron CMOS technology
 - Uses Serial Interface to Texas Instruments (TI) TPS2206 Dual Power Switch
 - System interrupts can be programmed as PCI-Style or ISA IRQ-Style interrupts
 - ISA IRQ interrupts can be serialized onto a Single IRQSER pin
 - Programmable Output Select for CLCKRUN
 - Supports Burst transfers to maximize data throughput on the PCI and CardBus Bus
 - Multifunction PCI Device with separate configuration spaces for each socket
 - Five PCI Memory Windows and Two I/O Windows available to each PC Card 16 Socket
 - Two I/O Windows and Two Memory Windows Available to each CardBus Socket
 - CardBus Memory Windows can be individually selected prefetchable or non-prefetchable
 - Exchangeable Card Architecture (ExCA™)-Compatible registers mapped in Memory or I/O space
 - TI Extension Registers mapped in the PCI Configuration space
 - Intel 82365SL-DF Register compatible
 - Supports 16-bit Distributed Direct Memory Access (DMA) on both PC Card sockets
 - Supports PC/PCI DMA on both PC Card sockets
 - Supports Zoom Video mode
 - Supports Ring Indicate
 - Packaged in 208-pin Thin Plastic Quad Flatpack
-

HARD DISK SUBSYSTEM

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

The NEC Versa 2700 Series notebook is equipped with a high capacity hard disk drive that provides LBA (Logical Block Addressing) mode support. The I/O subsystem controller, NS PC87338CLJ, provides the IDE controller for the hard disk.

The built-in controller can support any industry standard 2.5-inch IDE hard disk drive. Setting up the hard disk type is done automatically by the CMOS Setup program. Setup auto-detects the installed hard disk type settings for optimized performance.

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

DISKETTE DRIVE SUBSYSTEM

The diskette drive subsystem consists of a FDD controller provided by Super I/O PC87338VLG and the built-in diskette disk drive. The diskette disk drive supports standard 3.5-inch; 720 KB and 1.44 MB mini-diskettes.

POINTING DEVICE SUBSYSTEM

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

POWER SUBSYSTEM

The Power Subsystem consists of the following major sections:

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

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 2700 Series notebooks utilizes NiMH (Nickel Metal-Hydride) or Li-Ion (Lithium Ion) batteries that provide DC power for the notebook.

The NiMH battery pack contains eight size A battery cells that provide the system with 9.6V and the Li-Ion battery pack contains eight size A battery cells that provide the system with 14.4V. When installed in the notebook, the battery LED automatically appears and also starts to recharge whenever the AC adapter is connected to the notebook.

Normal charging time for the battery pack is around 2 hours when the computer is turned off while it should take around 4 hours maximum when the computer is running.

Power Board

The power board receives approximately 12VDC from the battery pack and uses this input voltage to generate +12V, +5V, +3.3V, (+3.45V) regulated output voltages to provide power for all internal notebook board assemblies. The output of the +5V regulator also drives the LCD inverter circuit on the LCD inverter board assembly. Refer to Section 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 Power Board module of the system board into a high voltage AC output used to light the CCFT (Cold-Cathode Fluorescent Tube).

Section 4

Troubleshooting and Repair

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

SERVICE INFORMATION

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

Table 4-1 NECCSD Service and Information Telephone Numbers

Service	Call
To order NECCSD spare parts	In the U.S., call 1(800) 632-4525
To order options in the U.S.	Local Sales Office
To access the NECCSD Electronic Bulletin Board System (BBS)	1(978) 635-4706
To download files - provides software drivers and the latest ROM BIOS	1(978) 635-4706
NECCSD Customer Service and Technical Support Center	In the U.S., call 1(800) 632-4525
NECCSD Customer Assistance Center for customer service, extended warranties, and contracts	In the U.S., call 1(888) 632-9128
FaxFlash SM - automated fax service that sends the latest information about NEC products to the fax machine 24 hours a day	In the U.S. and Canada, call 1(888) 329-0088 Outside U.S. 1 (978) 635-6090

TECHNICAL SUPPORT

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

tech-support@neccsd.com

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

(978) 635-4100

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

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

PRODUCT INFORMATION

NECCSD FaxFlash is a self-help, automated electronic information service for obtaining up-to-date product application notes, installation procedures, troubleshooting tips, data sheets, technical information bulletins, illustrated parts lists, part numbers, and other information about your system.

Using a fax machine, you can obtain information from FaxFlash 24 hours a day, 7 days a week. You simply call the FaxFlash number on your touch-tone telephone and order the information you want by following the voice prompts. FaxFlash will automatically fax the information to you.

If you are new to FaxFlash, you should first order one of the following catalogs. Each catalog lists the available documents and their document numbers. Current catalogs include:

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

Technical support information includes BBS and FTP file listings, Illustrated Parts Breakdowns (IPB), part numbers, frequently asked questions (FAQ) lists, and other documents specific to each product.

Order information from FaxFlash as follows:

1. Be sure that your fax machine or fax/modem is on. Have the document number ready for the document you want, if you already know the number.
2. From your touch-tone telephone, enter 888-329-0088 (U.S. and Canada only).

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

3. Listen to the instructions provided by the voice prompts.

Press **1** if you do not want an introduction to FaxFlash. Follow the automated instructions for ordering your document or catalog.

Press **2** if you want an introduction to FaxFlash. Follow the automated instructions for ordering your catalog or document.

4. When prompted, enter your fax number and name.

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

The information you requested is automatically sent to your fax machine. Wait for the ordered document to arrive at your fax machine before calling to order more documents. If FaxFlash attempts to send the second order before the first order is completed, the order may be canceled. After three tries, FaxFlash assumes that your line is busy and terminates any further processing of the order.

HELPFUL STARTERS

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

- Is there any external power source connected to the computer?
 - Has the battery been fully charged?
 - Is the computer turned on and the POWER LED activated?
 - Is the LCD display control switch moved to its minimum level?
 - Is the LCD display switched to the external monitor?
 - Are all cables and devices connected properly and securely?
 - Have all needed device drivers been installed properly?
 - Have you checked the AUTOEXEC.BAT and CONFIG.SYS files for errors?
 - Is the Suspend mode activated (LED Status Bar)? Press the suspend button to wake up the system again.
-

POWER-ON SELF TEST (POST)

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

POST Messages

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

Table 4-2 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.
No display message, system will beep when adapter fails,	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 4-2 POST Error Messages (cont'd)

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 the 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 is 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 4-2 POST Error Messages (cont'd)

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 <i>hex-value</i> , read <i>hex-value</i> , expecting <i>hex-value</i>	Circuitry associated with the memory chips has failed.	Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Unexpected interrupt in protected mode	Hardware interrupt or NCI 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.

Beep Codes

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

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

Beep Codes are listed in the table that follows.

Table 4-3 Beep Codes

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

Informational Messages

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

Table 4-4 BIOS Informational Messages

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

Run-time Error Messages

The following table lists run-time error messages.

Table 4-5 Run-time Error Messages

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

QUICK TROUBLESHOOTING

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

Table 4-6 Quick Troubleshooting

Problem	Corrective Actions
No power	<p>Check that the AC adapter is plugged into the power connector of the system. Also, that the AC adapter is plugged into a properly grounded AC power outlet.</p> <p>If using the battery as main power source, check if the battery pack is of the right type, charged and is inserted correctly.</p> <p>Check the power board of the system. Is it inserted into the system board connector properly? Otherwise, replace the power board.</p>
Data on the LCD is unreadable	<p>Adjust the brightness and contrast display controls found on the right side of the LCD panel.</p> <p>Check if the LCD cables are inserted properly. Check also connections inside the LCD panel.</p> <p>Check if installed VGA driver is correct.</p> <p>Check VGA controller chip on the system board if there is any cold or loose soldering.</p> <p>Replace the system board.</p>
LCD screen does not show data	<p>Check the LED Status Bar if Suspend mode is activated. Press any key or press the power button to resume operation and display.</p> <p>Check if LCD cables are disconnected or loose.</p> <p>Check if the display output is switched to the external monitor.</p> <p>Check if the Contrast level is set to minimum.</p> <p>Check if there is power.</p> <p>Check if the SW51 Jumper setting mode is correct.</p> <p>Replace LCD Inverter board found inside the LCD Panel.</p>

Table 4-6 Quick Troubleshooting (cont'd)

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

Table 4-6 Quick Troubleshooting (cont'd)

Problem	Corrective Actions
PCMCIA card does not work	<p>Check the PCMCIA driver installation for any IRQ or IO address conflict.</p> <p>Check if the PCMCIA card is inserted properly and all connections are set.</p> <p>Replace the PCMCIA card.</p> <p>Check for work around for the card being used.</p> <p>Replace the system board.</p>
Serial device does not work	<p>Check if the serial device is connected properly.</p> <p>Replace the serial device.</p> <p>Check the I/O controller chip on the system board for any cold or loose soldering.</p> <p>Replace the system board.</p>
Parallel device does not work	<p>Check if all connections are properly set.</p> <p>Check if the Port is enabled in Setup.</p> <p>Check if external device is turned on.</p> <p>Check I/O controller chip on the system board for any cold or loose soldering.</p> <p>Replace the system board.</p>

Section 5

Field Service Guidelines

This section contains preventive and corrective maintenance procedures for the NEC Versa 2700 Series notebook computers. The first part of this section describes the computer cleaning procedures and preferred handling procedures for sensitive components (i.e., disk drives, batteries).

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

PREVENTIVE MAINTENANCE

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

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

Cleaning the Notebook's Exterior

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

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

Cleaning the Notebook's Interior

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

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

Protecting the Disk Drives

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

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

- Periodically back up the data files from the hard disk.
- Run a virus detection program to identify possible viruses on the hard disk.
- Use SCANDISK to correct any errors found in the directory and File Allocation Table (FAT). This will also free up space from any unused sectors.
- Never turn the computer off when the hard disk is being accessed.
- Never move or raise the computer while the hard disk is being accessed, importantly don't jar the hard disk, as this may cause a hard disk crash.
- Use hard disk maintenance programs to reorganize the hard disk by eliminating fragmentation and improving hard disk access time.

Handling the Computer Battery Packs

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

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

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

Maintaining the LCD Quality

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

REQUIRED TOOLS AND EQUIPMENT

All NEC Versa 2700 Series corrective maintenance procedures can be performed using the following tools:

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

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

PARTS REMOVAL AND REPLACEMENT PROCEDURES

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

Removing/Replacing the Notebook Battery Pack

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

1. Turn off the computer and close the LCD cover.
2. Slide the battery cover toward the front side of the unit and remove. To remove the battery pack, hold the unit with one hand and with the other hand lift the battery pack out of the bay.
3. To replace the battery pack again, simply set the battery pack into the bay making sure that the connector contacts engage. Then slide the cover back over the battery bay. The battery pack can only be inserted in one direction so there is no danger of improper insertion.

Removing/Replacing the Hard Disk Drive Module

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

1. Turn off the computer. Close the LCD cover and turn the unit over.
 2. On the bottom of the system, locate the two (2) screws, toward the front, that hold the palm rest cover in place. Remove the screws and turn the unit back over.
 3. Lift open the palm rest cover and the hard disk drive will be located on the right side of the unit. Remove the two (2) screws that secures the hard disk drive module to the system unit. To remove the hard disk drive module, first remove the connector from the system board, then lift the hard disk drive module out.
 4. To replace the hard disk drive module, reverse the above procedure.
-

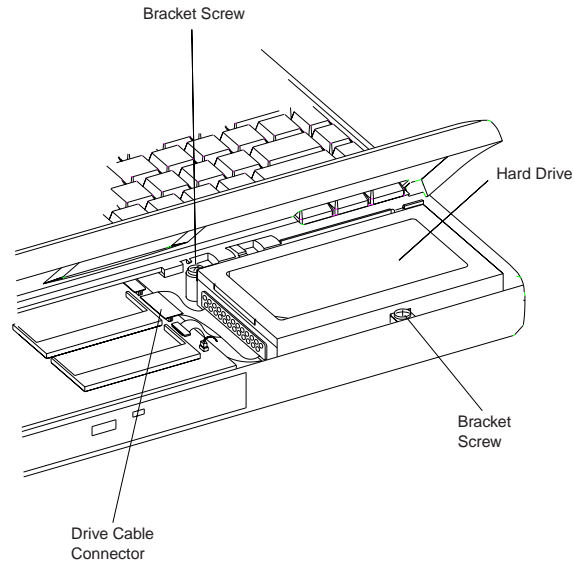


Figure 5-1 *Disconnecting the Hard Drive Assembly*

Removing/Replacing the CMOS Battery

The procedure for removing and replacing the CMOS Battery is as follows:

1. Turn off the computer and close the LCD cover.
2. On the bottom of the system, locate the two (2) screws, toward the front, that hold the palm rest cover in place. Remove the screws and turn the unit back over.
3. Disconnect the hard disk connector cable from its connector on the circuit board. The CMOS battery is underneath the cable.
4. Disconnect the CMOS battery from its connector.

Removing/Replacing the Fax/Modem

The procedure for removing and replacing the Fax/Modem is as follows:

1. Turn off the computer and close the LCD cover.
2. On the bottom of the system, locate the two (2) screws, toward the front, that hold the palm rest cover in place. Remove the screws and turn the unit back over.
3. Remove the three screws holding the protective cover above the fax/modem.
4. Disconnect the fax/modem connector from its connector on the circuit board.

Removing/Replacing the Keyboard and LCD Assembly

The procedure for removing the keyboard and LCD assembly are as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
2. Close the Palm rest cover and turn the unit over.
3. Remove the three (3) screws from the rear of the unit. Then turn the unit back over and open the palm rest cover.
4. Remove the Fax/Modem support bracket from the left front of the open palm rest area.
5. You can now lift the keyboard from the unit. Make sure to disconnect the keyboard cables from the mother board before lifting the keyboard off of the system.
6. You will now be able to see the Heat Plate. To remove the heat plate from the unit, remove the three (3) visible screws and lift the heat plate out of the unit.

NOTE: The Heat plate is sitting right up against the CPU, take care that you do not damage the CPU when removing the heat plate.

7. After removing the heat plate you will now be able to finish the final removal of the Keyboard and LCD Assembly by removing the eight (8) screws now visible on the unit. There are two (2) along the left side, two (2) along the lower right edge, and there are four (4) around the CPU module in the center.
8. There are numerous wires and connectors attached to the system board and the LCD assembly. Carefully disconnect all of these cables before completely removing the LCD assembly.
9. To replace the keyboard and LCD assembly, reverse the removal procedures mentioned above.

MEMORY UPGRADE PROCEDURE

The NEC Versa notebook allows you to install and expand the 16 MB (or 32 MB) system memory via the memory compartment found under the palm rest. Inside the compartment is an extra memory module socket (the lower socket) that can accommodate any standard (1-inch) SO-DIMM 16 MB, 32 MB, or 64 MB SO-DIMM modules. The upper socket can accept 1.75-inch modules as well as 1-inch modules.

For NEC Versa 2700 Series notebooks, the following memory configurations are applicable:

Table 5-1 16-MB Memory Configurations

Upper Socket	Lower Socket	Total Memory
16 MB	empty	16 MB
16 MB	16 MB	32 MB
16 MB	32 MB	48 MB
16 MB	64 MB	80 MB

Table 5-2 32-MB Memory Configurations

Upper Socket	Lower Socket	Total Memory
32 MB	empty	32 MB
32 MB	16 MB	48 MB
32 MB	32 MB	64 MB
32 MB	64 MB	96 MB

Table 5-3 64-MB Memory Configurations

Upper Socket	Lower Socket	Total Memory
64 MB	empty	64 MB
64 MB	16 MB	80 MB
64 MB	32 MB	96 MB
64 MB	64 MB	128 MB

To upgrade the memory in the notebook, follow these steps.

1. Make sure the system is powered off and that no peripheral devices are attached.
2. Turn the system over and locate the two screws that secure the palm rest.

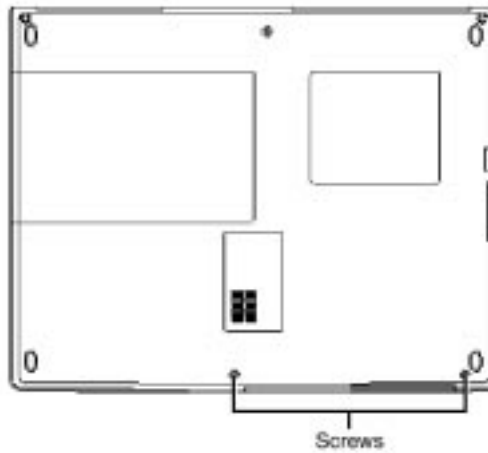


Figure 5-2 Cover screw locations

3. Remove the screws and turn the system over.
4. Open the LCD panel.
5. Slide the palm rest about a half inch towards the front of the system and tilt it back towards the keyboard.
6. Locate the alignment notch on the module.

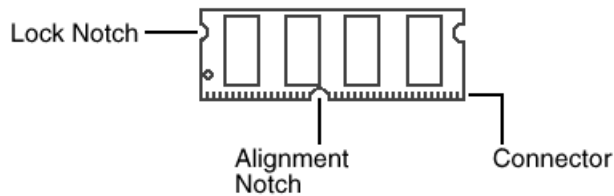


Figure 5-3 Memory module notch locations

7. Locate the memory module sockets. Your system comes with one module already installed in the socket closest to the keyboard. When installing additional memory, use the socket closest to the front of the system.
-

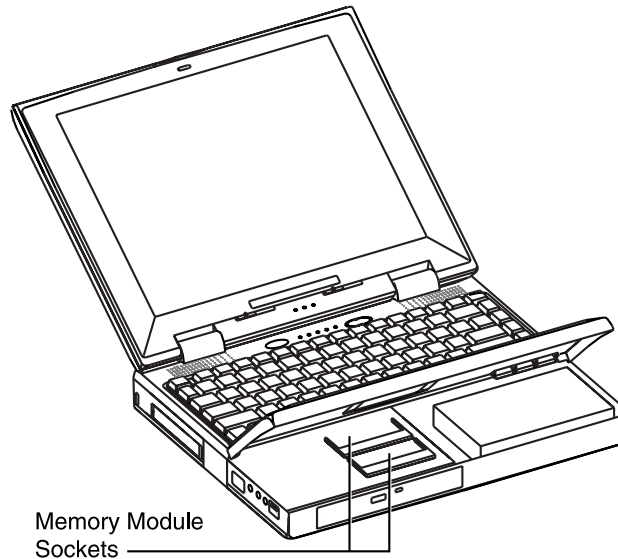


Figure 5-4 Memory module sockets

8. Align the notch with the notch in the socket connector and insert the module as follows:
 - Hold the SO-DIMM at a 60-degree angle and align the SO-DIMM connector with the socket in the system. Push the connector into the socket.
 - Press down on the edge of the SO-DIMM until the locking tabs on the sides snap into place, securing the module.
9. Replace the palm rest and screws.
10. Reconnect the AC adapter and insert the battery pack into the computer.
11. Power on the notebook and notice the BIOS error message informing you that the memory amount stored in CMOS does not match the installed memory amount. Press **F2** to run the SETUP program and save the new CMOS settings. The computer automatically adjusts the memory amount.

To remove a SO-DIMM, press the locking tabs away from the sides of the module until the module pops up. Then, remove the SO-DIMM.

NOTE: If the notebook has been configured for save-to-disk, it may be necessary to run HDPREPEZ to re-partition the save-to-disk partition size. The save-to-disk partition must be of a size sufficient to store the contents of the entire memory amount. If the partition is not large enough, a warning message displays at power on.

12. Replace the NEC Versa components as follows.

- Gently lower the palm rest back into place.
- Close the LCD panel.
- Turn the system over and replace the two screws.

CAUTION: Replace the two screws snugly. Do not overtighten or the CD-ROM tray may not open.

HDPREPEZ Utility

The HDPREPEZ utility increases the amount of space reserved on the hard drive for use when the system goes into the Save to File state.

You only need to access this utility when you install additional memory that increases your total system memory to more than 48 MB.

The following instructions are for Windows 95 only. If you have Windows NT or Windows for Workgroups, see the supplementary documentation that came with your system.

Use these steps to run the HDPREPEZ utility.

1. Power off and restart your NEC Versa.
2. At the statement "Starting Windows 95," press **F8**.
3. From the Startup menu, select option 6, "Safe Mode Command Prompt Only."
4. Enter MS-DOS. At the c: prompt, type **cd\necutils** and press **Enter** to change to the \necutils directory.
5. Type **HDPREPEZ** and press **Enter**. The utility automatically prepares your NEC Versa for the newly installed memory.
6. Power off your system and then power on. A file, large enough to accommodate the new memory capacity, is created on the hard disk.

Changing Switch Settings Procedure

Use the following steps to change switch settings.

1. Make sure that the system power is off and that no peripheral devices are attached to the system.
2. Turn the system over and locate the two screws that secure the palm rest.

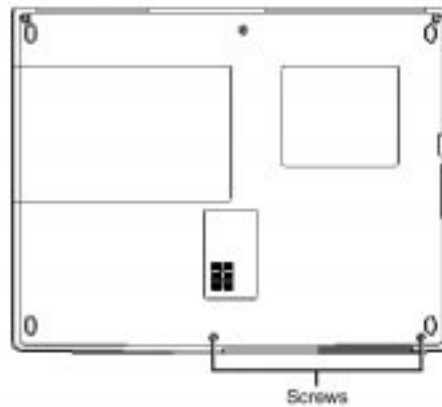


Figure 5-5 Locating the palm rest screws

3. Remove the screws and turn the system over.
4. Open the LCD panel.
5. Slide the palm rest forward about a half inch and lift it towards the keyboard.
6. Locate the dip switch bank(s).

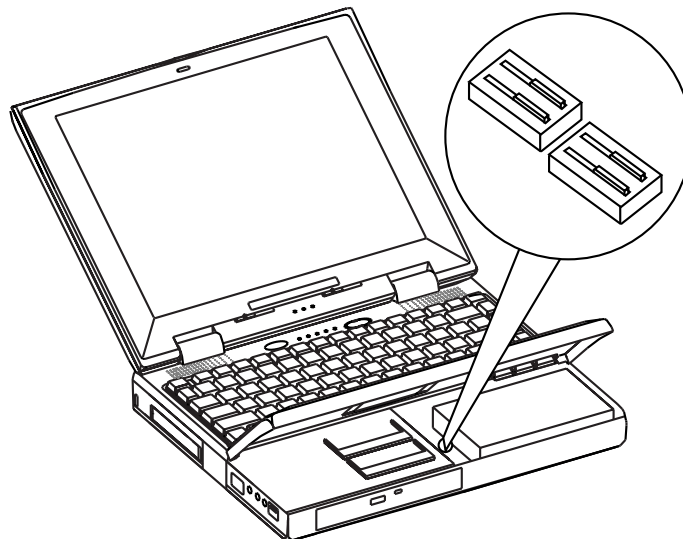


Figure 5-6 Two dip switch banks

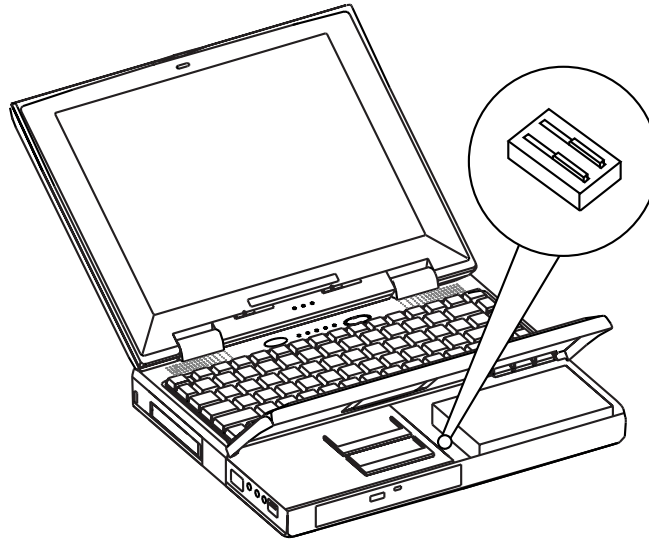


Figure 5-7 One dip switch bank

7. Using a fine-tipped object, remove the yellow tape (if present) and change the switch settings as follows (the figure that follows shows the factory default settings for SW50).

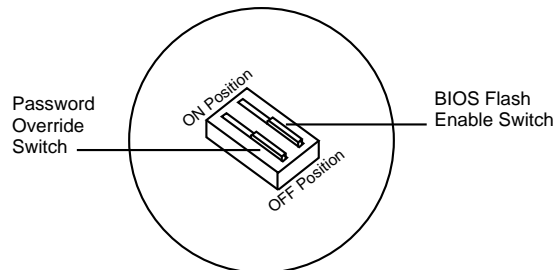


Figure 5-8 Factory default switch settings (SW50)

In the two dip switch bank configuration, access the bank closest to the back of the NEC Versa for BIOS and Password changes (SW50).

NOTE: Do not touch the bank closest to the front of the NEC Versa (SW52) unless you are replacing the CPU. This switch should be covered by a protective sealant or yellow tape.

For SW50:

- Set the BIOS Flash Enable to ON to enable the switch and upgrade the BIOS.
 - Set the Password Override Switch to ON to change the password.
-

CAUTION: Never use a pencil tip to change switch settings. Residue from the pencil can damage the system.

8. For SW52, use a plastic pick to loosen the sealant and a pair of tweezers to remove the protective sealing. Then using a fine-tipped object, change the switch settings as follows (the figure that follows shows the factory default settings for SW52).

- Bank 1 sets the CPU voltage to ON to enable use of the 200MHz or 233MHz processors. Set Bank 1 to OFF for 133MHz, 150MHz, and 166MHz processors.
- Bank 2 is not used.

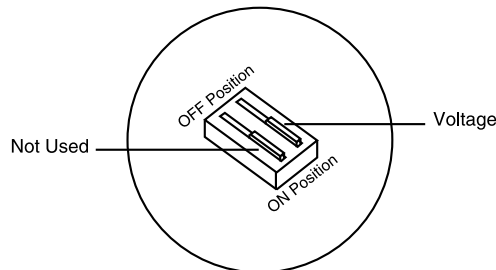


Figure 5-9 Factory default switch settings (SW52)

Replace the protective sealant using the instructions in “Seal Replacement Procedure” (immediately following this procedure).

Sealant Replacement Procedure

Use the following steps to seal switch SW52 to prevent accidental changes to the processor type voltage setting. For best results, use a silicone rubber adhesive sealant such as General Electric (GE) RTV 162 (White).

This sealant provides the following important features:

- electronic grade
 - non-corrosive to metal
 - low odor
 - paste-like consistency for ease of use
 - Maximum operating temperature of 500° F (260° C)
-

WARNING: Be sure to follow these guidelines before starting this procedure:

- Remove contact lenses before using the sealant.
 - Wear safety eye protection
 - Use with adequate ventilation
 - Avoid contact with skin. The uncured product may cause skin irritation.
-

1. Apply a small dab of sealant on to the switch.
2. Wipe off any excess sealant with a cotton swab.
3. Complete any other procedures, then close the palm rest and secure the palm rest screws.

SYSTEM BIOS UPGRADE PROCEDURE

If you made any changes through the Setup utility, you may want to jot them down. When you update the BIOS, any customized settings you made are lost. After completing the BIOS update, you can then use your notes to reset them to your preferences.

Use the following procedure to perform the BIOS update.

1. Make sure that the system is plugged into the AC adapter and AC power and that system power is off.

NOTE: Your system must be connected to AC power to perform the BIOS update.

2. Insert the BIOS Update diskette into the diskette drive.
3. Power on the system with the diskette in the diskette drive. The system boots and automatically loads the utility. A message similar to the following appears:

FLASH ROM EQUIPPED

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

4. Press any key to continue.

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

5. Use the arrow keys to highlight the "Display BIOS Version" option on the Main Menu. Use this option to check the currently installed BIOS version and the version of the new replacement BIOS.
-

Press any key to return to the Main Menu.

6. Highlight the “Install New BIOS” option and press **Enter**.
7. Press **Y** and then press **Enter**. After a brief pause, a message appears telling you to remove the diskette from the diskette drive.
8. Remove the diskette and press any key to continue. The utility updates the BIOS. A message appears indicating that your system has been updated and that you should power off your system.
9. Power off your system. The next time you power on your system, you will have the latest NEC Versa 2700 Series BIOS revision level.
10. When the update is complete, follow the instructions in the previous section and reset BIOS Flash Protection switch back to the ON position.
11. Enter Setup to restore the default parameter settings.

While you are in Setup, restore any customized settings that you made. Save your changes and exit.

Removing/Replacing the CPU Module

The procedure for removing the CPU is as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
2. The CPU is located at the center rear of the system base assembly under the heat pipe. The system board has been designed to allow the heat generated by the CPU to be released from the system.
3. Gently remove the CPU Module. Avoid damaging the CPU pins by forcing the CPU out of its slot immediately.
4. To replace the CPU, align the module with the socket and plug in the CPU Module.

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

NOTE: It is not necessary to remove the CPU when performing normal service on the NEC Versa 2700 Series.

Removing/Replacing the NEC VersaGlide Assembly

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

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

1. Turn off the computer and follow all disassembly procedures mentioned from the start of this section.
2. Turn the Palm Rest assembly over and locate the VersaGlide assembly. Remove the four (4) screws securing the VersaGlide assembly to the palm rest.
3. To replace the VersaGlide assembly, reverse the removal procedures mentioned above. Make sure to test the VersaGlide before entirely securing it to the top bottom assembly.

Removing/Replacing the LED Board

The procedure for removing the LED board is as follows:

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
2. The LED board is located in the center of the Keyboard and LCD assembly unit. This board alerts you to the processes presently in use on the computer.
3. Remove the two screws and lift the board carefully off the assembly.
4. To replace the LED board assembly, reverse the above mentioned procedure.

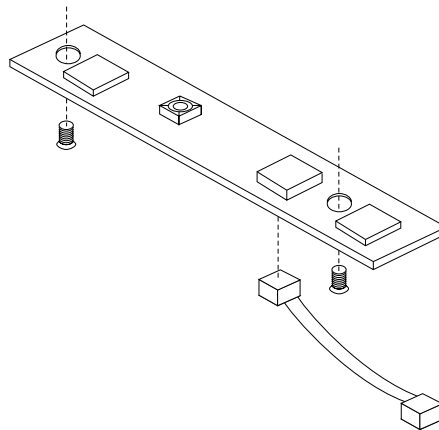


Figure 5-10 The LED Board Module Assembly

Removing/Replacing the System Board

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

1. Turn off the computer. Follow all disassembly procedures mentioned from the start of this section.
2. Remove the three (3) screws from the left rear of the system board and the one small screw from the left front.
3. Using a small wrench or needle nose pliers, remove the port connector screws from the back of the electronic assembly around the Expansion Port and the VGA Port.
4. Gently lift the entire electronic system from the unit.
5. You should now be able to separate the system board from the I/O board.
6. Since the system board is the main unit of the notebook, all of the other boards are connected to this electronic module either by connector or by cable. Special care should be taken when removing this module, so as not to damage any of these connectors and/or cables.

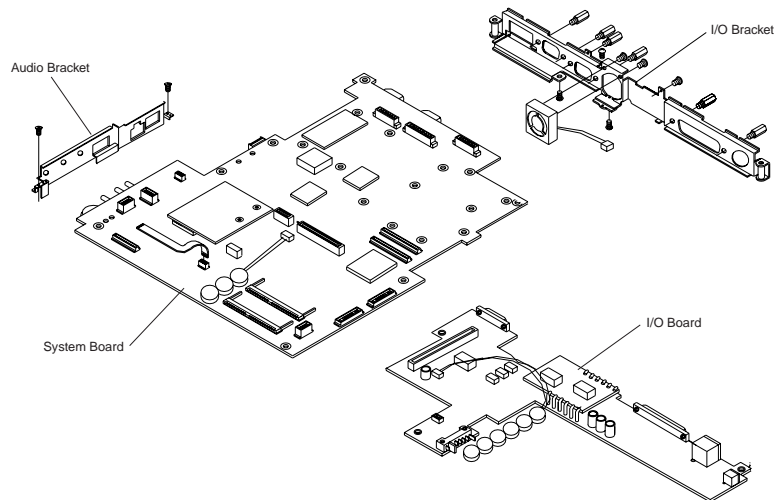


Figure 5-11 The Electronic Module Assembly

ILLUSTRATED PARTS BREAKDOWN

This section contains the illustrated parts breakdown (IPB) and NEC part numbers for the NEC Versa 2700 Series notebook computer. Table 5-4 lists field-replaceable parts and corresponding part numbers. Figure 5-12 shows the field-replaceable parts for the NEC Versa 2700 computer.

Table 5-4 NEC Versa 2700 Series Field-Replaceable Parts*

Item	Description	Part Number
1	16 MB RAM Module - EDO	02-30117-01
	32 MB RAM Module - EDO	02-30118-10
	64 MB RAM Module - EDO	02-30122-00
2	AC Adapter	12-00282-02
3	Power Cord - U.S.	22-30033-03
	Power Cord - UK	22-30036-00
	Power Cord - Europe	22-30036-01
	Power Cord - Japan	22-30036-02
	Power Cord - Australia	22-30036-03
4	Keyboard - U.S.	71-30368-00
	Keyboard - Japan	71-30368-01
5	LCD Status Cover - NEC	80-40004-00
6	Versa 2730M/ES Pro Logo Plate	158-032328-006
	Versa 2730MT/ES Pro Logo Plate	158-032328-007
	Versa 2730MT Logo Plate	158-032328-001
	Versa 2760MT/ES Pro Logo Plate	158-032328-008
	Versa 2760MT Logo Plate	158-032328-002
	Versa 2765MT Logo Plate	158-032328-013
	Versa 2770MT Logo Plate	158-032328-009
	Versa 2780MT Logo Plate	158-032328-010
	Versa 2780X Logo Plate	158-032328-016
	Versa 2783MT Logo Plate	158-032328-012
	Versa 2785MT Logo Plate	158-032328-011
	Versa 2790MT Logo Plate	158-032328-014
Versa 2790MT Logo Plate	158-032328-015	
7	12.1" DSTN LCD Assembly - Panasonic	56-10119-00
	12.1" TFT LCD Assembly - NEC	56-10120-00
8	LED Board Assembly	51-70295-01
9	Fan Assembly	21-20088-00
10	Top Cover Assembly (2 pieces)	80-00001-00
11	Battery, Sub-Batt	21-90387-00
12	VersaGlide Pad Module Assembly	71-20133-00

* This data was prepared November 1997. For an up-to-date listing of spare parts, please call FaxFlash (888) 329-0088 (international (978) 635-6090) and order document number 42200313.

Table 5-4 NEC Versa 2700 Series Field-Replaceable Parts*(cont'd)

Item	Description	Part Number
13	Fax/Modem Module Assembly	71-40028-00
14	CPU, 133 MMX - TCP	25-01080-00
	CPU, 150 MMX - TCP	25-01080-10
	CPU, 166 MMX - TCP	25-01080-20
	CPU, 200 Tillamook	25-00655-00
	CPU, 233 Tillamook	25-00656-00
15	System (Mother) Board Assembly	51-70294-00
	System (Mother) Board Assembly (Versa 2770 and Versa 2780 only)	51-70294-20
16	Speaker, Sub-Woofer Module	21-20090-00
17	Door, Serial/VGA Ports	80-40006-00
18	Door, Parallel/PS-2 Ports	80-40007-00
19	Bottom Cover Assembly	80-40003-00
20	Battery, RTC-Batt	21-90388-00
21	I/O Board Assembly	51-70302-00
	I/O Board Assembly (Versa 2770 and Versa 2780 only)	51-70302-10
22	1.4 GB HDD	25-00476-01
	2.1 GB HDD	25-00476-03
23	Battery, Primary - NiMH	21-90393-01
	Battery, Primary - Li-Ion	21-90393-02
24	FDD Module Assembly	25-00478-00
25	Battery Cover	80-40008-00
26	16X CD-ROM Module Assembly	25-00477-00
	20X CD-ROM Module Assembly	25-00653-00
27*	NEC Logo	158-032329-000
OPTIONS		
28*	PortBar Board Assembly	51-70417-00
29*	Bottom Cover Assembly, PortBar	24-41098-00
30*	Top Cover Assembly, PortBar	80-40010-00

* Not shown in IPB figure.

* This data was prepared November 1997. For an up-to-date listing of spare parts, please call FaxFlash (888) 329-0088 (international (978) 635-6090) and order document number 42200313.

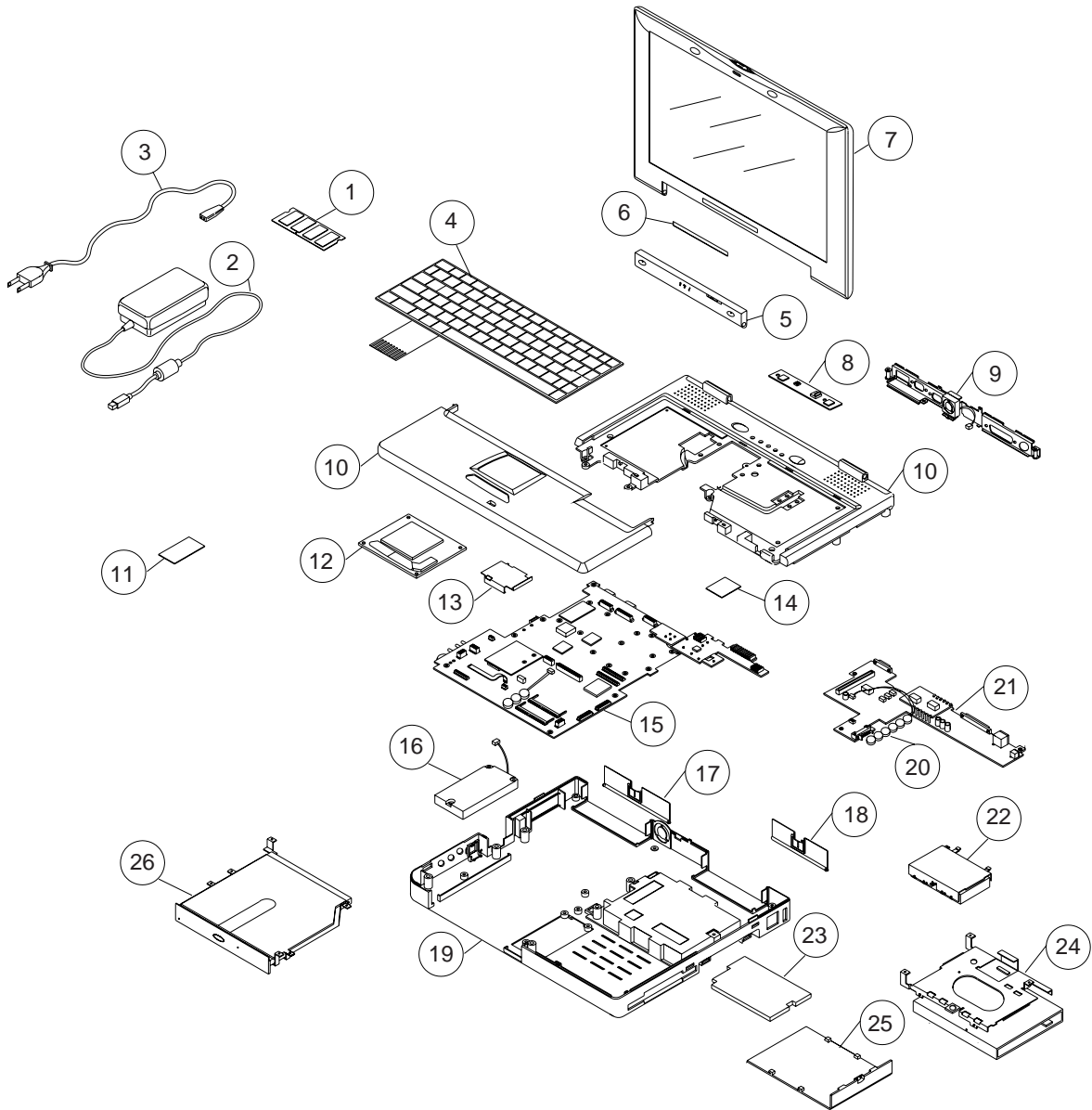


Figure 5-12 NEC Versa 2700 Series Illustrated Parts Breakdown

Packaging and Documentation

Packaging and documentation part numbers are listed in Table 5-5.

Table 5-5 Packaging and Documentation Part Numbers

Description	Model Number
<i>NEC Versa 2700 Series User's Guide</i>	819-200304-001
<i>NEC Versa 2700 Series Service and Reference Manual (this guide)</i>	819-200313-001
Shipping Carton (1 set)	25-01082-10

Appendix A

Video Modes

The NM 2160 VGA chipset supports high-resolution fixed frequency and variable frequency analog monitors in interlaced and non-interlaced modes of operation. Digital monitor support is also built-in. The tables in this section list all NM 2160 CRT monitor video modes.

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

VGA STANDARD MODES

The following table lists VGA standard modes.

Table A-1 VGA Standard Modes (Text Mode)

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
0, 1	16	40 x 25	9 x 16	360 x 400	28.322	31.5	70
		40 x 25	8 x 14	320 x 350	25.175		
		40 x 25	8 x 8	320 x 200	25.175		
2, 3	16	80 x 25	9 x 16	720 x 400	28.322	31.5	70
		80 x 25	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 A-2 VGA Standard Modes (Graphics Mode)

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

Table A-3 VGA Standard Modes (Planar Mode)

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

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

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

VGA EXTENDED MODES

The NM 2160 VGA BIOS supports standard VESA and extended modes, listed in the following table.

Table A-5 VGA Extended Modes (Text Mode)

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

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

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

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

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

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

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

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

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

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

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

Table A-11 VGA Extended Modes (Planar Mode)

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

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

Hex Mode	No. of Colors	Text Display	Font Size	Pixel Resolution	Dot Clock MHz	Horiz. Freq. KHz	Vert. Freq. Hz
78	16	80 x 25	8 x 16	640 x 400	25.175	31.5	70
79	256	80 x 30	8 x 16	640 x 480	25.175	31.5	60
7C	256	100 x 37	8 x 16	800 x 600	40.0	37.5	60
7E	256	128 x 48	8 x 16	1024 x 768	65.0	48.5	60
7E1	—	—	—	—	44.9	35.5	43

VGA HIGH REFRESH MODES

The following tables list VGA high refresh modes.

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

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

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

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

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

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

BATTERY REPLACEMENT

A CMOS clock battery in your computer maintains system configuration information. In the event that the battery fails to maintain system configuration information, NEC recommends that you replace the battery. Have an authorized NEC service representative replace the battery.

WARNING

There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

ATTENTION

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

BATTERY DISPOSAL

The main battery and CMOS clock battery are made of nickel metal hydride (NiMH).

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

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