Contents

Preface

This service and reference manual contains the technical information necessary to set up and maintain the Versa Note ® notebook computer.

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

The manual is organized as follows:

Section 1, Overview of the Versa Note, provides an overview of the hardware and interface components.

Section 2, Installation and Upgrade, provides information on setup and installation of drivers, utilities, and system upgrades.

Section 3, Software Functional Overview, provides information on BIOS, power and battery management, and other settings.

Section 4, Hardware Functional Overview, shows the system boards and the peripheral devices.

Section 5, Maintenance and Disassembly, provides detailed instructions on how to disassembly the notebook and preventive maintenance.

Section 6, Troubleshooting and Repair, provides the most common problems encountered with the Versa Note notebook computer and some troubleshooting checklists.

Section 7, Notebook Specifications, lists physical dimensions, video modes, pin assignments, connector locations, memory map and interrupt controllers.

An **Index** is included for convenience.

Abbreviations

A	ampere
AC	alternating current
AT	advanced technology (IBM PC)
BBS	Bulletin Board Service
BCD	binary-coded decimal
BCU	BIOS Customized Utility
BIOS	basic input/output system
bit	binary digit
BUU	BIOS Upgrade Utility
bpi	bits per inch
bps	bits per second
C	capacitance
C	centigrade
Cache	high-speed buffer storage
CAM	constantly addressable memory
CAS	column address strobe
CD/ROM	compact disk-ROM
CG	character generator
CGA	Color Graphics Adapter
CGB	Color Graphics Board
CH	channel
clk	clock
cm	centimeter
CMOS	complementary metal oxide semiconductor
COM	communication
CONT	contrast
CPGA	ceramic pin grid array
CPU	central processing unit
DAC	digital-to-analog converter
DACK	DMA acknowledge
DC	direct current
DIP	dual in-line package
DLAB	Divisor Latch Address bit
DMA	direct memory access
DMAC	DMA controller
DOS	disk operating system
DRAM	dynamic RAM
ECC	error checking and correction
EDO	extended data output
EGA	Enhanced Graphics Adapter
EPROM	erasable and programmable ROM
EVGA	Enhanced Video Graphics Array
F	Fahrenheit
FAX	facsimile transmission
FCC	Federal Communications Commission
FG	frame ground
FM	frequency modulation
FP	fast page
FRU	field-replaceable unit
GB	gigabyte
GND	ground
HEX	hexadecimal
HGA	Hercules Graphics Adapter
Hz	hertz
IC	integrated circuit
ID	identification
IDE	intelligent device electronics
IDTR	interrupt descriptor table register
in.	inch
INTA	interrupt acknowledge
IPB	illustrated parts breakdown
IR	infrared
IRR	Interrupt Request register
ISA	Industry Standard Architecture
ISR	In Service register
I/O	input/output

IPC	integrated peripheral controller
ips	inches per second
IRQ	interrupt request
K	kilo (1024)
k	kilo (1000)
KB	kilobyte
kg	kilogram
kHz	kilohertz
lb	pound
LED	light-emitting diode
LSB	least-significant bit
LSI	large-scale integration
M	mega
mA	milliamps
max	maximum
MB	megabyte
MDA	Monochrome Display Adapter
MFM	modified frequency modulation
MHz	megahertz
mm	millimeter
ms	millisecond
MSB	most-significant bit
NASC	National Authorized Service Center
NC	not connected
NMI	Non-maskable Interrupt
ns	nanosecond
NSRC	National Service Response Center
PAL	programmable array logic
PCB	printed circuit board
PCI	Peripheral Component Interconnect
PDA	personal digital assistant
PFP	plastic flat package
PIO	parallel input/output
pixel	picture element
PLCC	plastic leaded chip carrier
PLL	phase lock loop
p-p	peak-to-peak
PPI	programmable peripheral interface
PROM	programmable ROM
QFP	quad flat pack
RAM	random-access memory
RAMDAC	RAM digital-to-analog converter
RAS	row address strobe
RGB	red green blue
RGBI	red green blue intensity
ROM	read-only memory
rpm	revolutions per minute
R	read
RTC	real-time clock
R/W	read/write
S	slave
SCSI	Small Computer System Interface
SG	signal ground
SIMM	single inline memory module
SPM	standard page mode
SRS	Sound Retrieval System
SVGA	Super Video Graphics Array
SW	switch
TAC	Technical Assistance Center
TSC	Technical Support Center
TTL	transistor/transistor logic
tpi	tracks per inch
USB	universal serial bus
V	volt
Vac	volts, alternating current
Vdc	volts, direct current
VESA	video electronics standards association
VFC	VESA-compliant feature connector
VGA	Video Graphics Array
VRAM	video RAM
W	watt
W	write

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Overview of the Versa Note

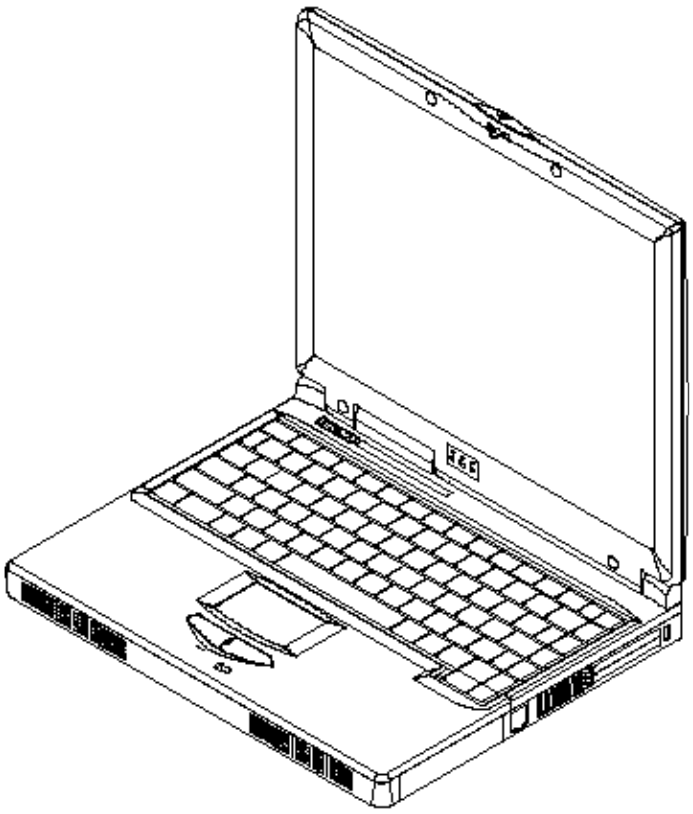
- Introduction
- Feature Highlights
- System Configuration
- Quick Tour of the Notebook
- System BIOS Program
- Notebook Accessories and System Options

Introduction

This chapter provides the outline features and operation of the Versa Note Series including the BIOS setup program and other system options.

The Versa Note all-in-one notebook offers the latest in advanced portable computing and multimedia technology that even outperforms most desktop computers. The notebook includes a powerful and upgradable Intel Mobile Module (IMM) microprocessor, high-speed IDE CD-ROM drive, 16-bit stereo audio capabilities, large screen colour display, high-capacity disk drive, and a PCI local bus video graphics accelerator. It comes with a built-in Windows 95/98 keyboard, glidepad pointing device, PCMCIA slots, and advanced power management. It also includes most of the I/O ports found in today's desktop PC including USB (Universal Serial Bus), FIR (Fast Infrared), and a docking port.

Versa Note Notebook Series Notebook Computer



Feature Highlights

The Versa Note Series notebook includes a variety of innovative features.

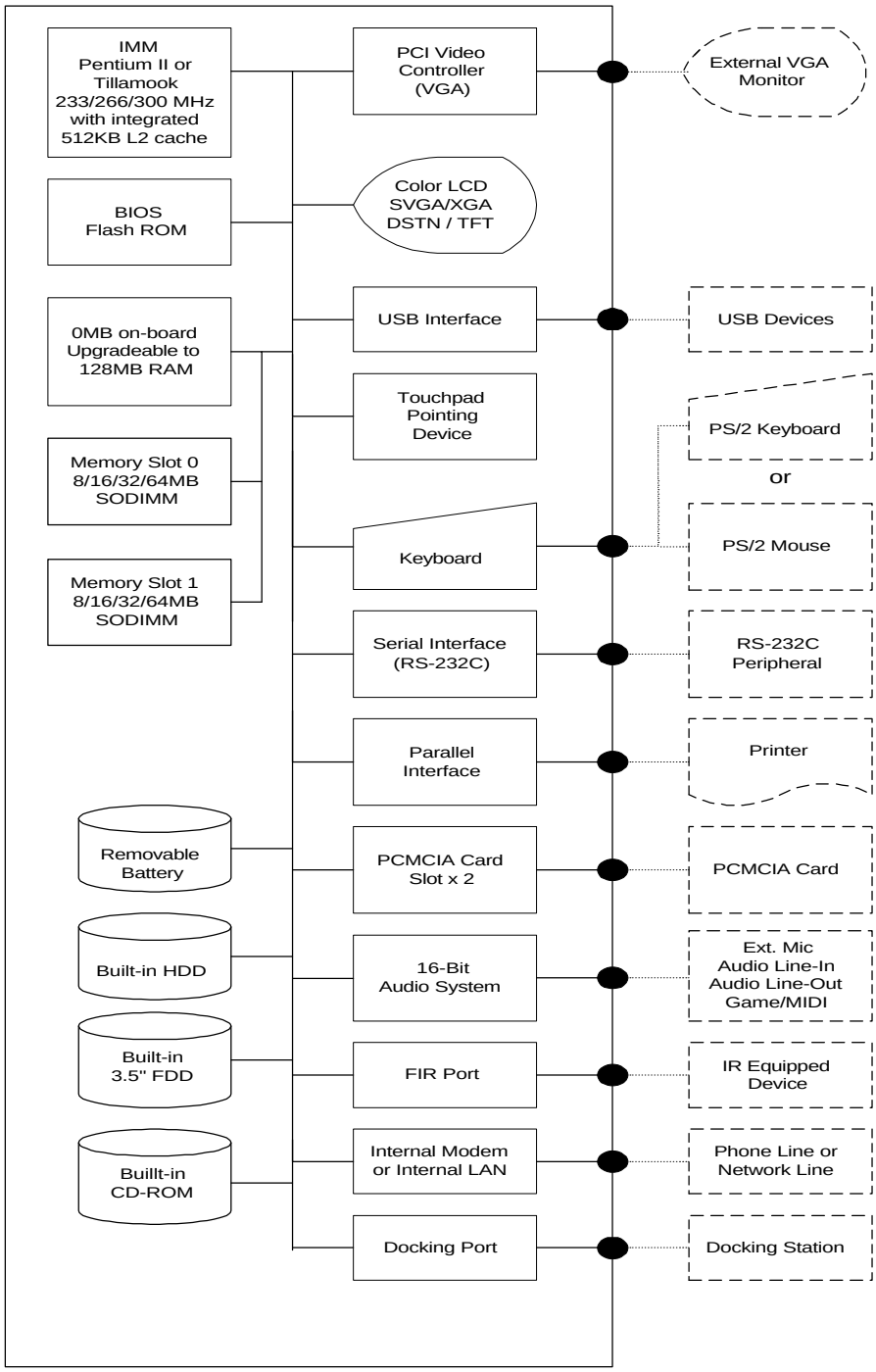
Feature Highlights

Features	Description
CPU	Intel Mobile Module (IMM) using MMC1 packaging: Tillamook IMM at 233 MHz; or Pentium-II IMM at 233/266 MHz
Cache Memory	IMM integrated L1 and L2 (512KB) Cache PBSRAM (pipelined-burst)
Bus Architecture	32-bit PCI/PCI-to-ISA Bus Architecture
System Memory	• Two memory slots for 144-pin SO-DIMM SDRAM (64-bit) • Upgradable to 128MB using 16MB / 32MB / 64MB SO-DIMM
Display	• 12.1”-SVGA TFT Colour LCD at 800x600 pixel resolution • 13.3”-TFT XGA Colour LCD at 1024x768 pixels resolution • Maximum 64K (16-bit High Colour) colour display • Brightness and Contrast controls via hot-key function
VGA	• 128-bit (internal) NeoMagic NMG4 PCI local bus VGA controller and Windows graphics accelerator with 2MB video memory • Up to 1024x768 resolution for external CRT monitor at 64K colours (16-bit) or 800x600 pixels at 16 million colours (24-bit True Colour)
HDD	• Built-in (internal) 2.5-inch Enhanced IDE hard drive • 3.2GB disk size with options for 2.1/4.0/6.4GB disk drives • Supports Bus Mastering Ultra-DMA feature
Diskette Drive	• Built-in 3.5-inch 1.44MB diskette drive with 3-Mode support
CD-ROM	• Built-in ATAPI IDE 20X or 24X-speed CD-ROM drive • Dummy case provided if system is without CD-ROM
Keyboard	• Built-in 87-key (90-keys for Japan) Windows 95/98 keyboard with 12 programmable function keys and 11 hot-key functions • Compatible with IBM enhanced 101/102-key keyboard
Pointing Device	• Integrated glidepad with 2 select click buttons • PS/2 mouse interface
PCMCIA Slot	Double-deck PCMCIA 2.1 card slots that support two Type II or one Type III PC cards 32-bit CardBus PCI local bus technology / Supports mixed voltage PC cards (5V and 3.3V) Integrated ZV (Zoomed Video) Port function on top PC slot

Features	Description
I/O Port	Includes the following standard I/O ports: 1 x 9-pin Serial Port (COM1) 1 x 25-pin Printer Port (LPT1) 1 x mini-DIN PS/2 Port (K/B or Mouse) 1 x 15-pin VGA Port (CRT) 1 x standard USB Port 1 x FIR Port (COM2) – up to 4Mbps 1 x Docking Port
Audio System	Integrated 16-bit full-duplex sound controller with software wavetable function and FM stereo synthesizer Compatible with Sound Blaster Pro Integrated 2-way stereo speakers and mono microphone Includes the following: • Microphone-in jack (MIC-IN) • Audio line-out jack • Audio line-in jack • Volume thumb-wheel knob control
Power System	Universal Auto-switching 50W AC Adapter (100V – 240V) / Auto-charging capability Rechargeable Li-Ion (2800mAh/14.4V) Battery Pack Over 2 hours of usage / 3 hours quick charge (computer off)
Power Management	Windows APM 1.2 Compliant ACPI and DMI 2.0 BIOS Ready Suspend-to-RAM and Suspend-to-Disk feature / Auto Suspend hot-key function / Battery Low Auto Suspend Cover Switch (Suspend/CRT-only) function
LED Indicator	8 x LED Status Indicator for Power Source, Battery Charge, Power Management, IDE, diskette drive, Caps Lock, Scroll Lock, Num Lock
Optional Module	56Kbps Fax/Voice/Data Internal Modem with V.90 support

System Configuration

System Configuration Diagram


IMM
Pentium II or
Tillamook
233/266/300 MHz
with integrated
512KB L2 cache
BIOS
Flash ROM
0MB on-board
Upgradeable to
128MB RAM
Memory Slot 0
8/16/32/64MB
SODIMM
Memory Slot 1
8/16/32/64MB
SODIMM
Removable
Battery
Built-in HDD
Built-in
3.5" FDD
Buillt-in
CD-ROM
PCI Video
Controller
(VGA)
Color LCD
SVGA/XGA
DSTN / TFT
USB Interface
Touchpad
Pointing
Device
Keyboard
Serial Interface
(RS-232C)
Parallel
Interface
PCMCIA Card
Slot x 2
16-Bit
Audio System
FIR Port
Internal Modem
or Internal LAN
Docking Port
External VGA
Monitor
USB Devices
PS/2 Keyboard
or
PS/2 Mouse
RS-232C
Peripheral
Printer
PCMCIA Card
Ext. Mic
Audio Line-In
Audio Line-Out
Game/MIDI
IR Equipped
Device
Phone Line or
Network Line
Docking Station

Quick Tour of the Notebook

Please take a moment to become familiar with the location and purpose of the controls, LED status panel, connectors and ports, which are illustrated in this section. Refer to the *Versa Note User's Guide* for further information on features.

The Front of the Notebook

Open the notebook by pushing the latch in the centre to the right to release and tilt the LCD cover up. The following sections describe the front features including the LCD display panel, keyboard, glidepad, status LED, and power switch.

Colour LCD Display Panel

The LCD panel can be SVGA (800x600) or XGA (1024x768) or active-matrix TFT colour liquid crystal display (LCD). You can adjust and tilt (up to 180°) the LCD screen panel to your desired viewing position.

The Versa Note Series uses a 128-bit PCI bus VGA graphics controller with 2MB of video memory. All TFT SVGA or XGA Colour LCD models can support up to 64K colours (65,536 colours) or 16-bit high colour. The notebook also supports simultaneous display of the LCD with the external VGA monitor.

The LCD screen also uses CCFT (Cold Cathode Fluorescent Tube) backlighting which consumes much of the electrical power of the notebook. To save battery power, the system has an advanced power management feature that switches off the LCD when there is no system activity for a predetermined amount of time.

Adjust the brightness and contrast level of the LCD by pressing the display control hot-keys. The hot-keys are activated by pressing the **Fn** key in conjunction with another key:

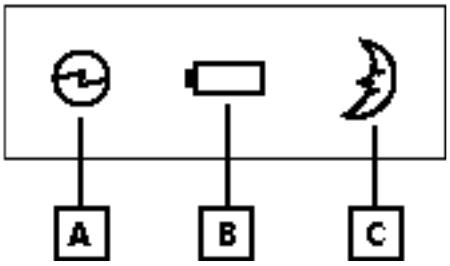
Fn + **F8** Key = Increases the brightness of the LCD display

Fn + **F9** Key = Decreases the brightness of the LCD display

Power and Suspend Status LED

Three LEDs at the bottom of the LCD front panel indicate power and suspend status and are visible even when the cover is closed.

Power and Suspend Status LED



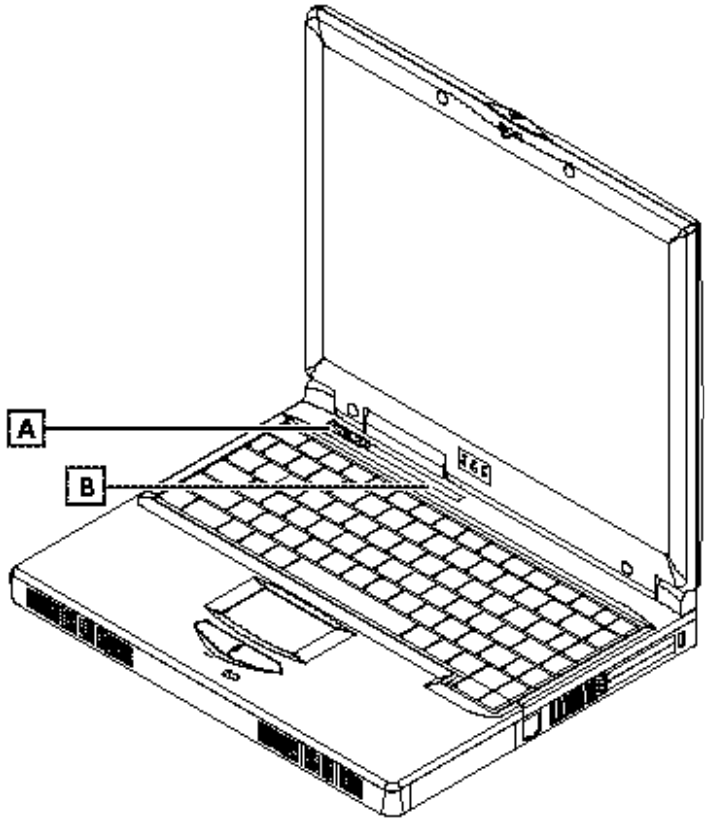
A - Power LED
B - Battery Charging LED
C - Suspend Mode LED

- Power LED – Lets you know if power to the system is turned on. This LED is visible when the LCD panel is opened or closed. The LED turns green when the system is powered on using the AC Adapter, battery, Xtender Auto Adapter. The LED turns amber when the battery power is low.
- Battery Charging LED – Indicates the battery charging status. The LED turns amber when the battery is charging. The LED is off when the battery is fully charged.
- Suspend Mode LED – Blinks green when the system is in Suspend mode.

Control Panel

The control panel of the notebook, located in front of the keyboard assembly, contains the Power button and the Status LED panel.

Power Button and Status LED Panel



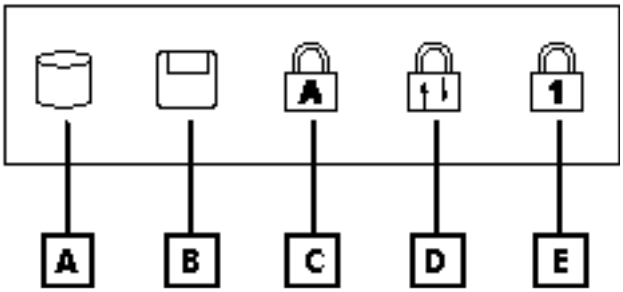
A - Power Button **B** - Status LED Panel

- Power Button – Press the Power button to power on or power off the system. The Power button is also a "Smart" switch, meaning that it recognizes when the system is in Suspend mode. Pressing the Power button while in Suspend mode will bring it out of Suspend mode rather than power it off.

> ***Note:*** If you are unable to power off the system, use the power override. Press the power button and hold it in place for four seconds. The system will then power off.

- Status LED Panel – Keeps you informed of the operating status. Each LED is marked with an icon to designate a system status.

Status LED Panel Icons



A - Hard Drive Access
B - Diskette Drive Access
C - Caps Lock
D - Scroll Lock
E - Num Lock

- Hard Drive Access - Flashes when the system is accessing the hard disk drive.
- Diskette Drive Access - Flashes when the system is accessing the diskette drive.
- Caps Lock - When lit indicates that the Caps Lock key on the keyboard is activated and all alphabet keys are in upper case letters.
- Scroll Lock - When lit indicates that the Scroll Lock key on the keyboard is active.
- Num Lock - When lit indicates that the Num Lock key on the keyboard is active. The embedded numeric keypad (blue print numeric keys) is enabled.

Cover Switch

The Cover switch is near the left hinge of the LCD panel. Whenever the LCD cover is closed, it activates the Suspend mode or switches the display to CRT if there is an external monitor connected.

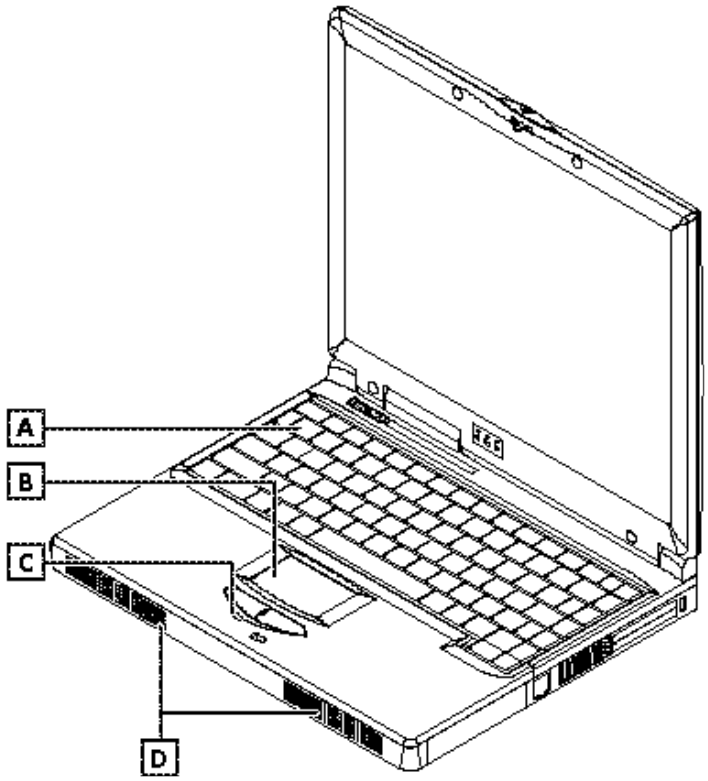
⚠ CAUTION

When Suspend mode is activated, do not let the system run for a long period in battery mode. The battery continues to drain power even in Suspend mode. If the notebook is not going to be used for several hours, save all files and shut down the power instead.

Keyboard Panel and Base Unit

The keyboard unit, glidepad, internal microphone, and the system speakers are located on the keyboard panel and base unit. Below is a short description of each feature.

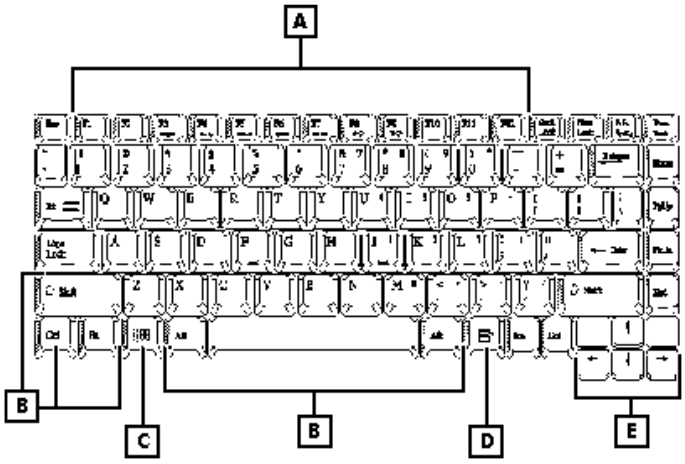
Keyboard Panel and Base Unit



A - Keyboard
B - Versa Glide
C - Internal Microphone
D - Internal Speakers

- Keyboard – Standard QWERTY-key layout. The notebook keyboard has 87-keys that provides complete emulation of a full-sized enhanced desktop keyboard. It includes Windows 95/98 hot-keys, 12 function keys, inverted “T” cursor keys, embedded numeric keys, separate page screen control keys, and special function hot-keys.

Keyboard Layout



A - Function Keys
B - Control Keys
C - Windows 95/98 Key
D - Windows Short Cut Key
E - Cursor Control Keys

The notebook keyboard is a little bit different from a standard desktop keyboard. Aside from the normal alphanumeric characters and the standard keyboard function keys, the notebook keyboard includes an embedded numeric keypad and special function keys that become active by pressing the **Fn** key together with another key. These special function keys or hot-keys allow you to control and adjust some of the functions of the notebook like display controls, power saving features, and others.

Function Keys — Twelve function keys, **F1** through **F12**, are available on the Versa Note keyboard. These keys also work together with the **Fn** key to activate special functions. Eight keys (printed in blue) are pre-programmed with dual functions.

The following function-key combinations are pre-programmed for the Versa Note:

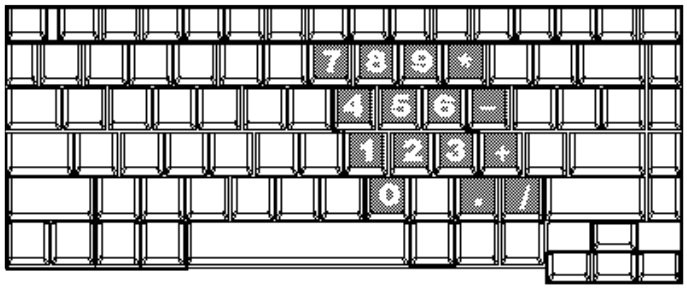
Function Key Combinations

Function Keys	Function Description
Fn + F3	Toggles between three video modes, LCD, CRT, or simultaneous display on both.
Fn + F4	Sets standby power management mode to On. Press any key to turn off standby mode.
Fn + F5	Stretches the display when running a low resolution mode on a high resolution LCD panel.
Fn + F6	Turns the system speaker On or Off.
Fn + F7	Sets the power saving mode.
Fn + F8	Increases the LCD's brightness.

Function Keys	Function Description
Fn + F9	Reduces the LCD's brightness.
Fn + F10	Increases the LCD's contrast.
Fn + F11	Reduces the LCD's contrast.
Fn + Suspend	Save to File on Demand immediately saves your system's working state to a reserved area on the hard disk drive.
Fn + SysReq	System request is used in terminal emulation applications.
Fn + Break	Sends a Break command.

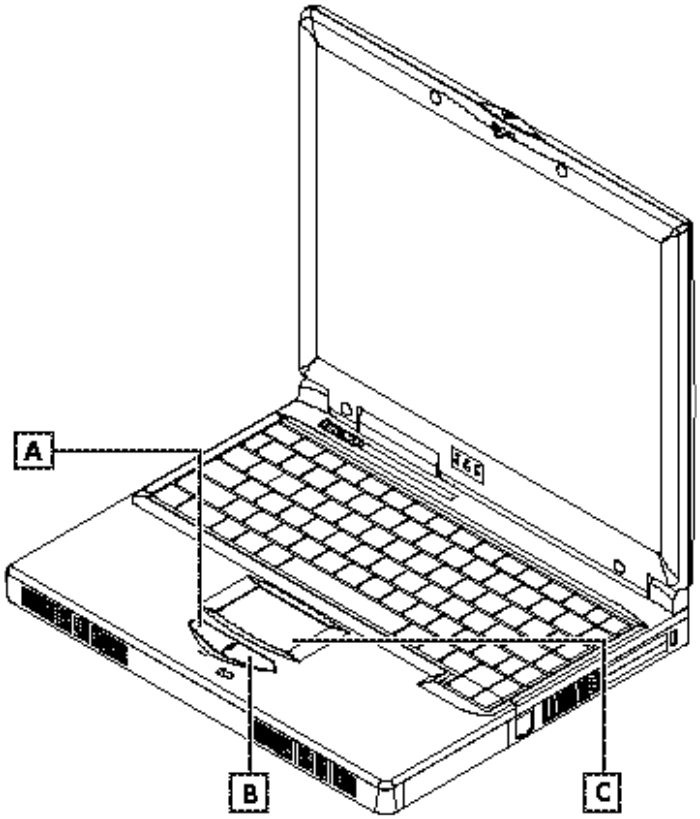
- Control keys – **Ctrl**, **Alt**, **Fn**, and **Shift** are used in conjunction with other keys to change their functions. To use Control keys, press and hold the Control key while pressing another key. For example, "Press **Ctrl C**" means to hold down the **Ctrl** key and type the letter **C**.
- Windows 95/98 keys – Use this key to activate the Start menu of Windows 95/98.
- Shortcut/Application key – Provides quick access to shortcut menus. (This key acts like a right mouse button.)
- Cursor Control keys – Cursor control keys move the cursor on the screen. The cursor indicates where the next typed text is inserted and can be blinking underline, block, or vertical bar depending on the application.
- Typewriter keys – Typewriter keys (also called *alphanumeric* keys) are used to enter text and characters. Keys with blue print on them behave differently when combined with control keys or the **Fn** key.
- Numeric Keypad – Pressing **Num Lock** on the keyboard activates the embedded numeric keypad numbers and functions printed in blue on top of the keys. When you press **Num Lock** again, the keys revert to their normal functions as typewriter keys.

Embedded Numeric Keypad



- VersaGlide – Located just below the keyboard panel is the VersaGlide pointing device. The left and right select buttons of the glidepad are found below the glidepad surface. The left select button is configured (by default) as the left button you normally click on the mouse; the right button is configured as the right mouse button.

Glidepad Pointing Device



A - Left click Button **B** - Right click Button **C** - Glidepad

To move the cursor, place your finger lightly on the sensor pad and move in the desired direction. If you reach the end of the pad, lift your finger and place it back down on the other side.

The Glidepad is compatible with the standard PS/2 mouse and can be activated using the normal DOS or Windows IBM or PS/2 mouse driver. You can also disable the glidepad in the BIOS program.

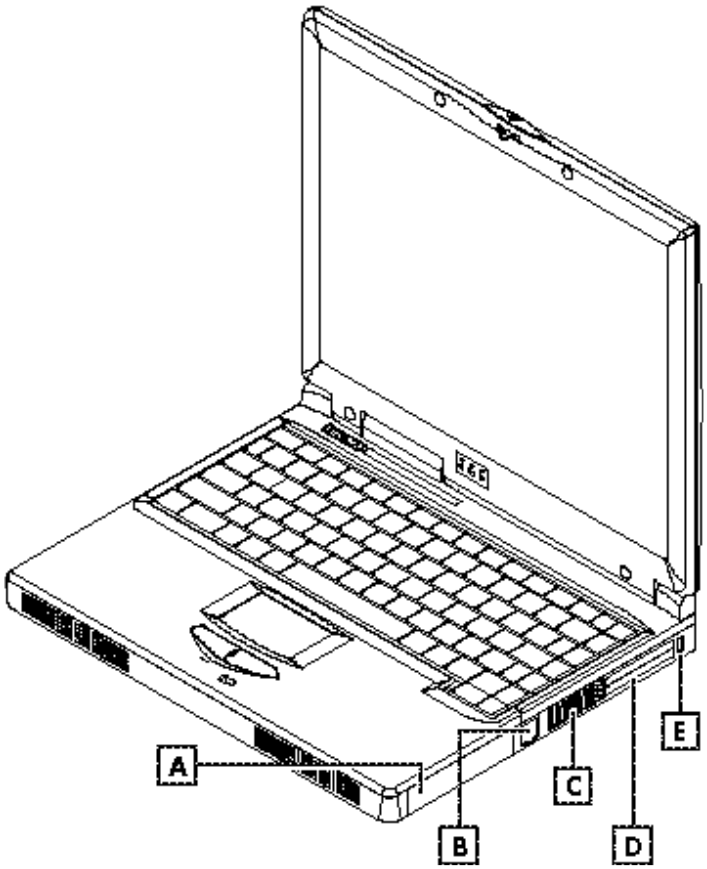
Note: You can execute a left button click function by simply tapping on the Glidepad surface once. See the *Versa Note User's Guide* or the file for the Glidepad driver for more information.

- Microphone – Located just below the VersaGlide buttons is a tiny hole where the integrated mono microphone is installed. This allows you to instantly record voice annotations (normally saved as WAV files) and later attach them to documents and presentation using the notebook's integrated audio system and application software. Since the notebook also supports full-duplex audio capabilities, you can talk to the microphone and at the same time listen to others talk when connected to a speaker phone modem, Internet live chat, or video conferencing.
- Built-in Stereo Speakers – At the front left and right sides of the notebook's base unit are two built-in mini stereo speakers. The speakers are controlled by the notebook's audio controller and activated by installing the audio driver. To adjust the volume of the speakers, use the volume control program under Windows 95/98 or use the thumb-wheel volume knob found on the left rear side of the notebook.

Internal Hard Disk Drive

Found just underneath the left side of the palm-rest panel is the internal hard disk drive (HDD). The internal HDD is an approved industry standard 2.5-inch (19mm or smaller) high-capacity IDE hard disk drive. The notebook supports Ultra-DMA and LBA mode up to 6.2GB capacity or higher. The internal HDD is controlled by the Primary Master IDE controller of the computer.

The Right Side of the Notebook



A - Battery Bay
B - Modem Port
C - CPU Fan Exhaust
D - PCMCIA Slot
E - Kensington Lock Latch

Battery Compartment

The battery compartment stores the Lithium-Ion (Li-Ion) primary battery pack for “off-the-cord” operation. The battery pack is instantly charged whenever you connect the AC adapter to the notebook. Always have the battery installed on the notebook so it is always charged and conditioned by the AC adapter.

> ***Note:*** For new battery packs or for battery packs that are not used frequently, fully discharge and recharge the battery before using.

Modem Port

The modem port provides a reserve jack for installing an internal modem with RJ-11 jack. The internal modem is a 56Kbps-fax/data/voice PCI modem and supports the latest V.90 standard. Only one module can be fitted in and is not user upgradable. The internal module is found just underneath the palm-rest panel. Remove the palm-rest panel and check if there is one inserted on the rightmost socket.

CPU Fan Exhaust

The exhaust vent allows the CPU fan inside to emit the heat out of the notebook and keep it within operating temperature.

PCMCIA Slot Compartment

The PCMCIA slot compartment houses two card slots that support two PCMCIA Type II cards at the same time or one Type III card. The notebook uses a CardBus PCMCIA controller that supports 5V and 3V 32-bit CardBus and 16-bit PC cards including cards with Zoomed Video (ZV) function like MPEG PC cards. Refer to Chapter 2 on how to configure and setup the PCMCIA controller of the notebook.

The PCMCIA slot compartment comes with sliding doors so you can directly insert the PC card. If you are using a Type III card, insert the Type III card into the lower slot.

To remove the inserted PC card, slightly push the button found on the left side of the PC slot to release the eject button. Then push it again to release the PC card. The upper left button releases the card on the top slot while the lower left button releases the card on the bottom slot. When the PC card has moved out a space out of the slot, hold the edges of the card and slowly slide it out.

⚠ CAUTION

Do not force the PC card into the PCMCIA slot as you may damage the connector pins in the slot.

For ZV-function PC cards, insert only into the upper slot. The bottom slot does not support these cards.

For full functionality of PC cards, always ask for the latest driver from your PCMCIA card dealer or download it from their Internet web site.

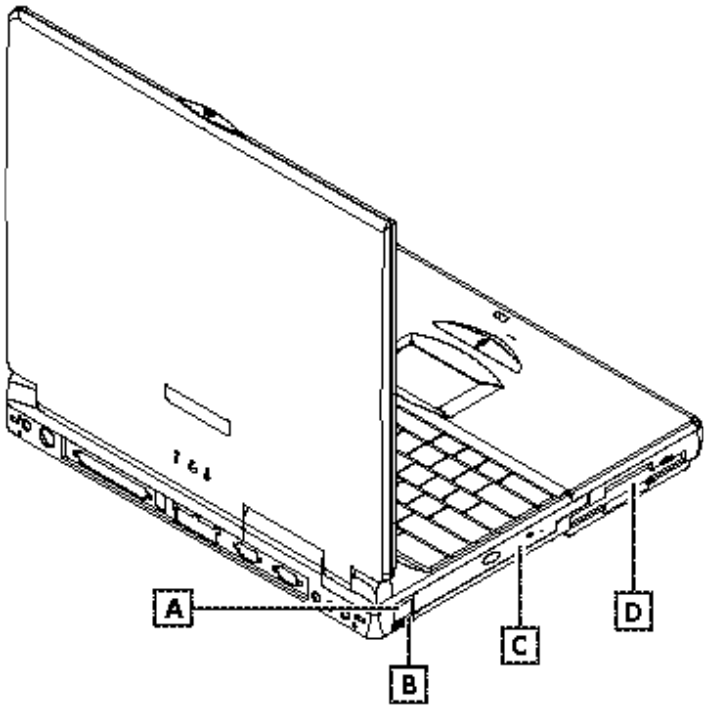
For network PC cards, first disable the device under the PC Card properties of Windows 95/98 Control Panel. Otherwise, this may cause system problems.

When using two PC cards at the same time, it is recommended to disable the COM2 port (IR) in the BIOS Setup to free up IRQ resource space.

Security Lock Latch

This latch allows you to attach a Kensington security lock or other compatible lock to secure the notebook from theft.

The Left Side of the Notebook



A - IrDA (IR) Port
B - Volume Control Knob
C - CD-ROM
D - Built-in diskette drive

IR Port (FIR/SIR)

The IR port (COM2 port) provides wireless file transfer between your notebook computer and an IR-equipped computer or device. You can also print to an IR-equipped printer without connecting the printer cable. The IR port supports two transfer rates: standard IR (SIR) mode at 115.2Kbps and Fast IR (FIR) mode at 4Mbps. See Chapter 2 to setup and configure the IR port driver under Windows 95.

⚠ CAUTION

When not using the IR port, disable the COM2 port in the BIOS program to free up IRQ resource space.

When using the IR port, make sure that there is nothing blocking the data transmission.

When the IR port is enabled, set the PCMCIA fax/modem to COM3 or COM4.

Thumb-Wheel Volume Knob Controll

The notebook includes a thumb-wheel volume knob to easily adjust the volume level of the built-in speakers or the external earphone/headphone set.

> ***Note:*** The volume knob does not work for the Line-Out jack. Adjust the volume from the external speakers or from the Windows program.

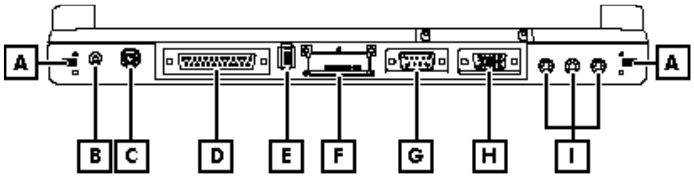
Built-in CD-ROM

The notebook comes with a standard 24X-speed ATAPI IDE CD-ROM drive that supports all major CD formats like CD-R, Photo CD, and Video CD. The drive uses a pop-out tray loading mechanism and supports bootable CDs when setting the BIOS program. See Chapter 2 for details on the CD-ROM driver.

Built-in Diskette Drive

The built-in diskette drive allows you to use any standard double-sided high-density (DSHD) diskette for copying and transferring data files. The notebook also comes with a 3-mode driver for 1.2MB diskettes normally used in Japan. You also have the option to disable the diskette drive or set a password option when accessing the drive in the BIOS program.

The Rear Side of the Notebook



A - PortBar Notches
B - AC Power Port
C - PS/2 Port
D - Printer Port
E - USB Port
F - Expansion Port
G - Serial Port
H - VGA Port
I - Audio Port

PortBar Notches

There are two PortBar notches located at both ends at the back of the system to secure the PortBar to the notebook.

AC Power Port

The AC Power Port connects the Versa Note to an AC power source using the AC adapter that comes with your system. Keep the system connected to AC power whenever possible to keep the battery pack and internal CMOS battery charged. The Battery Charge LED on the LCD panel activates whenever the battery is recharged. Connect the AC adapter to a properly grounded AC outlet and check if the LED on the AC adapter is activated.

PS/2 Port

Use the standard PS/2 port to connect an external PS/2-style mouse, PS/2-style keyboard, or PS/2 style Numeric Keypad. With an optional Y-adapter, cable connect any combination of these devices. For non-PS/2 keyboard, use a keyboard adapter that converts the DIN-type connector to a PS/2 connector.

WARNING

When connecting an external PS/2 mouse, first power off the computer before plugging in the PS/2 mouse. Do not disable the Internal glidepad in the BIOS program. Both the Glidepad and the external PS/2 mouse work simultaneously.

Printer Port (LPT1)

The printer port lets you connect a 25-pin parallel device such as printer, pocket LAN adapter, ZIP drive, or remote data transfer cable. Many operating systems and software applications refer to this port as LPT1. You can run the BIOS program to change the configuration of the parallel port to Bi-directional or ECP (Extended Capabilities Port) mode.

Note: The default setting for the parallel port on your Versa Note is set to Enhanced Capabilities Port (ECP). Some older parallel devices may not function with the ECP default setting. Run the BIOS program to adjust the settings.

USB (Universal Serial Bus) Port

The USB (Universal Serial Bus) Port is a new generation port for PC97 system hardware design and has the symbol . This 4-pin slim port allows you to simultaneously connect multiple USB devices through daisy-chaining or USB hub. The USB specification states it can support up to 127 USB devices running at up to 12Mbps. See Chapter 2 for details to setup and configure the USB port driver.

Note: When you resume the system from Suspend mode, the USB port may not initialize properly. If this occurs, unplug and replug the USB device again. This is a known bug released by Intel and Microsoft Windows 95.

Expansion Port

The Expansion port is used to connect to the PortBar. The PortBar is an accessory that duplicates the ports found on the back of your Versa Note Series system. Keep the PortBar in your office connected to peripherals while you take your Versa Note on the road.

Serial Port (COM 1)

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

⚠ WARNING

When connecting an external serial mouse, first power off the system before connecting the external mouse. Go into the BIOS program and disable the Internal glidepad item under the Advanced Setup menu to disable the Glidepad. However, for Windows 95, you can auto-detect the serial mouse hardware and run both Glidepad and serial mouse simultaneously.

Whenever using an external mouse in place of the built-in Glidepad, it is recommended to switch the mouse driver to the default standard Microsoft mouse driver.

VGA Port (CRT)

The VGA port lets you connect an external VGA (CRT) monitor to your notebook. You can also run the LCD and the external CRT monitor display simultaneously; or switch it to CRT only using the function hot-key (Fn+F3). When switched to CRT only, you can set the display resolution up to 1024x768 at 64K colours (16-bit high colour), or 800x600 at 16 million colours (24-bit true colour).

Audio Port

The audio port found at the back of the notebook provides the following input/output jacks.

- External Microphone Jack (MIC) – The microphone jack (1/8-inch mini-jack) connects an external microphone with 600-ohm dynamic in place of the built-in microphone of the notebook. The external microphone provides lesser recording noise compared to the built-in microphone of the notebook.

Note: Plugging in an external microphone disables the internal microphone.

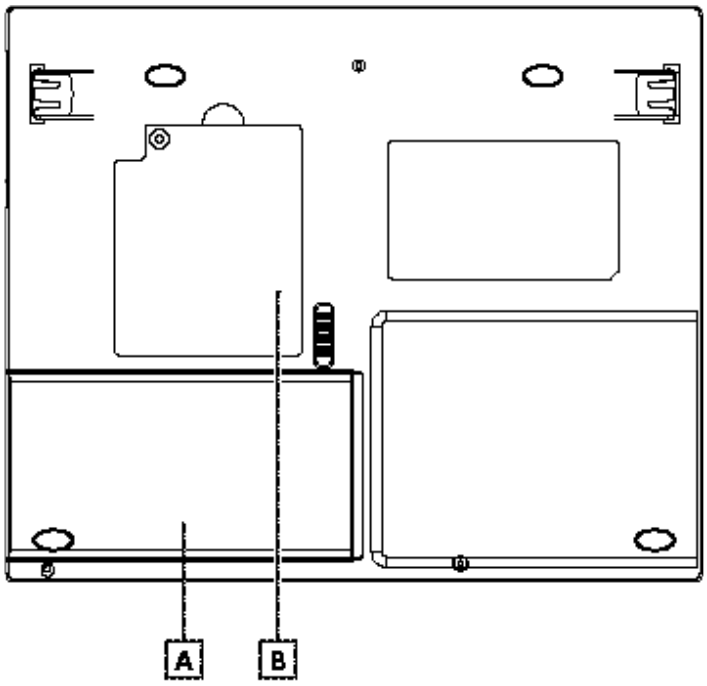
- Audio Line-in Jack – This jack (1/8-inch mini-jack) feeds in audio signals from compact disc player, radio cassette and tape recorder.
- Headphone Jack – This jack (1/8-inch mini-jack) connects an external headphone, earphone, or amplified speakers for personal listening.

⚠ WARNING

Turn the volume level down first before placing the earphone or headphone set to your ear. Then adjust the volume according to your listening level.

If you get noise feedback on the external speaker, try to lower the volume knob on the speaker and adjust the volume using the notebook's volume control buttons or the software.

The Under Side of the Notebook



A - Battery Bay **B** - Memory Compartment

Memory Compartment

The memory compartment is found on the underside of the notebook. Underneath the cover are two, 144-pin SO-DIMM memory slots for inserting and upgrading the system memory using 16MB, 32MB, and 64MB SO-DIMM. You can upgrade the memory up to 128MB. Your system contains one SO-DIM in the first memory slot. The other slot is empty and available for upgrading your memory. See Chapter 2 for details on upgrading system memory.

Battery Bay Latch

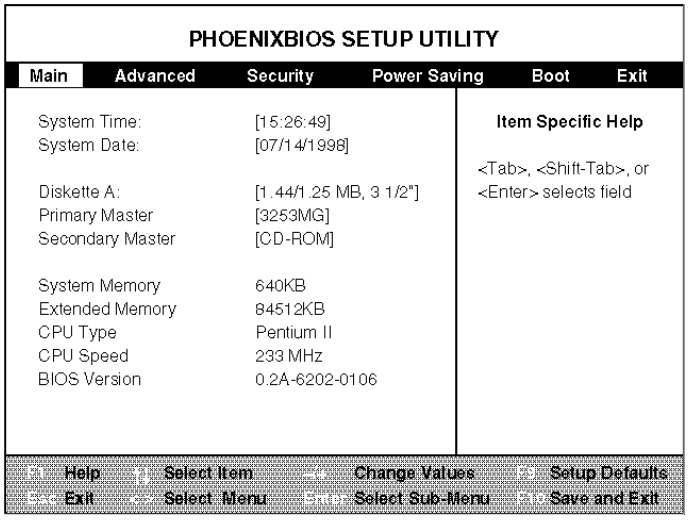
Also found on the underside of the notebook is the battery bay latch. To remove the battery pack, push this latch and at the same time pull the battery pack.

System BIOS Program

Use the Phoenix BIOS setup program to set system parameters such as system time and date, disk drive configuration, I/O device controls, boot drive sequence, and power management settings. The information is stored in the CMOS RAM chip and remains permanent unless you change it again. The notebook also uses EPROM Flash BIOS to update the system BIOS by simply overwriting it using the Phoenix Flash programming utility.

Whenever you turn on the computer, the NEC logo screen appears. Before boot-up, the system reads the BIOS settings and compares them to the equipment check conducted during the POST (Power-On Self-Test). If an error occurs, an error message appears on the screen, and prompts you to run the BIOS program. When you see the NEC logo screen, press the **F2** key to run the BIOS program. The BIOS program is organized into six menus which you can select using the and keys. To move from one option to another, use the up and down arrow keys.

BIOS Setup Menu



The BIOS program screen contains the following components.

- Menu Bar – At the top of the screen. Each of the six items has a separate menu screen.
- Parameters – On the left side of the screen. This area lists the parameters and their current settings.
- Item Specific Help – On the right side of the screen. This area describes each parameter and its available settings.
- Key Legend – On the bottom part of the screen. These lines display the keys available to move the cursor, select a particular function and so forth.

The following table lists the edit and navigate keys for the Setup menus.

BIOS Setup Control Keys

Key	What It Does
F1	Displays on-line help.
↑ ↓	Moves the cursor between parameters.
F5 / F6	Modifies the current parameter setting.
F9	Loads the default configuration.
Tab, Shift-Tab, or Enter	For some parameter settings, moves the cursor between the fields. Also moves the cursor to the next line or selection. For example, for system time, Tab moves the cursor from hour to minute to second.
Esc	Exits the current menu and returns to the main menu or goes directly to the Exit menu.
	Changes between displayed menus.
F10	Save changes and exit.

Below is a list of parameters, their factory default settings, and alternate settings. A description of each setting follows the table. To reset all parameters to the default settings, select F9 or Load Setup Defaults from the Exit Menu and press **Y**.

BIOS Setup Parameters, Default and Alternate Settings

Parameter	Default Setting	Alternate Setting(s)
Main Menu		
Language	English (US)	Japanese (JP)
System Time	hh:mm:ss	
System Date	mm/dd/yyyy	
Diskette Drive A	1.44 MB, 3.5"	Disabled
Primary Master	Auto	User Defined
Secondary Master	Auto	
Boot Display Device	Both	Both, LCD, CRT
System Memory	640 KB	(Auto Detect)
Advanced Menu		
PS/2 Mouse	Enabled	Enabled, Disabled
Installed O/S	Win98/WinNT5.0	Win95, Win98/WinNT5.0, Other
Silent Boot	Enabled	Enabled, Disabled, Black
Local Bus IDE adapter	Both	Both, Primary, Secondary, Disabled
I/O Device Configuration		
Serial port	Auto	Enabled, Disabled, Auto
Infrared port	Auto	Enabled, Disabled, Auto
Parallel port	Auto	Enabled, Disabled, Auto
Mode	ECP	Output only, Bi-directional, EPP
Floppy disk controller	Enabled	Enabled, Disabled, Auto

BIOS Setup Parameters, Default and Alternate Settings

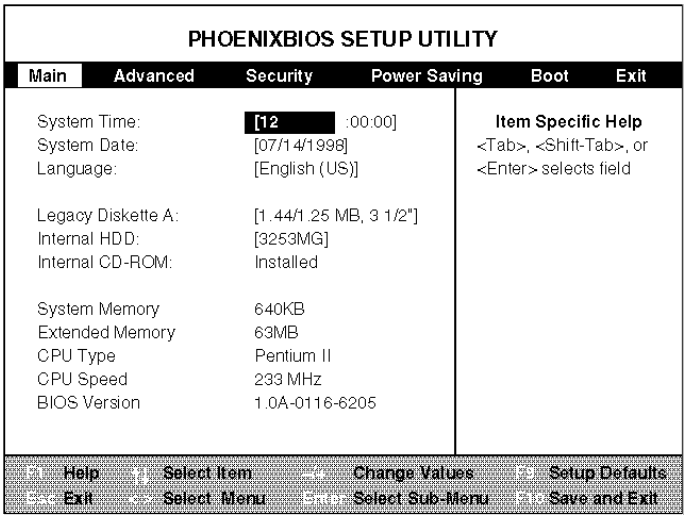
Security Menu		
Set User Password	None	User Defined
Set Supervisor Password	None	User Defined
Password on boot	Disabled	Enabled, Disabled
Password on Resume	Disabled	Enabled, Disabled
Fixed disk boot sector	Normal	Normal, Write Protect
Diskette access	Supervisor	User, Supervisor
Power Saving Menu		
Power Switch	On/Off	Suspend/Resume, On/Off
Power Management Function	Battery only	Always on, Battery only
Power Savings	Maximum Power Saving	Disabled, Customized, Max Performance, Max Power Saving
Standby Timeout	1 min	Off, 1/2/4/6/8/12/16 min
Suspend Timeout	5 min	Off, 5/10/15/20/30/40/60 min
Suspend Mode	Suspend	Suspend, Save To Disk
Audio Save To Disk	Off	Off, After 1 Hour
Hard Disk Timeout	Disabled	Disabled, 1/2/4/6/8/10/15 min
Video Timeout	Disabled	Disabled, 1/2/4/6/8/10/15 min
Resume On Modem Ring	Off	On, Off
Resume On Time	Off	On, Off
Resume Time	[00:00:00]	User Defined
Boot Menu		
Bootup Sequence is described in numerical order.	ATAPI CD-ROM Drive	ATAPI CD-ROM Drive, Diskette Drive, Hard Drive,
Exit Menu		
Exit Saving Changes		User Selectable when exiting
Exit Discarding Changes		same as above
Load Setup Defaults		same as above
Discard Changes		same as above
Save Changes		same as above
Battery Refresh		

Note: Some information may not be available or different from other date code versions of the notebook BIOS. Always check for the latest BIOS update from the support web site (to be reached via http://www.pbnec.nl).

Using the Main Menu

The BIOS Setup Main menu contains the settings for system time and date, and disk drives as well as system memory information.

BIOS Setup Main Menu

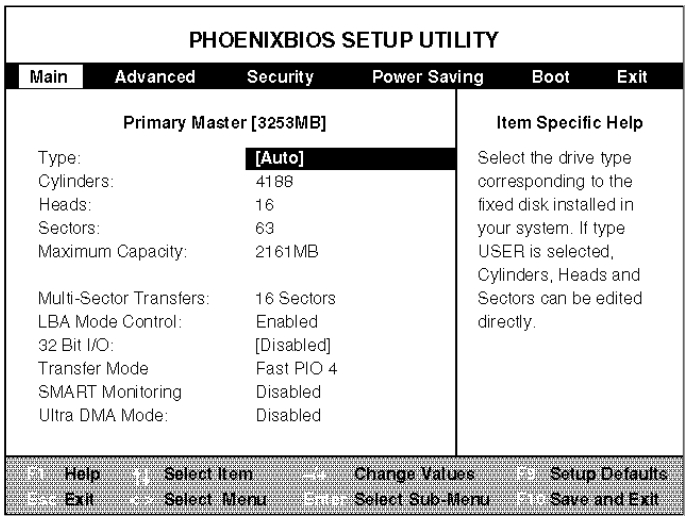


BIOS Setup Parameters, Default and Alternate Settings

Parameter	Setting	Instructions
Language	[English (US)] / [Japanese (JP)]	Select the display language for the BIOS.
System Time	[12:00:00]	Tab, Shift-Tab, or Enter to select a field. Sets the time. Enter the current hour, minute, and second in hr/min/sec, 24-hour format.
System Date	[07/01/1998]	Sets your Versa Note calendar in month, day, and year. The calendar clock is year 2000-compliant. These settings remain in memory even after you turn off the system. To set the date, use the Tab, Shift-Tab, or Enter keys to move from field to field. Use the F5/F6 keys to change numbers within each field.
Diskette A	[Disabled] / [1.44/1.25 MB, 3½"]	Allows you to enable or disable the built-in 1.44/1.25MB 3½ " diskette. Note that 1.25 MB is the 1024 byte/sector Japanese media format.
Internal HDD	[3253MB]	Displays various parameters for the hard disk drive. If type [Auto] is selected, the system automatically sets these parameters. If type [User] is selected, Cylinders, Heads and Sectors can be edited.
Internal CD-ROM	[Installed]	This field is for information only as the BIOS automatically detects the CD-ROM.
System Memory	640 KB	This field is for information only as the BIOS automatically detects system values.

Parameter	Setting	Instructions
Extended Memory	63 MB	(BIOS auto detect, for information only)
CPU Type	Pentium II	(BIOS auto detect, for information only)
CPU Speed	233 MHz	(BIOS auto detect, for information only)
BIOS Version	1.0A-0116-6205	(BIOS auto detect, for information only)

Internal HDD Sub-Menu



Primary/Secondary Master Sub-Menu Options

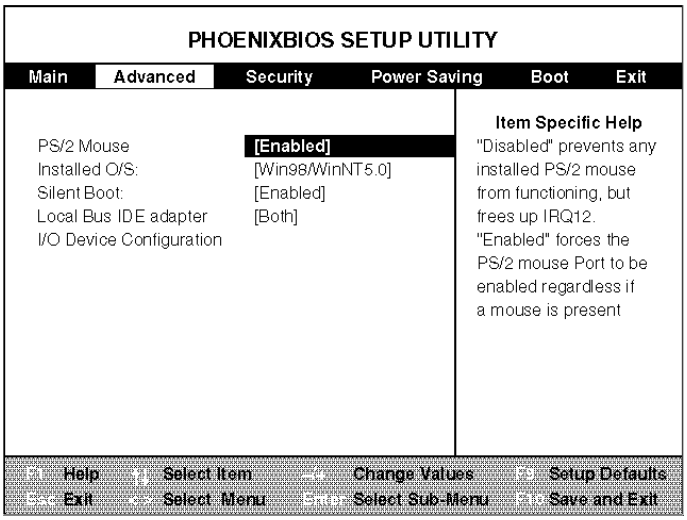
Parameter	Setting	Instructions
Type	[None] / [CD-ROM] / [User] / [Auto]	Select the drive type corresponding to the fixed disk installed in your system. When USER is indicated, you can edit the Cylinders, Heads & Sectors fields.
Cylinders		
Heads		
Sectors		
Maximum Capacity		
Multi-Sector Transfers	[Disabled] / [2 Sectors] / [4 Sectors] / [8 Sectors] / [16 Sectors]	Determine the number of sectors per block for multiple sector transfers.
LBA Mode Control	[Disabled] / [Enabled]	Enabling LBA causes Logical Block Addressing to be used in place of Cylinders, Heads & Sectors
32 Bit I/O	[Disabled] / [Enabled]	This setting enables or disables 32 bit IDE data transfers.

Parameter	Setting	Instructions
Transfer Mode	[Standard] / [Fast PIO 1] / [Fast PIO 2] / [Fast PIO 3] / [Fast PIO 4] / [FPIO3 / DMA1] / [FPIO4 / DMA2]	Select the method for moving data to/from the drive. Autotype the drive to select the optimum transfer mode
SMART Monitoring	[Disabled] / [Enabled]	Self-Monitoring, Analysis and Reporting Technology (SMART) – a new technology that provides near-term failure prediction for disk drives.
Ultra DMA Mode	[Disabled] / [Enabled]	Select the method for moving data to/from the drive. Autotype the drive to select the optimum transfer mode.

Using the Advanced Menu

The Advanced menu allows you to configure the O/S and I/O device settings.

BIOS Setup Advanced Menu

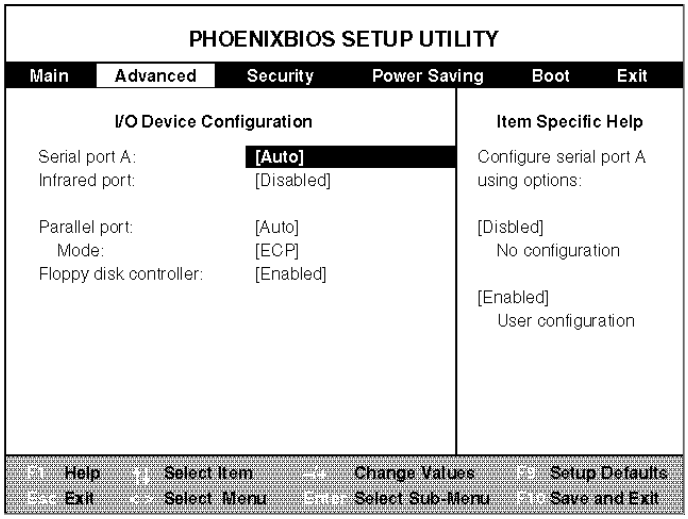


BIOS Setup Advanced Menu Options

Parameter	Setting	Instructions
PS/2 Mouse	[Enabled] / [Disabled]	'Enabled' forces the PS/2 port to be enabled even if a mouse is present. 'Disabled' prevents any installed PS/2 mouse from functioning and frees up IRQ12.
Installed O/S	[Other] / [Win95] / [Win98/WinNT5.0]	Select the operating system installed on your system which you will use most often. Note: An incorrect setting can cause some operating systems to display unexpected behaviour.

Parameter	Setting	Instructions
I/O Device Configuration	Submenu	Configures the input/output devices such as serial port, parallel port, IrDA and diskette controller.
Silent Boot		Select boot screen during POST.
Local Bus IDE adapter		Enable the integrator local bus IDE adapter.

I/O Device Configuration Sub-Menu



BIOS Setup Advanced Menu Options

Parameter	Setting	Instructions
Serial port A	[Disabled] / [Enabled] / [Auto]	Configure serial port A using options: Disabled - No configuration, Enabled - User configuration, Auto - BIOS or O/S configuration.
Base I/O address	[3F8 IRQ4] / [2F8 IRQ3] / [3E8 IRQ4] / [2E8 IRQ3]	Set the base I/O address for serial port A.
Infrared port	[Disabled] / [Enabled] / [Auto]	Configure serial port B using options: Disabled - No configuration, Enabled - User configuration, Auto - BIOS or O/S configuration.
Mode	[IrDA] / [FIR]	Set the mode for serial port B.
Base I/O address	[3F8 IRQ4] / [2F8 IRQ3] / [3E8 IRQ4] / [2E8 IRQ3]	Set the base I/O address for serial port B.
Interrupt	[IRQ3] / [IRQ4]	Set the interrupt for serial port B.
DMA channel	[DMA 0] / [DMA 1]	Set the DMA channel for the FIR of serial port B.
Parallel port	[Disabled] / [Enabled] / [Auto]	Configure parallel port using options: Disabled - No configuration, Enabled - User configuration,

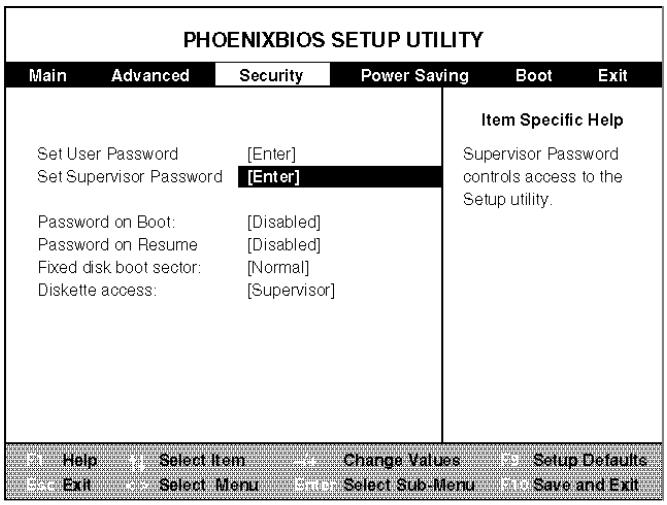
Parameter	Setting	Instructions
		Auto - BIOS or O/S configuration.
Mode	[Output only] / [Bi-directional] / [ECP]	Set the mode for the parallel port using options: Output Only, Bi-directional, ECP.
Base I/O address	[378] / [278] / [3BC]	Select the base I/O address for the parallel port.
Floppy disk controller	[Disabled] / [Enabled]	Configure the floppy disk controller using options: Disabled - No configuration, Enabled - User configuration

Note: If you disable a device in Setup, you cannot enable or assign it using the Windows (95 or 98) Device Manager. The device is not listed in the Windows device list. To control the device using the Windows device manager, select any setting other than “Disable” in Setup.

Using the Security Menu

The Security menu allows you to set the system password as well as disk-protection security features.

BIOS Setup Security Menu



BIOS Setup Security Menu Options

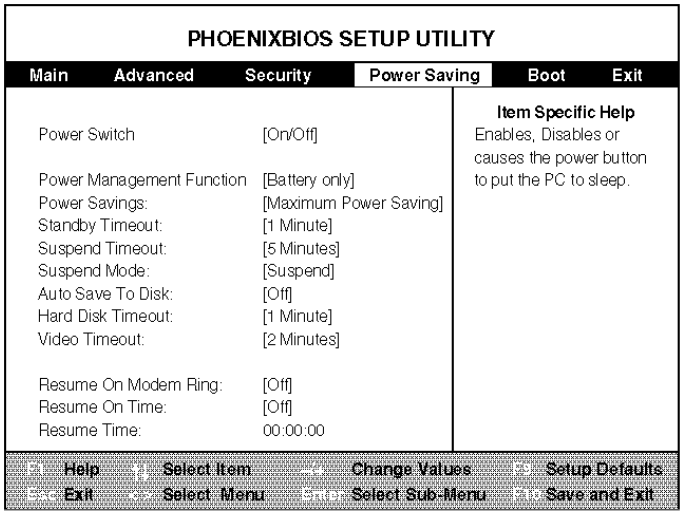
Parameter	Setting	Instructions
Set User Password	Press Enter	User password controls access to the system.
		Specifies whether the system prompts you to enter a password to access the system. This function is enabled once a Supervisor password is set. Enter a new password with up to eight alphanumeric characters. Then enter the same password again for confirmation.
Set Supervisor Password	Press Enter	Supervisor password controls access to the setup utility.
		Specifies whether the system prompts you to enter a password when entering Setup.
Password on boot	[Disabled] / [Enabled]	Enables password check when booting.
Password on Resume	[Disabled] / [Enabled]	Enables password check during resume from Suspend mode.
Fixed disk boot sector	[Normal] / [Write protect]	[Write Protect] enables write protect boot sector on hard disk to guard against viruses. [Normal] disables this write protect function.
Diskette access	[User] / [Supervisor]	Control access to diskette drives.

Note: It is important to remember your password. If the password is forgotten, the only way to delete the password is to reset the CMOS battery. You do this by removing the CMOS battery and all power supply including AC adapter and battery pack.

Using the Power Menu

The Power Setup menu lets you balance high performance and energy conservation.

BIOS Setup Power Menu



BIOS Setup Power Menu Options

Parameter	Setting	Instructions
Power Switch	[On/Off] / [Suspend/Resume]	Enables, Disables or causes the Power button to put the Versa Note to sleep
Power Management Function	[Always On] / [Battery only]	Select Power Management mode.
Power Savings	[Disabled] / [Customized] / [Maximum Power Savings] / [Maximum Performance]	Select Power Management Mode. Choosing modes changes system power management settings. Maximum Power Savings conserves the greatest amount of system power while Maximum Performance conserves power but allows greatest system performance. To alter these settings, choose Customize. To turn off power management, choose Disable.
Standby Timeout	[Off] / [1 / 2 / 4 / 6 / 8 / 12 / 16 Minutes]	Amount of time the system needs to be in Idle mode before entering Standby Mode. Standby mode powers down various devices in the system, until you start using the computer again.
Suspend Timeout	[Off] / [5 / 10 / 15 / 20 / 30 / 40 / 60 Minutes]	Amount of time the system needs to be in Standby before entering Suspend Mode.

Parameter	Setting	Instructions
Suspend Mode	[Suspend] / [Save To Disk]	Select the type of Suspend Mode. If you choose Save To Disk the system saves its state to disk and power off. If you choose Suspend the system saves its state but remains in a low power mode. If you choose Suspend then you also have the option to choose Auto Save To Disk.
Auto Save To Disk	[Off] / [After 1 Hour]	Turn on or off the Auto Save To Disk feature. When Auto Save To Disk is turned on, the system saves its state to disk and then powers off after being in Suspend mode for a period of time.
Hard Disk Timeout	[Disabled] / [1 / 2 / 4 / 6 / 8 / 10 / 15 minutes]	Amount of time the hard disk needs to be inactive before it is turned off.
Video Timeout	[Disabled] / [1 / 2 / 4 / 6 / 8 / 10 / 15 minutes]	Amount of time the user input devices need to be inactive before the screen is turned off.
Resume On Modem Ring	[Off] / [On]	Enabled wakes the system up when an incoming call is detected on your modem. If 'Suspend Mode:' is enabled, Resume on Ring will not work when the Suspend Mode is set to "SAVE TO DISK".
Resume On Time	[Off] / [On]	Enabled wakes the system up at a specific time. If 'Suspend Mode:' is enabled, Resume on Time will not work when the Suspend Mode is set to "SAVE TO DISK".
Resume Time	[Hour:Minute:Second]	Specify the time when system is to wake up. Tab, Shift-Tab, or Enter selects field.

- Power Switch – Select the behaviour of the power button.
- Power Management Function – Battery only enables the power saving management function when the system operates in battery power only. [Always] enables the power saving management function when the system operations either in AC power or battery.
- Power Savings – Lets you choose one of four levels of power management:

  — Maximum Power Savings conserves the greatest amount of system power.

  — Maximum Performance conserves power but allows the greatest system performance.

  — Disabled turns off the power management function.

  — Customized allows you to change related settings so that you can define your own power management configuration. You can set the following parameters:

- Standby Timeout – Allows you to select the standby timeout period. The Standby Timeout sets the time the system needs to be idle before entering the Standby mode. Standby mode powers down various devices in the system until you start using the system again.
- Suspend Timeout – Allows you to select the suspend timeout period. The Suspend Timeout sets the time the system needs to be idle before entering the Suspend mode. Suspend mode powers off various devices in the system until you resume the system again.
- Suspend mode – If you choose [Suspend] the system saves its state but remain in a low power mode. If you choose [Save To Disk], the system saves the current state on the disk and power off.
- Auto Save To Disk When Auto Save To Disk is turned on, the system saves its state to disk and then powers off after being in Suspend mode for a period of time.
- Hard Disk Timeout – Allows you to select the amount of time the hard disk needs to be inactive before it shuts down.
- Video Timeout – Allows you to select the amount of time the user input devices needs to be inactive before it shuts down.
- Resume On Modem Ring – [On] wakes the system up when an incoming call is detected on your modem. If Suspend Mode is set to "Save To Disk" the Resume On Modem Ring does not work.
- Resume On Time – [On] wakes the system up at a specific time. If Suspend Mode is set to Save To Disk, the Resume On Time does not work.
- Resume Time – Specifies the time when system is to wake up.

CAUTION

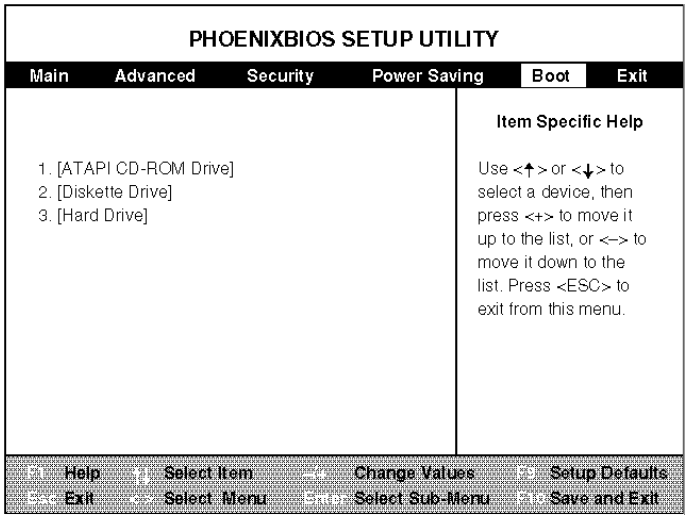
Some operating systems, like Windows 95 or 98, have their own power management software that overrides the CMOS settings. In this case, use the Setup utility to set your desired power management settings.

Standby and Suspend mode are only active on Windows 95 or Windows 98 if the CD-ROM auto-insertion option and USB driver is disabled under Control Panel/System/Device Manager.

Using the Boot Menu

The Boot menu lets you decide the boot order.

BIOS Setup Boot Menu



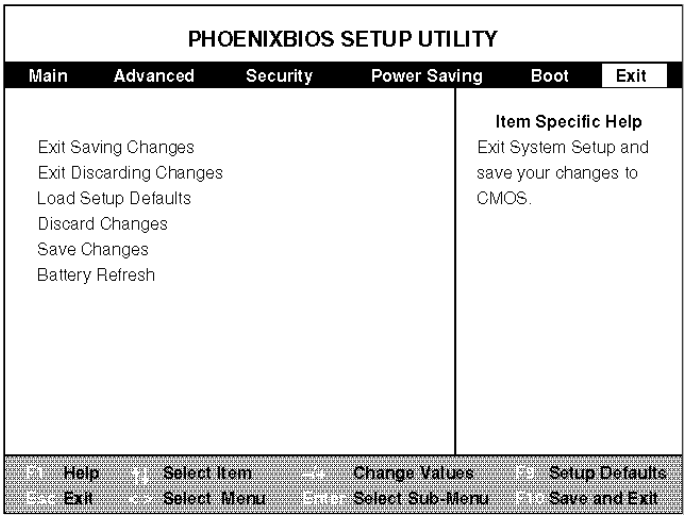
- Diskette Drive – Put this option first if you want to boot from a bootable diskette (Drive A:\).
- Hard Drive – Put this option first if you want to boot from a bootable hard disk drive (Drive C:\)
- ATAPI CD-ROM Drive – Put this first if you want to boot from a bootable CD-ROM like Windows NT (Drive D:\).

How to Exit the Setup Program

There are three ways to exit the Setup program.

- Exit Saving Changes – Exits System Setup and saves your changes to CMOS.
- Exit Discard Changes – Exits Setup utility without saving setup data to CMOS.
- Load Setup Defaults – Loads the default settings for all items in Setup.
- Discard Changes – Reverts to previously selected settings and exits Setup.
- Save Changes – Saves setup data to CMOS.
- Battery Refresh – Charges the battery.

BIOS Setup Exit Menu



Notebook Accessories and System Options

It is also important to understand the accessories and options for your notebook to fully utilizing its capabilities. This section describes briefly the accessories and options.

AC Adapter and Power Cord

The AC adapter supplies external power to your computer and at the same time charges the internal battery pack. The AC adapter has an auto-switching design that can connect to any 100VAC – 240VAC power outlet. Connect the adapter to the AC wall outlet using the power cord. The LED on the AC adapter indicates that DC power is available.

Battery Pack

Besides the AC adapter, your computer can also be powered through the removable battery pack. The battery pack uses rechargeable Lithium-Ion (Li-Ion) battery cells that can run for more than 2 hours when fully charged and power management enabled. Recharging the battery takes around 3 hours when the computer is off. The battery pack also includes a four-LED fuel gauge or meter that provides a rough estimate of the battery capacity:

Battery LED Status	Battery Capacity
One LED blinking	0%
One LED on	1% - 25%
Two LEDs on	26% - 50%
Three LEDs on	51% - 75%
Four LEDs on	76% - 100%

You should always leave the battery inside your computer even when using the AC adapter as it also act as a back-up power supply in case power from the AC adapter is cut off. It is also very important to have the battery pack always charged to prevent battery cell degradation. If the AC adapter is not connected or not available, and the notebook is not going to be used for some period of time, remove the battery pack from the notebook to prevent any leakage in the current.

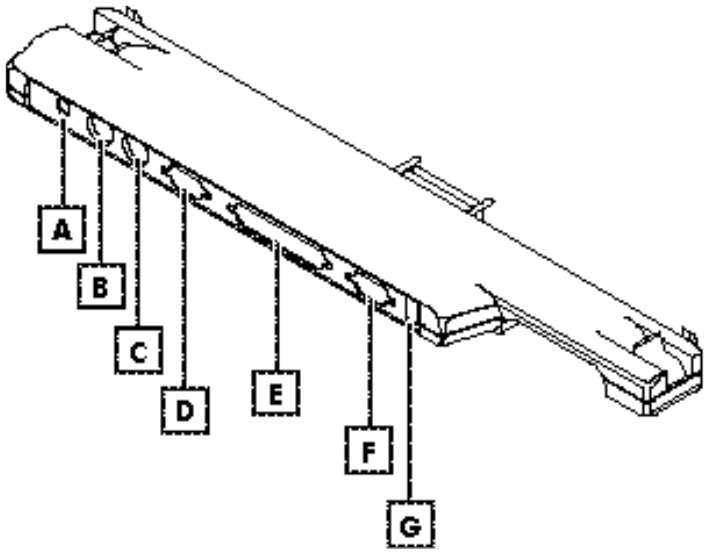
Internal Modem Module Card

The notebook allows you to insert a proprietary internal 56Kbps modem card underneath the palm-rest panel. The internal modem card supports voice, fax, and data communication. It also comes with a communication software program for fax and modem including a speaker phone for teleconference calls. You can connect the telephone line to the RJ-11 jack found on the right side of the notebook.

PortBar

The PortBar™ is an accessory that duplicates the ports found on the back of your Versa Note Series system. Keep the PortBar in your office connected to peripherals while you take your Versa Note on the road.

PortBar



A - AC Adapter Input
B - PS/2 Mouse Port
C - PS/2 Keyboard Port
D - Serial (COM1) Port
E - Parallel (LPT1) Port
F – VGA (CRT) Port
G – USB Port

2

Installation and Upgrade

- Overview
- Notebook Drivers and Utilities
- System Upgrades

Overview

This chapter provides guidelines for installing device drivers for the built-in features of the Versa Note Series. Most of the driver installation procedures mentioned here are only for Windows 95 and Windows 98. This chapter also includes procedures for upgrading major internal system components like CPU, memory, hard disk, LCD and feature card modules.

Notebook Drivers and Utilities

The notebook requires several device drivers that you need to install and setup before you can fully operate the notebook. These are:

- Phoenix PHDisk Suspend-to-Disk Utility – DOS
- TEAC CD-ROM Driver – DOS
- NeoMagic 2160 VGA Driver – Windows 95/98 and NT 4.0
- ESS 1968 Maestro-2 Audio Driver – Windows 95/98 and NT 4.0
- TI 1221 PCMCIA Driver – Windows 95 and NT 4.0
- SMC 37N769 Fast IR (FIR) Driver – Windows 95 only
- ALPs Touchpad Driver – Windows 95/98 and NT 4.0
- Intel 430TX PCI Bridge Driver – Windows 95 only (for Tillamook)
- Intel 440BX PCI Bridge Driver – Windows 95 only (for Pentium-II)

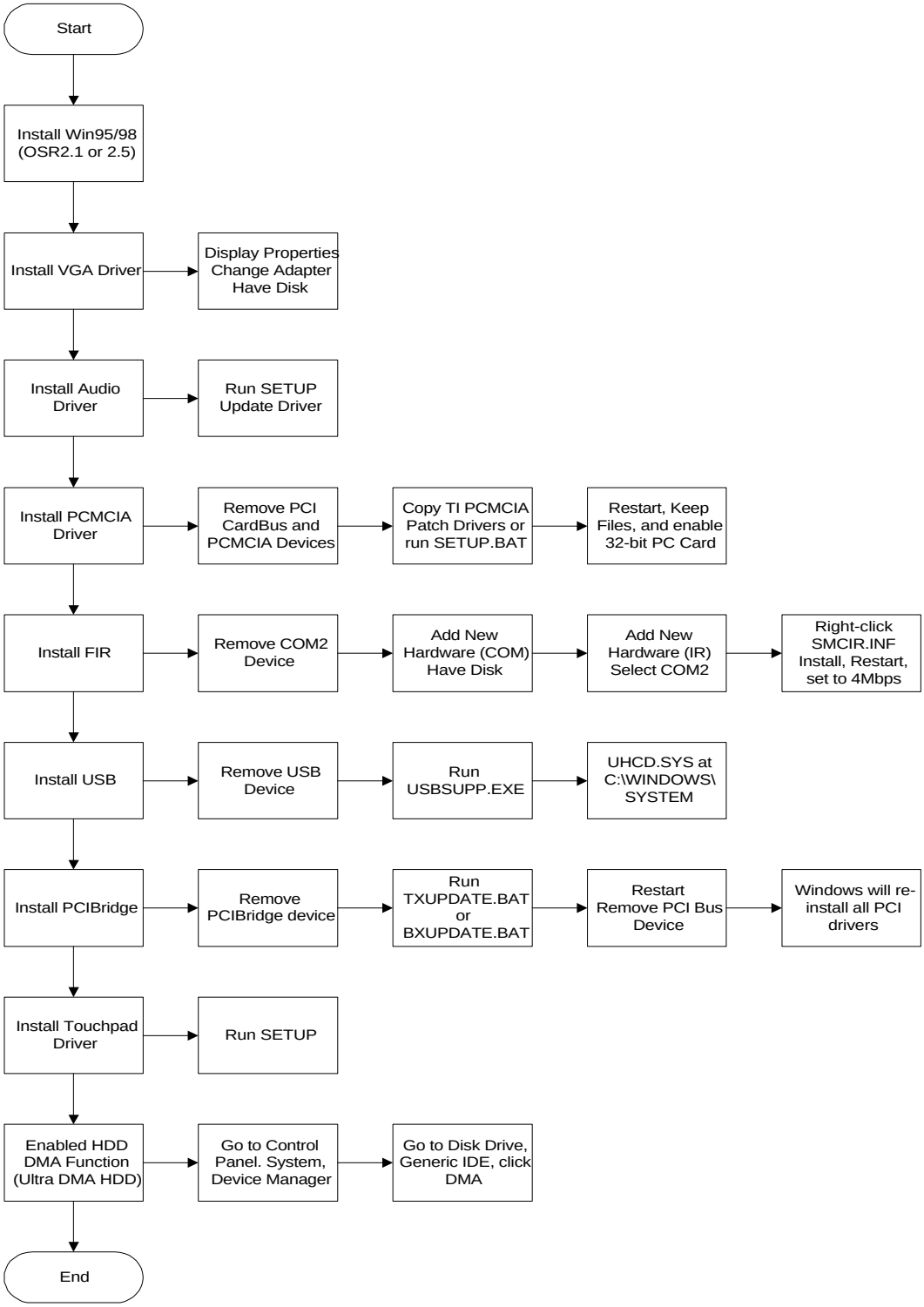
The notebook also comes with other (optional) devices that requires driver installation:

- Internal 56K Modem Module – Windows 95/98
- Internal Ethernet 10BaseT Module – Windows 95/98
- Margi DVD-to-Go MPEG-2 PCMCIA Card – Windows 95/98

> ***Note:*** For new features like CardBus, USB, and Fast IR, install at least Microsoft Windows 95 OSR2 (OEM Service Release 2 - B version). To determine if you have version B, click on Start, Settings, and Control Panel. Double click on System. On the General folder tab, you should find version 4.00.950 B listed under the Microsoft Windows 95.
>
> Windows 98 provides the easiest and least required driver installation.
>
> Go to the support web site for the latest driver updates.

Notebook Drivers Installation Flowchart

Below is a flowchart that details how to install drivers on a Windows 95 system.



Note: For Windows 98, only install the VGA, Audio, and glidepad drivers.

Running the PHDisk STD Utility

The PHDisk utility allows you to create a suspend-to-disk (STD) partition or file that saves open files when you activate STD mode and power off the computer. To use the STD feature, first run the PHDisk utility. There are two options when executing this utility.

- PHDisk / Create / Partition – You can run Suspend-to-Disk and save your work into an allocated fixed disk partition. Do this before partitioning and formatting your hard disk. This option is more secure since the files are saved in a separate partition and there is no risk of deletion. However, you need to allocate enough disk partition for future memory upgrade. The STD partition should always be larger than the system memory RAM.
- PHDisk / Create / File – You can run Suspend-to-Disk and save your work into a STD file. You do not need to allocate an extra disk partition for this option. However, option is less secure since there is a risk of deleting the hidden STD file.

Running the PHDisk /Create /Partition Option

Before you run this option, carefully consider the disk size needed for the STD partition. The STD partition should be larger than the installed system memory RAM. If you plan to install more memory in the future, allocate more disk space. Run PHDisk under DOS and leave around 5% of disk space or more for the non-DOS partition. This is used later by the PHDisk for the STD partition.

If you have run PHDisk before, delete the original partition on the hard disk.

Load the Versa Application and Drivers CD and look for the PHDisk program file. Run **PHDISK /Create /Partition** or **PHDISK /C /P**.

The PHDisk utility program automatically assigns a disk size in reference to the installed system RAM to be allocated for the STD partition. After PHDisk has completed the STD partition, you are prompted to reboot the system.

Running the PHDisk /Create /File

Creating a STD file is simple since you do not need to allocate an extra disk partition. Load the notebook driver CD and look for the PHDisk program file. Run **PHDisk /Create /File** or **PHDisk /C /F**.

PHDisk creates the **SAVE2DSK.BIN** file on drive C. The size of this file depends on the installed RAM memory of your computer. This file is also hidden and has read-only attributes. Do not delete this file.

Note: During power on or restart, the system detects whether the STD partition or file is present. If not, a red coloured dialog box informs you that “Save to Disk Partition Not Present” and “Save to Disk Feature Disabled”.

Whenever you upgrade the memory, delete the existing STD partition or file and create a new one according to the new memory size. Run PHDisk /Delete /Partition or PHDisk /Delete /File to delete existing STD partition or file.

Use PHDisk v3.4.1 or later.

Installing the CD-ROM Driver

This section provides installation instruction for the CD-ROM device driver.

CAUTION

For DOS installation, you must have a pre-installed MS-DOS v6.0 or higher operating system on your hard disk with the “MSCDEX.EXE“ (Microsoft CD Extension) driver file.

Installing the CD-ROM driver using DOS

- Power on the system and insert the Toshiba CD-ROM driver diskette into the diskette drive.
- Change to the drive A directory and run the CD-ROM installation program by typing the command **A:\>INSTALL**.
- The INSTALL program automatically copies the CD-ROM driver to your hard disk and modifies the AUTOEXEC.BAT and CONFIG.SYS batch files so the CD-ROM drive is activated every time you boot the system.
- Remove the diskette and restart the computer after installation is complete. Your computer then detects the CD-ROM drive and displays the designated drive letter. The CD-ROM drive should be assigned to drive D. If you have two disk partitions, the CD-ROM drive is assigned to drive E.

CAUTION

You may also install Windows 95/98 by first installing the CD-ROM driver under a pre-formatted hard disk with the DOS operating system. Run “**SETUP.EXE**” from drive D to install Windows 95/98.

It is important that you use the CD-ROM driver provided with the notebook. Using other CD-ROM drivers may not allow Windows 95/98 to shutdown properly.

Installing Windows NT from CD-ROM

If you are installing Windows NT 4.0, set the boot sequence under the Boot menu of the BIOS program to ATAPI CD-ROM Drive. Insert the Windows NT CD-ROM into the drive and boot directly from the CD-ROM for immediate installation.

Installing the VGA Device Driver

Follow this procedure to install the NeoMagic MagicGraph 128XD (2160) VGA driver for Windows 95 OSR2 or Windows 98.

1. Load the notebook driver CD containing the VGA driver for Windows 95 into the CD-ROM drive.
2. Click on Start, Settings, and then click on Control Panel.
3. Double click on Display. Then click on the Settings tab.
4. Click on Advanced Properties and click on Change on the Adapter tab.
5. Click Have Disk and browse to the sub-directory where the NeoMagic NM2160 VGA driver is located.
6. The NeoMagic Magic Graph 128XD device driver is listed. Click OK to install from diskette.
7. After driver installation is complete, click the Monitor folder tab, then click Change.
8. Select Laptop Display Panel (800x600) if you have a SVGA LCD or Laptop Display Panel (1024x800) if you have an XGA LCD. Then, click Close.
9. From the dialog box, select your own preference by adjusting the resolution (Desktop area) and the colour (Colour palette). The ideal configuration is an 800x600 desktop area for SVGA LCD 1024x768 for XGA LCD with High Colour (16-bit) colour palette. Click Apply and restart your computer to activate new VGA settings.
10. For more colours and resolution, connect an external high-resolution monitor and switch the display to the CRT. Click on the NeoMagic folder tab on how to switch display mode and refresh rate. You can also use the Fn and F3 hotkey function to switch display between the LCD, external monitor, or both. With the CRT display, you can select an 800x600 desktop area with True Colour (24-bit) colour palette or a 1024x768 desktop with High Colour (16-bit) palette.

> ***Note:*** This procedure is similar to installing the VGA driver under Windows NT 4.0.
>
> Windows NT 4.0 VGA driver is different from the Windows 95/98 VGA driver.

Installing the Audio Device Driver

Your notebook computer uses the ESS 1968 Maestro-2 AudioDrive controller which allows you to work with the sound features of your computer.

Installing Audio Driver for Windows 95 and Windows 98

For installing the Audio driver under Windows 95 or Windows 98, follow these steps:

1. Boot Windows 95 from your hard disk and insert the notebook driver CD containing the Audio driver for Windows 95.
2. Click the Start button, then point to Settings, and click Control Panel.
3. Double click on the System icon and click on the Device Manager folder tab.
4. Under the Other Devices line, is the PCI Multimedia Audio Device. Click the device line and click Remove. Click OK to confirm.
5. Click Start, Run, and browse to the sub-directory where the SETUP.EXE program of the ESS 1968 audio driver is located. Press Enter and the ESS Maestro-2 Setup program starts. Click Next to continue installation.
6. Select the option “Upgrade Drivers” and click Next. The system prompts you to restart your computer. Select Yes and click on Finish.
7. After restarting the computer, Windows 95 detects new hardware – “ESS Device Manager” and prompts you for the disk labeled “Maestro PCI Audio Device Multimedia Disk”. Click OK to continue.
8. The New Hardware Found dialog box asks you for the “a3d.dll” file. Type the path “C:\WINDOWS\SYSTEM”. Then click OK. Windows 95 detects all the components of the ESS AudioDrive and configures them for you. When the program prompts for the msjstick.drv file, insert the Windows 95 CD-ROM to install the Gameport Joystick.
9. Go to Control Panel – System – Device Manager and double click on ESS Media Device Controllers. Check if the following devices are present:
   - ESS Device Manager
   - ESS Multi-Device Enumerator
10. Double click on “Sound, video and game controllers.” Check if the following devices are present.
    - Gameport Joystick
    - Maestro DOS Games/FM Devices (DOS)
    - Maestro MPU401 Devices (WIN/DOS)
    - Maestro Wave/WaveTable Synthesis Devices

Installing Audio Driver for Windows NT 4.0

To install the Audio driver under Windows NT 4.0, follow these steps.

1. Boot Windows NT from your hard disk and insert the notebook driver CD containing the Audio driver for Windows NT.
2. Click the Start button, then point to Settings, and click Control Panel.
3. Double click on the Multimedia icon and click on Devices.
4. Click the Add button and double click on Unlisted or Updated Drivers.
5. Browse or type the sub-directory where the Windows NT 4.0 audio driver is located.
6. After installing the drivers, restart your computer.

Configuring the PCMCIA for Windows 95B version (OSR2)

For supporting CardBus controllers, you need at least Windows 95 OSR2 (B version) installed on your hard disk.

Your notebook computer incorporates a true 32-bit PCMCIA CardBus controller that you must configure properly to run smoothly.

If you only have a Windows 95 B version, follow these steps:

1. Go to Control Panel, System, Device Manager, and double click on Other Devices to open the list of detected devices.
2. Two PCI CardBus Bridge devices display. Click on these two and remove them by clicking on Remove. Click OK to confirm.
3. Next, double click on PCMCIA socket and click on PCIC or compatible PCMCIA controller. Click Remove and OK to confirm. Click Close.
4. To update the PCMCIA INF and VXD files run the program UPDATE.BAT in the PCMCIA driver sub-directory. This program copies and updates the following files in the Windows subdirectory of the HDD.

   CBSS.VXD → C:\WINDOWS\SYSTEM\
   CONFIGMG.VXD → C:\WINDOWS\SYSTEM\VMM32
   PCCARD.VXD → C:\WINDOWS\SYSTEM\
   PCI.VXD → C:\WINDOWS\SYSTEM\
   PCMCIA.INF → C:\WINDOWS\INF\
5. Restart Windows 95 after you finish copying the files. You may need to insert the Windows 95 CD-ROM again. When Windows 95 prompts you that new files are detected, click Yes to keep the newer files.
6. Under the Control Panel, double click on the PC Card (PCMCIA) icon.

7. The PC Card (PCMCIA) wizard is activated to enable 32-bit support. Follow the prompts and click Next to accept the default settings. Then, click Finish to end the configuration. Shut down your system to activate the new settings.
8. Start Windows 95 again and return to the Control Panel, System, Device Manager, and double click on PCMCIA socket to open the list of detected devices.
9. Two identical Texas Instruments PCI-1221 CardBus Controller device line appear. Check if there is any resource conflict.

CAUTION

For Windows 98, the PCMCIA controller is pre-configured during O/S installation.

When using two PCMCIA cards at the same time, it is recommended to disable the FIR port (COM2) under the BIOS Setup program.

Installing the Glidepad Mouse Driver

To optimize the performance and operation of the built-in glidepad pointing device, you may want to load the drivers and utilities included on the driver diskette.

Note: It is not necessary to install the glidepad device driver. The glidepad is fully compatible with the standard IBM or PS/2 Mouse driver used with all Windows operating systems.

Installing from Control Panel

Follow this procedure to change from a standard Windows 95 mouse driver, or from another driver that uses the standard Mouse Properties sheet.

1. From the Start menu, select Settings, Control Panel.
2. Double click on Mouse to open the Mouse Properties.
3. Select the General tab, then click Change.
4. When the Select Device screen appears, click on Have Disk.
5. Insert the ALPS touchpad driver disk (APOINT.INF) in your diskette drive. Confirm or correct the source file path (normally "A:\"), then click OK.
6. Click VersaGlide, then click OK to copy the driver files to your system.
7. After the files are copied, Mouse Properties shows the new device name. Click Close.

8. The System Settings Change message offers to restart your computer so the new settings can take effect. Click Yes.

Installing from Device Manager

Use this procedure if you cannot access the Change option through Mouse Properties (for example, your current driver substitutes its own control panel).

1. From the Start menu, select Settings, Control Panel.
2. Double click System to open System Properties.
3. Select the Device Manager tab.
4. Click the plus sign next to the Mouse category. Then double click the current device name.
5. Select the Driver tab and click Change Driver.
6. If the Select Device screen appears, then click Have Disk.
7. Insert the ALPS touchpad driver disk (APOINT.INF) in your diskette drive. Confirm or correct the source file path (normally "A:\"), then click OK.
8. Click VersaGlide, then click OK.
9. If returned to the property sheet Driver tab, then click OK to copy the driver files to your system.
10. The System Settings Change message offers to restart your computer so the new settings can take effect. Click Yes.

> ***Note:*** After installation is finished, go back to the Mouse Properties for the added VersaGlide Control Panel.
>
> Refer to README file for more information on the VersaGlide.

Installing the Fast IrDA Driver (Windows 95 only)

Your notebook PC incorporates a Fast IrDA port that provides wireless data transfer at maximum speed of 4Mbps. There are two steps to take to set up the FIR port in Windows 95.

1. Install the SMC Infrared Port driver and configure it as COM2.
2. Install the Windows 95 IR program.

SMC FAST IR PORT Driver Installation

Follow these steps to install the SMC FIR driver as COM2.

1. From the Start Menu, click Settings, Control Panel, System, Device Manager.
2. Double click Ports (COM & LPT), and click on Communications Port (COM2). Click Remove and OK to confirm. If you also see a Generic IR Port (COM2) or other device configured as COM2, click it and click Remove.
3. From the Control Panel, click Add New Hardware.
4. Click No when asked if you want Windows to search for new hardware.
5. Click Ports (COM & LPT) on hardware types and click NEXT.
6. When prompted for the type of port to install, click on Have Disk.
7. Type or browse to the sub-directory where the SMC FIR driver for Windows 95 is located.
8. The Add New Hardware Wizard looks for the SmcSer.inf file and displays the device “SMC IrCC (Fast Infrared) Hardware and Driver.”
9. Click on the device and click Next. Finish the installation and restart the system.

Windows 95 IrDA Program Installation

After the device SMC IrCC (Fast Infrared) Hardware and Driver is properly configured as COM2, you now need to install the Microsoft Windows Infrared program.

1. Insert the Windows 95 OSR2 compact disc into the CD-ROM drive.
2. From the Start menu, select Settings, Control Panel, Add New Hardware.
3. The Add New Hardware wizard appears. Click Next to continue.
4. When prompted click No if you want Windows to search for your new hardware.
5. Double click on Infrared. From the Hardware types list, click on Built-in Infrared port on the laptop or desktop. Then click Next to continue.
6. Click on SMC IrCC (Fast Infrared) Hardware and Driver (COM2). Click Next to continue.
7. Accept default ports of COM4 and LPT3. Click Next to continue.
8. Click Finish to save all settings and restart your system. The new Infrared icon appears under the Control Panel.

9. Go to System, Device Manager and double click on Ports (COM & LPT). You should have the following devices.
   - Communications Port (COM1)
   - ECP Printer Port (LPT1)
   - Infrared Printing (LPT) Port
   - Infrared Serial (COM) Connections Port
   - SMC IrCC (Fast Infrared) Hardware and Driver (COM2)
10. Next, you need to install the SMCIRLAP.INF to enable the 4Mbps connection speed. Go to the sub-directory where the SMC FIR driver for Windows 95 is located.
11. Right click on the SMCIRLAP.INF file. Click on Install.
12. Go back to the Control Panel. Double click the Infrared icon to activate the Infrared monitor and detect if there is any IR device in range. Click on the Options folder tab and set the connection speed to 4Mbps.

> ***Note:*** You need to install the Windows 95 Direct Cable Connection or LapLink for Windows in using the Fast IR for fast peer-to-peer data transfer connection.
>
> Be sure to enable File Sharing on the Network Properties.
>
> Refer to the SMC Release notes for more information.
>
> For Windows 98, the SMC IR device is detected automatically and listed under the System-Device Manager-Ports (Virtual Infrared COM Port / Virtual Infrared LPT Port) and Network Adapters (SMC IrCC).

Installing the USB Driver

To support USB (Universal Serial Bus) devices, you must have a Windows 95 OSR2.1 (B version) that includes the USB supplement driver. If you only have an OSR2.0, then you need to copy the USBSUPP.EXE program file from the OSR2.1 CD.

> **CAUTION**
>
> Make sure the version of the USB driver is 4.03.1214 (QFE) or later. Earlier versions may cause problems like hot-swapping USB devices.

Follow this procedure to install the USB supplement driver.

1. Boot Windows 95 OSR2 and insert the diskette containing the USBSUPP.EXE driver file.
2. Go to Control Panel, System, Device Manager. Click on Other Devices and PCI Universal Serial Bus. Click Remove and click OK to confirm.
3. Click the Start button, click on Run and enter A:\USBSUPP.EXE.
4. The Microsoft USB Supplement (QFE) dialog box appears. Click Yes to continue the installation.
5. Follow the instructions to complete the installation. When prompted for the uhcd.sys file, enter C:\WINDOWS\SYSTEM.
6. After installation is complete, you need to restart your system to activate new settings.

Installing the Intel PCI Bridge Driver (Windows 95 only)

You need to run the PCI Bridge update driver in order for Windows 95 to properly detect the PCI Bridge device of the Intel Mobile Module (430TX for Tillamook / 440BX for Pentium-II module).

⚠ CAUTION

Do not install the Intel PCIBridge driver from the Intel web site because it may not be entirely compatible with the Versa Note.

1. Go to the Control Panel, System, Device Manager. Click Other Devices and click on PCI Bridge. Click Remove and OK to confirm.
2. Go to the sub-directory or diskette containing the PCI Bridge drivers. If you are using a Tillamook processor chip, run TXUPDATE.BAT. If you are using a Pentium-II processor chip, run BXUPDATE.BAT. This updates the following INF files.

   MACHINE.INF → C:\WINDOWS\INF
   MSHDC.INF → C:\WINDOWS\INF
3. Restart Windows 95. Go to the Control Panel, System, Device Manager, System Devices and click on PCI Bus. Click Remove and restart the system.
4. Windows 95 reinstalls all PCI device drivers including VGA, PCMCIA, Audio, and USB. Restart the computer when prompted.
5. After all PCI devices have been pre-installed, the following devices should be detected and installed under the System devices of System Device Manager (Control Panel).

- Intel 82371EB PCI to ISA Bridge (ISA Mode)
- Intel 82371EB Power Management Controller
- Intel 82443BX Pentium II Processor to PCI bridge

System Upgrades

This section provides an easy to follow procedure to upgrade your system. The upgrade procedures includes the following.

- Pentium CPU – configuring clock speed up to 300 MHz
- Memory – configuring the system memory up to 192MB
- Hard Drive – upgrading up to 4.1GB HDD
- System BIOS – updating to the latest BIOS date version

Jumper Settings

This section lists jumper settings.

IRQ3 Hardware Jumper Setting

SW3	ON	OFF
1	ISA-IRQ3 CONNCET	DISCONNECT ISA-IRQ3

> ***Note:*** IRQ3 for MODEM test only in DOS mode.

Keyboard Select Jumper Setting

SW3	2	3
US KEYBOARD	OFF	OFF
JP KEYBOARD	OFF	ON
RESERVE	ON	OFF
RESERVE	ON	ON

Password Override Jumper Setting

For motherboard AMB V0.1/0.2/0.3

SW3	ON	OFF
4	RTC BATTERY NORMAL	CLEAR CMOS(RTC) DATA

For motherboard AMB V0.4/0.5/later

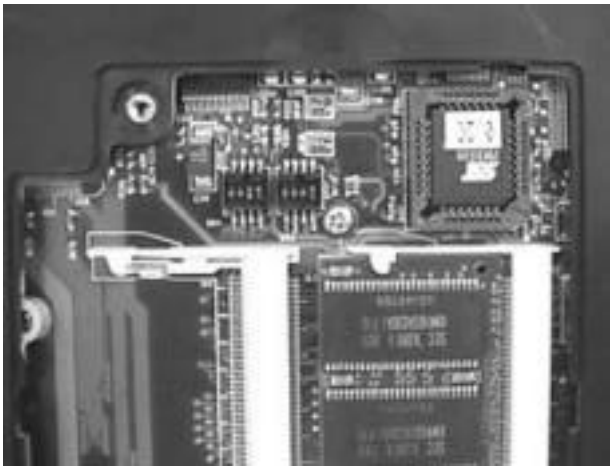
SW3	ON	OFF
4	CLEAR CMOS(RTC) DATA	RTC BATTERY NORMAL

Note: There is no jumper switch for upgrading the LCD module. Simply swap LCD panels when upgrading.

CPU Module Jumper Setting

SW4	1	2	3	4
Tillamook CPU	ON	ON	OFF	OFF
Pentium-II CPU	OFF	OFF	ON	ON

Jumper Switch Location (Memory Compartment)



CPU Upgrade Procedure

The Versa Note features an MMC-1 connector for plugging in either a Pentium II or Tillamook Intel Mobile Module (IMM). The connector is located on the right side of the system motherboard. You only need to set the CPU module jumper settings if you are replacing a Tillamook module to a Pentium-II module or vice-versa. Refer to the previous section on jumper settings. The jumper settings are located on the memory compartment underneath the system unit.

How to Access the CPU Socket

To install or replace the CPU, follow these steps.

1. Remove the two screws securing the palm-rest cover underneath the system base unit.

2. Remove the palm-rest cover by slowly unsnapping each section of the palm-rest cover from the base unit.

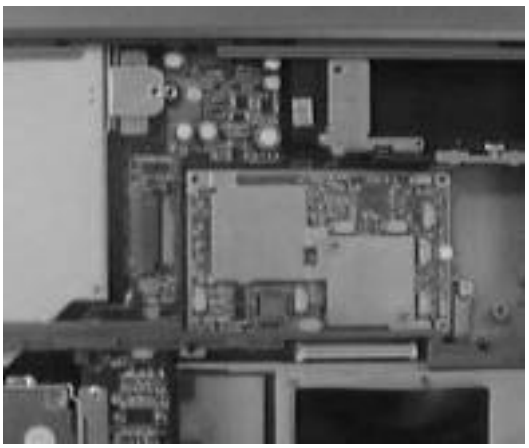
3. After you remove the entire palm-rest cover, remove the cable attaching the glidepad to the daughterboard inside the unit.

4. Lift the keyboard and tilt it towards the LCD panel. Remove the two round screws securing the heat plate. You do not need to remove the other two flat screws as these secure the cooling fan underneath. Remove the heat plate afterwards.

5. Take out the keyboard cable and remove the keyboard. You will see the CPU module on the right side of the motherboard. If you do not have a CPU module, you see two rectangular white connectors (MMC-1).

6. Three screws secure the upper corners of the CPU module. Remove them and slowly pull out the CPU module.

CPU Module Location



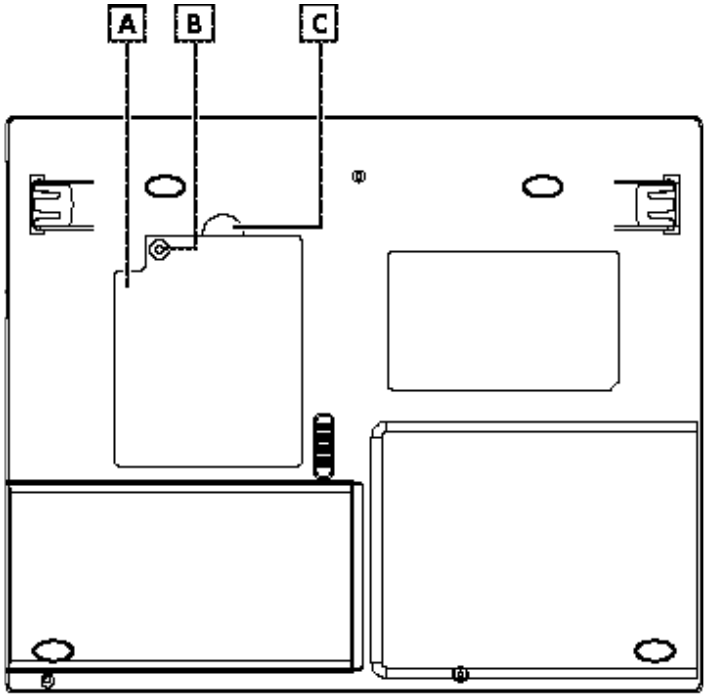
7. To insert the CPU module again, fit in the CPU module into the connectors and make sure it fits snugly. Then, secure the screws again.

Memory Upgrade Procedure

The notebook computer offers two 64-bit memory slot using 144-pin SO-DIMM (Small Outline Dual Inline Memory Module) at 16MB, 32MB, and 64MB SDRAM. This configuration supports single SO-DIMM module insertion on any memory slots. The memory compartment is located on the underside of your computer inside the memory compartment. The notebook has no memory on-board so you should have at least one SO-DIMM 32MB RAM module for optimum performance.

With two memory slots, you can have several combinations of 16MB, 32MB, 48MB, 64MB, 80MB, 96MB, and 128MB.

Memory Compartment



Follow these steps to upgrade the memory modules.

1. Power off the system and disconnect any peripheral devices.
2. Turn the system over and locate the screw on the memory compartment.
3. Remove the screw and open the memory compartment by lifting its upper side.
4. Locate the alignment notch on the module.
5. Locate the memory module sockets. Your system comes with one module already installed in the socket. When installing additional memory, use the other empty socket.
6. 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.
7. 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.
8. Reassemble the Versa Note components as follows.

   — Replace the DIMM door back.

— Replace the screw.

— Turn the system over.

Hard Disk Upgrade Procedure

The notebook provides a built-in hard disk for the primary IDE controller. The HDD is an industry standard 2.5” IDE disk drive and can be upgraded with another standard 2.5” HDD.

To remove the built-in hard disk, follow these steps.

1. Remove the two screws securing the palm-rest cover underneath the system base unit.
2. Remove the palm-rest cover by slowly unsnapping each section of the palm-rest cover from the base unit.
3. When you remove the entire palm-rest cover, remove the cable attaching the glidepad to the daughterboard inside the unit.
4. Once the cover is removed, you see the built-in hard disk secured with one screw at the upper left corner of the hard disk. Remove the screw and carefully pull the hard disk module from the connector on the daughterboard.
5. Remove the four screws securing the hard disk to the bracket connector and replace with another one.
6. Plug in the hard disk module to the connector on the daughterboard and secure the screw on the upper left corner of the hard disk.

Hard Disk Drive Location

System BIOS Upgrade Procedure

The notebook supports EPROM Flash BIOS that allows you to easily update the system BIOS using the Phoenix BIOS Flash utility program called PHLASH.COM. This program runs under DOS and so it doesn't load high memory like HIMEM.SYS. It also needs the PLATFORM.BIN file to activate.

Follow these steps to update the system BIOS:

1. Prepare a clean bootable diskette without loading the HIMEM.SYS. Copy the files PHLASH.COM and PLATFORM.BIN into the diskette along with the BIOS ROM file.
2. Restart the computer and boot from the diskette. At the DOS prompt, enter the command PHLASH <*BIOSfile*.ROM> to activate Flash BIOS programming utility. The computer then starts to update the system BIOS inside the notebook.
3. After programming is complete, the system prompts you to press any key to shutdown the computer. Power on again and check the BIOS version and date code. The BIOS version and date code is shown on the Reference ID and Manufacturer ID during power on display.

   — Reference ID : 10-112-3015

   — Manufacturer ID : 0915-1200A

   - The first two numbers of the Reference ID is the number version (1.0) while the last letter of the Manufacturer ID is the letter version (A). So the BIOS version is 1.0A.
   - The first four numbers of the Manufacturer ID denotes the BIOS date – 09/15 or September 15.

⚠ CAUTION

It is very important not to power off the system when the FLASH BIOS program is running. Otherwise, the system may not be able to power on and you will need to replace the BIOS EPROM chip from another working notebook system.

3

Software Functional Overview

- Overview
- Summary of the BIOS Specification
- Subsystem Software Functions
- Power Management
- ACPI
- Battery Management
- PIC16C62-UP
- Miscellaneous
- CMOS Setup Utility

Overview

The Versa Note is an IBM PC/AT compatible notebook PC that supports the Intel Pentium processor family. The major features of the notebook are as follows:

- Microsoft Windows 95 and Windows NT logo approved
- Supports 1024 x 768 high resolution LCD with 13.3" panel
- ACPI 1.0 and PC97 Compliant
- Supports DMI 2.0
- Supports a proprietary Port Replicator or Docking Station (pending)

Summary of the BIOS Specification

Following is a summary of the BIOS software specifications:

Controller Chip	Description
BIOS Feature	Boot Block / Crisis Rescue APM 1.2 Compliance Supports PCI 2.1 Specification Supports Windows 98 & 95, Windows NT Supports Flash function for new BIOS update Supports ACPI 1.0 Specification Supports DMI 2.0 Specification (SMBIOS 2.1) Supports 3-Mode FDD Supports maximum 4 different keyboards on same BIOS
CPU	Auto detects CPU type and speed for the Pentium based system
DRAM	Auto sizing and detection. Supports SDRAM
Cache	Level 2 Synchronous/Asynchronous SRAM auto sizing and detection Always enable CPU L1 and external L2 cache
Shadow	Always enable VGA and System BIOS shadow
Display	System auto detects LCD or CRT presence on boot and lid closed Supports Panning while LCD in a display resolution greater than supported Supports Microsoft Direct 3D
Hard Disk	Enhanced IDE specification Support auto IDE detection Support LBA mode for larger capacity HDD Supports 32-bit PIO transfer Supports Multi-sector transfer Support Ultra DMA 33 Support Fast PIO mode 1-4 transfer
Multi Boot	Allows the user to select boot drive from FDD, HDD, or CD-ROM
Plug and Play	Supports PnP Run Time Service and conflict-free allocation of resource during POST
Smart Battery	Supports BIOS interface to pass battery information to the application via SMBus

Controller Chip	Description
Keyboard Controller	Supports <Fn> hot keys, two Win95 hot keys, built-in Glidepad and external PS/2 mouse/keyboard
PCMCIA	Complies with PCMCIA 2.1 specification
CD-ROM	Supports boot from CD-ROM
Port Replicator	I/O port replicator duplicates the following ports: Video port Printer port COM1 port PS/2 Mouse & Standard Keyboard port USB Port DC-IN Jack
Power Management Support	The Power Management Unit complies with APM 1.2 specification and supports the following power state: Full-On Mode Doze Mode (This mode is transparent to user) Stand-By (POS) Mode Suspend to RAM (STR) Mode Suspend to Disk (STD) Mode Soft-Off Mode (SOff)

Subsystem Software Functions

This section provides an introduction to the software functions of the notebook subsystems and related functions.

Key Chipset Summary

Following are the main chipsets used in the notebook.

Key Chipsets

Controller Chip	Vendor	Description
Processor	INTEL	PENTIUM-II Intel Mobile Module (IMM) 233/266/300 MHz Tillamook Intel Mobile Module (IMM) 233/266 MHz
Core Logic	INTEL	443BX - 82443BX & PIIX4E(82371EB)
Video Controller	NeoMagic	NM2160 (NMG4)
PCMCIA Controller	TI	PCI 1221
Supplier I/O Controller	SMC	FDC37N769
Audio Chip	ESS	ES1968S (Maestro-2)
Audio Codec	Wolfson	WM9701
Audio Amplifier	TI	TPA0102
Keyboard Controller	Mitsubishi	M38867
PMU Controller	MicroChip	PIC16C62 (SSOP)
Gas Gauge IC	Benchmarq	BQ2092

Controller Chip	Vendor	Description
ROM BIOS	SST	29EE020, Boot Block Structure
Clock Generator	IMI	IMISC671
Temperature Sensor	MAXIM	MAXIM-1617 / LM75
Modem	Lucent	DSP1646 (Mars II)

System Memory

The system memory consists of SDRAM memory on 64-bit bus and the module size options are 16/32/64MB. The BIOS will automatically detect the amount of memory in the system and configure CMOS accordingly during the POST (Power-On Self Test) process. This is done in a way that requires no user interaction.

DRAM Combination Configuration

Base SO-DIMM DRAM slot (Bank 0 & 1)	Expansion SO-DIMM DRAM slot (Bank 2&3)	Total Size
16MB	NIL	16MB
16MB	16MB	32MB
16MB	32MB	48MB
16MB	64MB	80MB
32MB	NIL	32MB
32MB	16MB	48MB
32MB	32MB	64MB
32MB	64MB	96MB
64MB	NIL	64MB
64MB	16MB	80MB
64MB	32MB	96MB
64MB	64MB	128MB
NIL	16MB	16MB
NIL	32MB	32MB
NIL	64MB	64MB

Video

The video subsystem contains 2MB of video memory. The system supports ZV port, Windows accelerator, simultaneous display, monitor sense for auto display on boot, and VESA Super VGA function call.

Supported Video Mode

The following table lists various display modes supported by the NM2160 VGA controller in LCD, CRT, and LCD&CRT mode. The VGA BIOS will allow mode sets of resolutions greater than the panel size but only show as much mode display as will fit on the panel.

Supported standard VGA modes

Mode	Pixel Resolution	Colours	Dot Clock	Horiz. Freq.	Vert. Freq.
0, 1	320*400	16	27.175 MHz	31.5 kHz	70 Hz
0*, 1*	320*350	16	25.175 MHz	21.85 kHz	60 Hz
0+, 1+	360*400	16	28.322 MHz	31.5 kHz	70 Hz
2, 3	640*200	16	25.175 MHz	31.5 kHz	70 Hz
2*, 3*	640*350	16	25.175 MHz	21.85 kHz	60 Hz
2+, 3+	720*400	16	28.322 MHz	31.5 kHz	70 Hz
4, 5	320*200	4	25.175 MHz	31.5 kHz	70 Hz
6	640*200	2	25.175 MHz	31.5 kHz	70 Hz
7	720*400	Mono	28.322 MHz	31.5 kHz	70 Hz
D	320*200	16	25.175 MHz	31.5 kHz	70 Hz
E	640*200	16	25.175 MHz	31.5 kHz	70 Hz
F	640*350	Mono	25.175 MHz	31.5 kHz	70 Hz
10	640*350	16	25.175 MHz	31.5 kHz	70 Hz
11	640*480	2	25.175 MHz	31.5 kHz	60 Hz
12	640*480	16	25.175 MHz	31.5 kHz	60 Hz
13	320*200	256	25.175 MHz	31.5 kHz	70 Hz

Supported extended video modes

Vesa Mode	Pixel Resolution	Colours	Dot Clock	Horiz. Freq.	Vert. Freq.
100	640*400	256	25.175 MHz	31.5 kHz	70 Hz
101	640*480	256	25.175 MHz	31.5 kHz	60 Hz
			31.5 MHz	37.5 kHz	75 Hz
			36.0 MHz	43.3 kHz	85 Hz
103	800*600	256	40.0 MHz	37.8 kHz	60 Hz
			49.5 MHz	46.9 kHz	75 Hz
			56.25 MHz	53.7 kHz	85 Hz
105	1024*768	256	65.0 MHz	48.3 kHz	60 Hz
			75.359 MHz	56.746 kHz	75 Hz
			78.75 MHz	60.0 kHz	85 Hz
10D	320*200	32K	25.175 MHz	31.5 kHz	70 Hz
10E	320*200	64K	25.175 MHz	31.5 kHz	70 Hz
110	640*480	32K	25.175 MHz	31.5 kHz	60 Hz
			31.5 MHz	37.5 kHz	75 Hz
			36.0 MHz	43.3 kHz	85 Hz
111	640*480	64K	25.175 MHz	31.5 kHz	60 Hz
			31.5 MHz	37.5 kHz	75 Hz
			36.0 MHz	43.3 kHz	85 Hz
112	640*480	16M	25.175 MHz	31.5 kHz	60 Hz
			31.5 MHz	37.5 kHz	75 Hz
			36.0 MHz	43.3 kHz	85 Hz
113	800*600	32K	40.0 MHz	37.8 kHz	60 Hz
			49.5 MHz	46.9 kHz	75 Hz
			56.25 MHz	53.7 kHz	85 Hz
114	800*600	64K	40.0 MHz	37.8 kHz	60 Hz
			49.5 MHz	46.9 kHz	75 Hz
			56.25 MHz	53.7 kHz	85 Hz
115	800*600	16M	40.0 MHz	37.8 kHz	60 Hz
			49.5 MHz	46.9 kHz	75 Hz
			56.25 MHz	53.7 kHz	85 Hz
116	1024*768	32K	65.0 MHz	48.3 kHz	60 Hz
			75.359 MHz	56.746 kHz	75 Hz
			78.75 MHz	60.0 kHz	85 Hz
117	1024*768	64K	65.0 MHz	48.3 kHz	60 Hz
			75.359 MHz	56.746 kHz	75 Hz
			78.75 MHz	60.0 kHz	85 Hz
120	320*240	256	25.212 MHz	31.5 kHz	60 Hz
121	320*240	64K	25.212 MHz	31.5 kHz	60 Hz
122	400*300	256	40.091 MHz	37.965 kHz	60 Hz
123	400*300	64K	40.091 MHz	37.965 kHz	60 Hz
124	512*384	256	65.028 MHz	48.384 kHz	60 Hz
125	512*384	64K	65.028 MHz	48.384 kHz	60 Hz

Panel Type Initialization

The VGA BIOS will issue an INT 15h function call during POST. This function call allows the system BIOS to specify the panel type to the VGA BIOS. The system BIOS gets the panel type from GPI pins before the VGA chip initializes and passes this information to VGA BIOS through INT 15 Function 5F40h.

Supported LCD panel type

Panel Type	Display Size	Panel Description
Type 2	800*600	12.1” TFT NEC
Type 3	1024*768	13.3” TFT NEC

Enhanced IDE

The system BIOS supports 4 IDE devices on two controllers up to an 8 GB capacity. The BIOS supports Ultra DMA 33 and automatic configuration of drives using both the LBA and CHS large drive re-mapping method. In addition, the system supports standard drives through an auto-configuration process that does not require user involvement or confirmation. The system does this automatically at POST time in a way that is transparent to the user. If a drive is connected to the bus, the drive is automatically recognized, configured and available for use under MS-DOS 6.2x.

Ultra DMA

Ultra DMA/33 is a new physical protocol used to transfer data between an Ultra DMA/33 capable IDE controller and one or more Ultra DMA/33 capable IDE devices. It utilizes the standard Bus Master IDE functionality and interface to initiate and control the transfer. Ultra DMA/33 utilizes a source-synchronous signaling protocol to transfer data at rates up to 33 Mbytes/sec. The Ultra DMA/33 definition also incorporates a Cyclic Redundancy Checking (CRC-16) error checking protocol.

Audio

The Maestro-2 audio digital accelerator is a highly integrated PCI audio solution which includes advanced audio features. These features consist of a 64-voice wavetable synthesizer with Downloadable Sample (DLS) and complete DirectSound support. The Maestro-2 power management complies with ACPI 1.0 and APM 1.2. It also supports both PC97 logo requirements and DOS game compatibility.

Super I/O

The Super I/O Controller chip provides the following features:

- 3.3 Volt Operation
- Intelligent Auto Power Management
- Two High Speed NS16C550 Compatible UARTs with Send/Receive 16 Byte FIFOs

- Infrared Communications Controller - IrDA v1.1 (4Mbps)
- ECP/Standard/Bi-directional Parallel Port (IEEE 1284 Compliant)

PCMCIA

The PCMCIA controller chip of the notebook provides the following features:

- PCI Power Management Compliant
- ACPI 1.0 Compliant
- Supports Two PC card or CardBus slots with hot insertion and removal
- Supports Serialized IRQ with PCI Interrupts
- System Interrupts programmable as PCI-style or ISA IRQ-style
- Supports Zoom Video with internal buffering (Top Slot)
- Support for 3.3v, 5v and 12v (flash programming) cards.

LED Indicator

The Status LED indicator provides the following functions:

System Status LED (LCD panel side)

Indicator	Function Description
Power LED	Green - System is powered on.
	Yellow - Battery warning. (When plugged into an AC adapter, the power LED will turn Green)
	Amber - Battery low. (When plugged into an AC adapter, the power LED will turn Green)
Battery Charging LED	Amber - Battery is under charging mode
	Turn off - Battery is fully charged or there is no battery
Suspend LED	This LED will blink when the system is in Suspend to RAM mode

System Status LED (Main system side)

Indicator	Function Description
IDE LED	Turns on while accessing the HDD
Device Bay LED	Turns on while accessing the FDD
Caps Lock LED	Turns on when CapsLock is active
Scroll Lock LED	Turns on when Scroll Lock is active
Num Lock LED	Turns on when NumLock is active

Customer ID Support

It is required for the BIOS to include the machine ID at location FFF40h, and twelve bytes at location FFF42h for storing the BIOS version number in ASCII. Twelve bytes consist of three parts of this version, i.e. System BIOS (jjjj), Video BIOS (kkkk) and PIC (llll). This version displays on the screen as jjjj-kkkk-llll.

- Machine ID: FFF40h...FFF41h
  - 43h, 4Dh (for Tillamook)
  - 43h, 4Eh (for Pentium-II)
- BIOS version: FFF42h...FFF4Dh = jjjjkkkkllll
  (BIOS-VGA-PIC version in ASCII)

The Machine ID and BIOS version is in shadow RAM. (Not in ROM)

Hot Keys Definition

All hot keys must be active at all times under all operating systems.

Hot Keys by Internal Keyboard

Hot Key	Function	Handler
Fn + F3	Toggle Display (LCD/CRT/Simul)	BIOS Handler
Fn + F4	Stand By	BIOS Handler
Fn + F5	Display Stretch	BIOS Handler
Fn + F6	System Speaker On/Off	BIOS Handler
Fn + F7	Power Management Level*	BIOS Handler
Fn + F8	Brightness Increase	Controlled by M38867
Fn + F9	Brightness Decrease	Controlled by M38867
Fn + F10	Contrast Increase	Controlled by M38867
Fn + F11	Contrast Decrease	Controlled by M38867
Fn + Suspend Button	Save to Disk	BIOS Handler

Hot Keys by External Keyboard

Hot Key	Function	Handler
Ctrl + Alt + F3	Toggle Display (LCD/CRT/Simul)	BIOS Handler
Ctrl + Alt + F4	Stand By	BIOS Handler
Ctrl + Alt + F5	Display Stretch	BIOS Handler
Ctrl + Alt + F6	System Speaker On/Off	BIOS Handler
Ctrl + Alt + F7	Power Management Level*	BIOS Handler

Note: The hotkey for the Power Management Level responds with various beep sounds: one beep - PMU off; two beeps - customized; three beeps - maximum performance; four beeps - maximum power saving.

Port Replicator (Docking Station)

The PortBar duplicates the following ports from the notebook:

- VGA Port
- Serial Port
- Printer Port
- PS/2 port for Keyboard
- PS/2 port for Mouse
- USB Port
- DC In Jack

Note: The port replicator can only support cold insertion, not hot insertion.

Plug and Play

The BIOS supports the Plug and Play Specification 1.0A. this section describes the device management.

System Board Devices and Resources

Device	Connect Type	Resources			
		I/O	IRQ	DMA	Memory
DMA Controller	Static	00-0F, 81-8F	-	DMA4	-
Interrupt Controller	Static	20-21, A0-A1	IRQ2	-	-
System Timer	Static	40-43	IRQ0	-	-
RTC	Static	70-71	IRQ8	-	-
ISA Bus	Static	-	-	-	-
System Speaker	Static	61	-	-	-
System Board	Static	-	-	-	E0000-FFFFF
PnP Mother Board	Static	80	-	-	-
Keyboard Controller	Static	60, 64	IRQ1	-	-
Math Coprocessor	Static	F0-FF	IRQ13	-	-
PS/2 Mouse	Enable/Disable	-	IRQ12	-	-
Video Controller	Static	3B0-3BB 3C0-3DF	IRQ5	-	A0000-BFFFF C0000-C9FFF FE800000- FEBFFFFF
Serial Port	Dynamic	3F8-3FF	IRQ4	-	-
ECP, Parallel Port	Dynamic	378-37F 778-77F	IRQ7	DMA1	-
FDC	Static	3F0-3F5, 3F7	IRQ6	DMA2	-
Dual IDE Controller	Static	170-177 1F0-1F7, 3F6	IRQ14, 15	-	-
CardBus Controller	Dynamic	3E0-3E1	IRQ10	-	08000000- 08001FFF
Sound Chip	Dynamic	220-22F, 300-301 388-38B F800-F8FF	IRQ5	DMA3	-
FAX/Modem	Dynamic	1050-1057 1400-14FF	IRQ10	-	64000000- 640000FF
FIR	Dynamic	2F8-2FF 108-10F	IRQ3	DMA0	-
USB Host Controller	Dynamic	EF80-EF9F	IRQ5	-	-

PCI Device

The tables below summarize PCI device pin allocations.

IDSEL Pin Allocation

IDSEL Pin	PCI Device		
	Device Number	**Function Number**	**Device Name**
AD11	Device 00	Function 0	MTXC / 440BX – Host to PCI bridge
AD13	Device 02	Function 0	NMG4 Video Accelerator
AD15	Device 04	Function 0	ESS Maestro-2 Audio Accelerator
AD17	Device 06	Function 0	MODEM
AD18	Device 07	Function 0	PIIX4 – PCI to ISA bridge
		Function 1	PIIX4 – IDE interface
		Function 2	PIIX4 – USB interface
		Function 3	PIIX4 – PMU and SMBus interface
AD21	Device 0A	Function 0	PCI1221 – CardBus Socket A
		Function 1	PCI1221 – CardBus Socket B

INT Pin Allocation

INT pin	PCI Device
INTA	CardBus
INTB	Modem
INTC	VGA/Audio
INTD	USB

PCI Bus Master Allocation

REQ# pin	PCI Device
REQ 0	CardBus
REQ 1	VGA
REQ 2	Audio
REQ 3	Modem

SMBus Devices

The SMBus is a two-wire interface through which the system can communicate with power-related chips. The BIOS should initialize the SMBus devices during POST.

SMBus Devices

SMBus Device	Host/Slave	Address	BIOS Need to Initialization
PIIX4 – Core Logic	Both Host and Slave	10h	Enable SMBus interface and SMBus interrupt
PIC16C62 – micro P	Both Host and Slave	04h	No need
MAXIM 1617 – Temperature Sensor	Slave	9Ch	Program the desired temperature range: (Tos=48°C, Thyst= 52°C)
IMISC671 – Clock Synthesizer	Slave	D2h	Program the desired clock frequency (Pin23 output 24 MHz, Pin22 output 48 MHz)
BQ2092 – Smart Battery	Both Host and Slave	16h	No need

Resource Allocation

The following tables describe the resource allocations.

Device Addresses

Hex Address	Device
000-01F	8237-1
020-021	8259-1
022	430TX control Register
040-05F	8254
060-06F	Keyboard Controller
070-07F	RTC & NMI Mask
080-08F	DMA Page Registers
092	System Control Port
0A0-0A1	8259-2
0C0-0DF	8237-2
0F0-0FF	Math Coprocessor
170-177	Secondary IDE Controller
1F0-1F7	Primary IDE Controller
200-20F	Game Port
220-22F	Sound Blaster
279	PnP configuration – Address Port
2F8-2FF	FIR

Hex Address	Device
330-333	MIDI
370-371	Sound Chip Control Port
378-37A	Parallel Port
388-38B	FM Synthesizer
398-399	Super I/O chip
3B0-3DF	Video Controller
3E0-3E1	PCMCIA Controller
3E8-3EF	Fax/Modem
3F0-3F7	Floppy Disk Controller
3F8-3FF	Serial Port 1
530-537	Windows Sound System
778-77B	ECP Port
A79	PnP configuration –Write data port
CF8-CFC	PCI BUS configuration register

ISA DMA Map

DMA channel	Device
DMA 0	FIR
DMA 1	ECP
DMA 2	Floppy Disk
DMA 3	Audio
DMA 4	[Cascade]
DMA 5	Unused
DMA 6	Unused
DMA 7	Unused

Memory Map

Address Range	Length	Description
00000-9F7FFh	638KB	Base Memory
9F800-9FFFFh	2 KB	Extended BIOS Data Area
A0000-BFFFFh	128 KB	Video Memory
C0000-C9FFFh	40 KB	Video ROM
CA000-DFFFFh	88 KB	Unused
E0000-FFFFFh	128 KB	System ROM BIOS

IRQ Map

IRQ #	Description
IRQ 0	System Timer
IRQ 1	Keyboard
IRQ 2	[Cascade]
IRQ 3	FIR
IRQ 4	Serial Port
IRQ 5	Audio / VGA / USB
IRQ 6	Floppy Disk Drive
IRQ 7	Parallel Port
IRQ 8	RTC Alarm
IRQ 9	Reserve for ACPI OS
IRQ 10	Modem / CardBus
IRQ 11	Reserved for PCMCIA Card
IRQ 12	PS/2 Mouse
IRQ 13	FPU
IRQ 14	Hard Disk Drive
IRQ 15	CD-ROM

Power Management

This section provides the Power Management functions of the notebook.

General Requirements

The BIOS meets the following general Power Management requirements:

- Compliant with APM 1.2 Specification.
- Full APM Support for Windows 95 Fuel Gauge and Power Management functionality.
- Support for Suspend-to-RAM and Suspend-to-Disk mode.
- Support for Resume on Modem Ring while in STR Mode. This is controlled by a CMOS Setup option.
- Power Management is OS independent.
- Power Management supports Resume-on-Time.

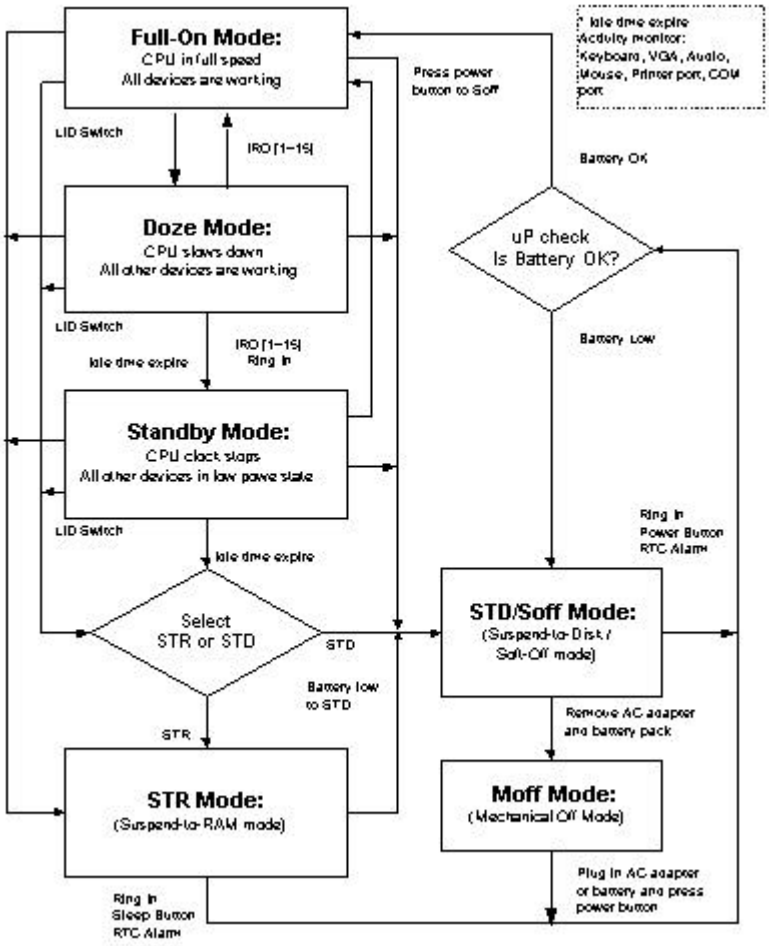
System Power Plane

The following table describes the system power plane divisions.

System Power Plane Divisions

Power Group	Power Control Pin	Controlled Devices
B+	NIL	IMM, (9V-20V)
5V always	NIL	PIC 16C62A
3V always	NIL	RTC I/F, Internal modem ring
RTCVCC	NIL	RTC
+12V	PWRON	PCMCIA Card
+5V	PWRON	BIOS ROM, M38867, MAX32443, PCMCIA Slot (5V VCC)
+3V	PWRON	VGA, Video RAM, PCMCIA chip, PCMCIA Slot (3V), DRAM, 440BX (DRAM I/F)
+3VS	SUSB#	Audio, PIIX4E(ISA I/F Power), Clock Generator, FIR (IM1651 SCLK), TAG RAM, PCI Interface, Super I/O
+5VS	SUSB#	HDD, CD-ROM, USB, Internal K/B, Glide Pad, External PS/2 Mouse, FDD, Audio AMP

Power Management Mode Transition Flow Chart



Power Management Mode Definitions

A particular implementation of system power management may use some or all of the depicted states. The following table describes the power management states.

Power Management States

PM 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	The CPU clock is slowed down while all other devices are fully operational. (Similar to IDLE mode – Transparent to the user)
Stand By (POS)	A suspend state where all motherboard 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 32KHz clock (SUSCLK) in this suspend mode to support the refresh function 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 motherboard components are powered-off. The CPU/L2 and PCI busses are powered off. All devices connected to the CPU/L2 and PCI busses must either be powered-off or isolate their bus interfaces. The system memory is powered and refreshed by the memory bridge, and the graphics frame buffer 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 motherboard 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.
Soft Off (SOFF)	This is the same as suspend to disk except the context of memory is not saved. The system will resume from Soft Off as if a hard reset had occurred.
Mechanical Off (MOFF)	All power except the RTC has been removed from the system.

PMU Mode Transition Events

Power State	Entry Event	Wake Up Event
Doze	Doze Time Out	Predefined Mem/IO range access Ring Indicator Keystroke(Int., Ex. and USB keyboard) Mouse movement
Stand By	Stand By Time Out	Predefined Mem/IO range access Battery Warning Battery Low Keystroke (Int., Ex. and USB keyboard) Mouse movement IRQ 1-15
STR	Suspend Time Out Lid Close Sleep Button	Sleep Button Ring Indicator Schedule Alarm Battery Low Lid Open
STD	Suspend Time Out battery Low FN + Sleep Button	Sleep Button Ring Indicator (internal Modem) Schedule Alarm
Soft Off	Sleep Button Execute Win 95 shutdown command	Sleep Button Ring Indicator (By internal Modem only) Schedule Alarm

Lid Switch

Display Mode	Power State	Lid Close	Lid Open
LCD	Full on	STR	Resume
	Stand by	STR	Resume
	STR	Not active	Resume
	STD	Not active	Not active
CRT	Full on	Not active	Not active
	Stand by	Not active	Not active
	STR	Not active	Resume
	STD	Not active	Not active
Both	Full on	CRT	Both
	Stand by	CRT	Both
	STR	Not active	Resume
	STD	Not active	Not active

Power Sleep Button

Working Mode	OFF	Full on	Doze	Stand by	STR	STD
Power on/off	Power on	Power off	Power off	Power off	Full on	Full on
Suspend	Power on	STR/STD	STR/STD	STR/STD	Full on	Full on

Note: The Power/Sleep Button can work as a Power Button or Sleep Button. The working mode is selected from the CMOS setup menu.

If you cannot resume properly from Suspend by pressing the Sleep button, press and hold it for 4 or more seconds to power off the system.

The mode STR/STD can be selected via CMOS Setup.

Device Power Management

This section illustrates the power control status of each key device/component of the system under each power management mode.

Power states of local devices

Power State Component	Doze	Stand By	STR	STD/SOFF
CPU	Stop Grant	Stop Clock	Power Off	Power Off
MTXC/440BX	ON	Stop Clock	Power Off (except Vcc)	Power Off
PIIX4	ON	ON	Power Off (except SUSVcc, RTCVcc)	Power Off (except SUSVcc, RTCVcc)
DRAM	ON	Self Refresh	Self Refresh	Power Off
L2 CACHE	ON	Power down	Power Off	Power Off
CD-ROM	ON	Power down	Power Off	Power Off
HDD	ON	Power down	Power Off	Power Off
FDD	ON	Power down	Power Off	Power Off
KBC	ON	ON	Power down	Power Off
PIC 16C62	ON	ON	Power down	Power down
VGA/VRAM	ON	Power down	Power down	Power Off
TI1221 (PCMCIA)	ON	Power down	Power down	Power Off
Sound	ON	Power down	Power Off	Power Off
LCD Backlight	ON	Power down	Power Off	Power Off
Serial (UART1)	ON	Power down	Power down	Power Off
IR Port (UART2)	ON	Power down	Power Off	Power Off
Modem	ON	Power down	Power down	Power down
Parallel	ON	Power down	Power Off	Power Off

Device PM Control/Stand By Mode

Device	Power Down Controlled By	Description
CPU	Hardware	Controlled by SUS_STAT#1 pin
MTXC/440BX	Hardware	Controlled by SUS_STAT#1 pin
VGA Chip	Software	Controlled by GPO[8] pin
PCMCIA Controller	Software	Controlled by GPO[30] pin
Super I/O Chip	Software	SMC769 support power down command
KBC	Working	
FDD	Software	FDD support power down command

Device	Power Down Controlled By	Description
HDD	Software	HDD support power down command
CD-ROM	Software	CD-ROM support power down command
Audio Chip	Software	Enter PCI PM D3hot state
Audio AMP	Software	Controlled by GPO[23] pin
Modem	Software	Enter PCI PM D3hot state
IR Module	Software	IR support power down command
LCD Backlight	Hardware	Controlled by VGA chip (FPBACK pin
Clock Synthesizer	Hardware	Controlled by CPUSTP# and PCISTP# pin)
PIC 16C62	Working	
MAX3243(RS232 Transceiver)	Software	Controlled by GPO[13] pin
L2 CACHE	Software	Controlled by GPO[19] pin

Device PM Control/STR Mode

Device	Power Down Controlled By	Description
MTXC/440BX	Hardware	Controlled by SUS_STAT#1 pin
Super I/O Chip	Hardware	Controlled by SUSB# Pin
VGA Chip	Software	Controlled by GPO[8] pin
HDD	Hardware	Controlled by SUSB# Pin
CD-ROM	Hardware	Controlled by SUSB# Pin
PCMCIA Controller	Software	Controlled by GPO[30] pin
Modem	Hardware	Controlled by SUSB# Pin
FDD	Hardware	Controlled by SUSB# Pin
Audio Chip	Hardware	Controlled by SUSB# Pin
Audio AMP	Hardware	Controlled by SUSB# Pin
IR Module	Hardware	Controlled by SUSB# Pin
LCD Backlight	Hardware	Controlled by VGA Chip FPBACK pin
Clock Synthesizer	Hardware	Controlled by SUSB# Pin
KBC	Software	Controlled by M38867 power down command
MAX3243(RS232 Transceiver)	Hardware	Controlled by GPO[13] pin
L2 CACHE	Hardware	Controlled by SUSB# Pin
PIC 16C62	Software	Controlled by PIC 16C62 power down command

Device PM Control/Stand By Mode

Device	Power Down Controlled By	Description
MTXC/440BX	Hardware	Power Off
Super I/O Chip	Hardware	Power Off
VGA Chip	Hardware	Power Off
HDD	Hardware	Power Off
CD-ROM	Hardware	Power Off
PCMCIA Controller	Hardware	Power Off
Modem	Hardware	Supply Ring Power
FDD	Hardware	Power Off
Audio Chip	Hardware	Power Off
Audio AMP	Hardware	Power Off
IR Module	Hardware	Power Off
LCD Backlight	Hardware	Power Off
Clock Synthesizer	Hardware	Power Off
KBC	Hardware	Power Off
MAX3243(RS232 Transceiver)	Hardware	Power Off
L2 CACHE	Hardware	Power Off
PIC 16C62	Software	Controlled by PIC 16C62 power down command

ACPI

This section provides the ACPI software function of the notebook.

General Requirements

The BIOS must meet the following general Power Management requirements.

- Refers to the portion of the firmware that is compatible with ACPI specifications.
- Support for Suspend-to-RAM (S3 state) and Suspend-to-Disk mode (S4 state).
- Support the Wake up event from Modem Ring in S2~S5 state. This is enabled by a CMOS Setup option.
- Support the Wake up event from RTC Time/Date alarm in S2~S5 state. This is enabled by a CMOS Setup option.
- Power Management must not substantially affect or degrade system performance.

Global System State Definitions

Global system states (Gx states) apply to the entire system and are visible to the user. The following are various system states:

G2/S5 – Soft Off

Power is removed from most of system components except Suspend wakeup logic in PIC and RTC. Refer to the next section on wake up events.

G1 – Sleeping

- CPU is in stop clock mode (core logic in stop clock mode also).
- Clock chip is in Power down Mode.
- VGA chip is in suspend mode, LCD power is removed.
- PCMCIA chip is in sleep mode.
- Hard disk is in sleep mode.
- CD-ROM is in sleep mode.
- Modem is in power down mode.

G0 – Working

This is a computer's state where the system dispatches user mode (application) threads for execution. In this state, the devices (peripherals) power states are dynamically changed. The user selects (through some user interface) various performance/power characteristics of the system for optimal software performance or battery life. The system responds to external events in real time. It is neither safe nor recommended to disassemble the machine in this state.

Sleeping State Definitions

Sleeping states (Sx states) are types of sleeping states within the global sleeping state, G1. The Sx states are briefly defined:

S1 - Sleeping State

The S1 sleeping state is a low wake-up latency sleeping state. In this state, no system context is lost (CPU or chip set) while the hardware maintains all system context.

S2 – Sleeping State

The S2 sleeping state is a low wake-up latency sleeping state. This state is similar to the S1 sleeping state except that the CPU and system cache context is lost. The OS is responsible for maintaining the caches and CPU context. Control starts from the processor's reset vector after the wake-up event.

S3 – Sleeping State

The S3 sleeping state is a low wake-up latency sleeping state where all system context is lost except system memory. CPU, cache, and chip set context are lost in this state. Hardware maintains memory context and restores some CPU and L2 configuration context. Control starts from the processor's reset vector after the wake-up event.

S4 – Sleeping State

The S4 sleeping state has the lowest power and the longest wake-up latency sleeping state supported by ACPI. In order to reduce the power to a minimum, it is assumed that the hardware platform has powered off all devices. All platform context is saved to disk.

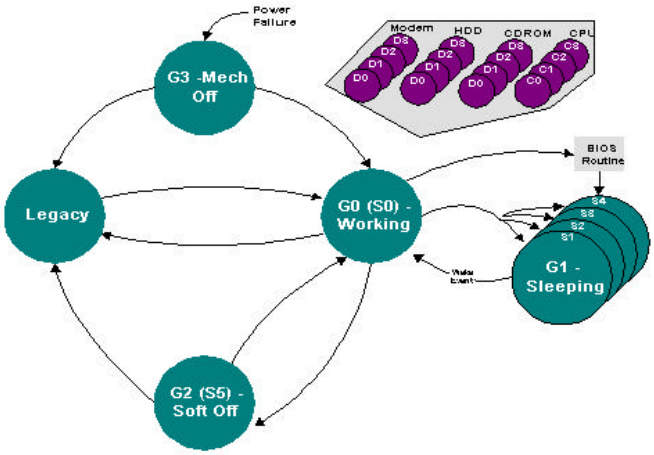
S5 – Soft Off State

The S5 state is similar to the S4 state except the OS does not save any context nor enable any devices to wake the system. The system is in the Soft Off state and requires a complete boot when awakened. To distinguish whether or not the boot is going to wake from a saved memory image, and allow for initial boot operations within the BIOS, a different state value is used to depict between the S5 state and the S4 state.

Power States

The following diagram visually interprets the system's power states.

System Power States



Power States Transition Event

The following table summarizes the entry and wake-up events of each power state:

Transition Events

Power State	Entry Event	Wake Up Event
S1	OSPM* control	Predefined Mem/IO range access Ring Indicator Keystroke IRQ1-15 SMI# / ACPI SCI# / USB
S2	OSPM control	Predefined Mem/IO range access Battery Warning Battery Low Ring Indicator Keystroke (Int., Ex. And USB keyboard) Mouse movement Schedule Alarm SMI# / ACPI SCI# / USB
S3	OSPM control Sleep Button Lid Close	Sleep Button Ring Indicator Schedule Alarm Lid Open PME# Battery Low
S4	OSPM control Fn + Sleep Button	Sleep Button Ring Indicator Schedule Alarm PME#
S5	OSPM control	

* OSPM: OS-directed Power Management.

Battery Management

The following section describes battery management indicators.

Battery Subsystem

The AMBER supports both the Li-Ion and the Ni-MH Battery Pack. Only one battery pack is activated at a time.

- The charger will stop charging the battery with following conditions:
  - The temperature of the system is too high
  - The battery voltage is too high.
- Battery Life — 2.5 to 3 Hours.
- Battery reading methodology is through M38867 SMBus.

> **Note:** The battery life depends on the system configuration. The battery life becomes shorter with the CD-ROM running or the PMU disabled. The battery life is extended with document key-in only or if the PMU is enabled.

Battery Warning

When the battery capacity remains at 8% (Windows 98 default is 10%), the M38867 generates a battery warning SMI.

- The Power LED light is yellow.
- The system issues a warning (3 beeps).

Battery Low

When the battery capacity remains at 3% (Windows 98 default is 3%), the system generates a battery low SMI.

- The Power LED light is amber.
- The system enters Suspend-To-Disk mode even when the power management is disabled.
- The power-on and Resume functions are inhibited until the battery low condition is removed.

AC Adapter

When you plug in the AC adapter, the following occurs:

- The battery charges.
- The Battery Charging Indicator is lit while the battery is in charging mode.
- The power management function is disabled if the Power Management Mode setup parameter is set to Battery Only.
- The Battery Warning and Battery Low conditions are removed.

PIC16C62 – uP

The micro controller PIC16C62 acts as a supplement for power management control. It supports many functions via SMBus interface.

System Communication with PIC16C62

The system communicates with PIC16C62 via SMBus interface. The SMBus host (M38867) is initialized before starting the transaction. The following is the procedure for system communication with PIC16C62.

1. Enable SMBus interface by writing 01h to SmbHstCfg register.
2. Get SMBus I/O port base address by reading from SmbBA register.
3. Clear SMBus status by writing 1Eh to SmbHstSts register.
4. Write the PIC16C62 slave address to SmbHstAdd register.
   - Send command to PIC16C62 -- Slave address is 04h.
   - Read data from PIC16C62 -- Slave address is 05h.
5. Write the desired command to SmbHstCmd register.
6. Write the desired parameters to SmbHstDat0(High byte) and SmbHstDat1(Low byte) registers if the system wants to send commands to PIC16C62.
7. Wait for SMBus interrupt occurred by monitoring SmbHstSts register INTR bit.
8. Get the desired data by reading from SmbHstDat0(High byte) and SmbHstDat1(Low byte) registers if the system wants to read data from PIC16C62.

PIC16C62 Command List

The micro controller PIC16C62 (called micro-P or uP) acts as a supplement for power management control and supports the functions described in the following table:

Command List

Command/Data	Access	Unit	Function Description
0x00			Reserved
0x01	read	word	Read PIC software version
0x02	read	byte	Read LCD contrast level (DAC)
0x03	read	byte	Read LCD brightness level (DAC)
0x04	read	word byte 0 byte 1	Read primary battery DQ_NAC NACH NACL
0x05	read	word byte 0 byte 1	Read primary battery DQ_LMD&NACH DQ_LMD DQ_NACH
0x06	read	byte	Read primary battery DQ_FLGS1
0x07	read	byte	Read primary battery DQ_TMPGG
0x08	read	byte	Read primary battery DQ_FLGS2
0x09	read	byte	Read primary battery DQ_PPD
0x0A	read	byte	Read primary battery DQ_PPU
0x0B	read	byte	Read primary battery DQ_VSB 2014
0x0C	read	byte	Read primary battery DQ_VTS 2014
0x0D	read	word byte 0 byte 1	Read primary battery DQ_NAC NACH NACL
0x0E	read	word byte 0 byte 1	Read primary battery DQ_LMD&NACH DQ_LMD DQ_NACH
0x0F	read	byte	Read secondary battery DQ_FLGS1
0x10	read	byte	Read secondary battery DQ_TMPGG
0x11	read	byte	Read secondary battery DQ_FLGS2
0x12	read	byte	Read secondary battery DQ_PPD
0x13	read	byte	Read secondary battery DQ_PPU
0x14	read	byte	Read secondary battery DQ_VSB
0x15	read	byte	Read secondary battery DQ_VTS

Command/Data	Access	Unit	Function Description
0x16	read	word	Read battery chemistry characteristic
		byte 0	primary battery 0x00:non-battery 0x02:Li-ION 0x03:Ni-MH
		byte 1	secondary battery 0x00:non-battery 0x02:Li-ION 0x03:Ni-MH
0x17	read	word	Read primary battery NACL1,NACL2 at interval of 20s
		byte 0	NACL2
		byte 1	NACL1
0x18	read	word	Read secondary battery NACL1,NACL2 at interval of 20s
		byte 0	NACL2
		byte 1	NACL1
0x19	read	word	Read LCD contrast/brightness
		byte 0	brightness
		byte 1	contrast
0x1A	reserved		
0x1B	reserved		
0x1C	reserved		
0x1D	reserved		
0x1E	reserved		
0x1F	reserved		
0x20	write	byte	System command
0x20/00			NOP
0x20/01			System suspend request
0x20/02			System resume from suspend
0x20/03			Mask PICSMI, BAT_L, BAT_LL
0x20/04			Enable PICSMI, BAT_L, BAT_LL
0x20/05			Battery low LED blinks
0x20/06			Turn off battery low LED
0x20/07			AC Adapter plugged in
0x20/08			AC Adapter unplugged
0x20/09			System power off
0x20/0A			Used in SMB system
0x20/0B			Used in DQ battery system
0x20/0C			Sound single set alarm beep
0x20/0D			Turn off single set alarm beep

Command/Data	Access	Unit	Function Description
0x20/0E			Blinking battery low LED Sound single set alarm beep
0x20/0F			Turn off battery low LED Turn off single set alarm beep
0x20/10			Sound alarm beep twice per minute
0x20/11			Turn off twice per minute beep alarm
0x20/12			Blinking battery low LED Sound alarm beep twice per minute
0x20/13			Turn off battery low LED Turn off twice per minute beep alarm
0x20/14			Enable LCD VEENA
0x20/15			Disable LCM VEENA
0x20/16			System resume from suspend Issue a low pulse 100mS
0x20/17			Set suspend LED ON
0x20/18			Set suspend LED OFF
0x20/19			Stop PWM1 & PWM2 function
0x20/1A			Resume PWM1 & PWM2 function
0x20/1B			Mask modem ring resume
0x20/1C			Enable modem ring resume
0x21	write	byte	Set LCD contrast level
0x22	write	byte	Set LCD contrast max. value
0x23	write	byte	Set LCD contrast min. value
0x24	write	word byte 0 byte 1	Set LCD adjust scale contrast scale brightness scale
0x25	write	byte	Set LCD brightness level
0x26	write	byte	Set LCD brightness max. value
0x27	write	byte	Set LCD brightness min. value
0x28	write	word	First power on set LCD contrast, brightness level & for POST reset BAT_L, BAT_LL signal * LED
		byte 0 byte 1	contrast brightness
0x29	reserved		

Command/Data	Access	Unit	Function Description
0x2A	write	word byte 0	Write data to primary battery: BQ2010 command I 0x80 (set bit7) 83H: write NACH 84H: write BATID 85H: write LMD 8CH: write VTS 2014 only
		byte 1	Data
0x2B	write	word byte 0	Write data to secondary battery: BQ2010 command I 0x80 (set bit7) 83H: write NACH 84H: write BATID 85H: write LMD 8CH: write VTS 2014 only
		byte 1	Data

Miscellaneous

The following section describes security and SMBIOS support.

Security

The user may enter up to eight standard text characters for a password. The password includes two levels. The higher priority is the Supervisor Password. The lower priority is the User Password. The Supervisor Password can access all the system resources, while the User Password may not access the floppy disk while it is protected by a Supervisor Password.

When the security function is enabled, the system will request the user to enter a password:

- Power On — The system will prompt the user to enter a password before booting the OS. If the user enters the wrong password three times, the system will halt.
- Resume — The system will prompt the user to enter a password while resuming from STR or STD mode. If the user enters the wrong password three times, the system will not resume and it will return to Suspend mode.
- Entering CMOS Setup — The system will prompt the user to enter a password before entering the CMOS Setup. If the user enters the wrong password three times, the system will halt.

SMBIOS Support

System Management BIOS 2.1 supports DMI 2.0 interface.

CMOS Setup Utility

The Setup utility is used to configure the system. The Setup contains the information regarding the hardware for boot purposes, and the changed settings will take effect following a system reboot. For more detailed information on running the BIOS Setup Program, refer to Chapter 1.

4

Hardware Functional Overview

- Overview
- System Hardware Block Diagram
- Chipset Summary
- System Processor (CPU)
- System Core Logic
- Clock Frequency Generator
- Cache Memory
- System Memory
- System BIOS
- Video Subsystem
- I/O Subsystem
- PCMCIA Controller
- Audio Subsystem
- Keyboard and Pointing Device
- Disk Drives Subsystem
- Micro-P Subsystem (PIC-16C62)

Overview

The Versa Note Series consists of several major functions and subsystems including:

System Processor - implemented on the motherboard with MMC-1 slot using Intel Mobile Module (IMM) Tillamook or Pentium II CPU.

- System Core Logic - implemented on the motherboard using the Intel PIIX4E PCI chipset which integrates the following:

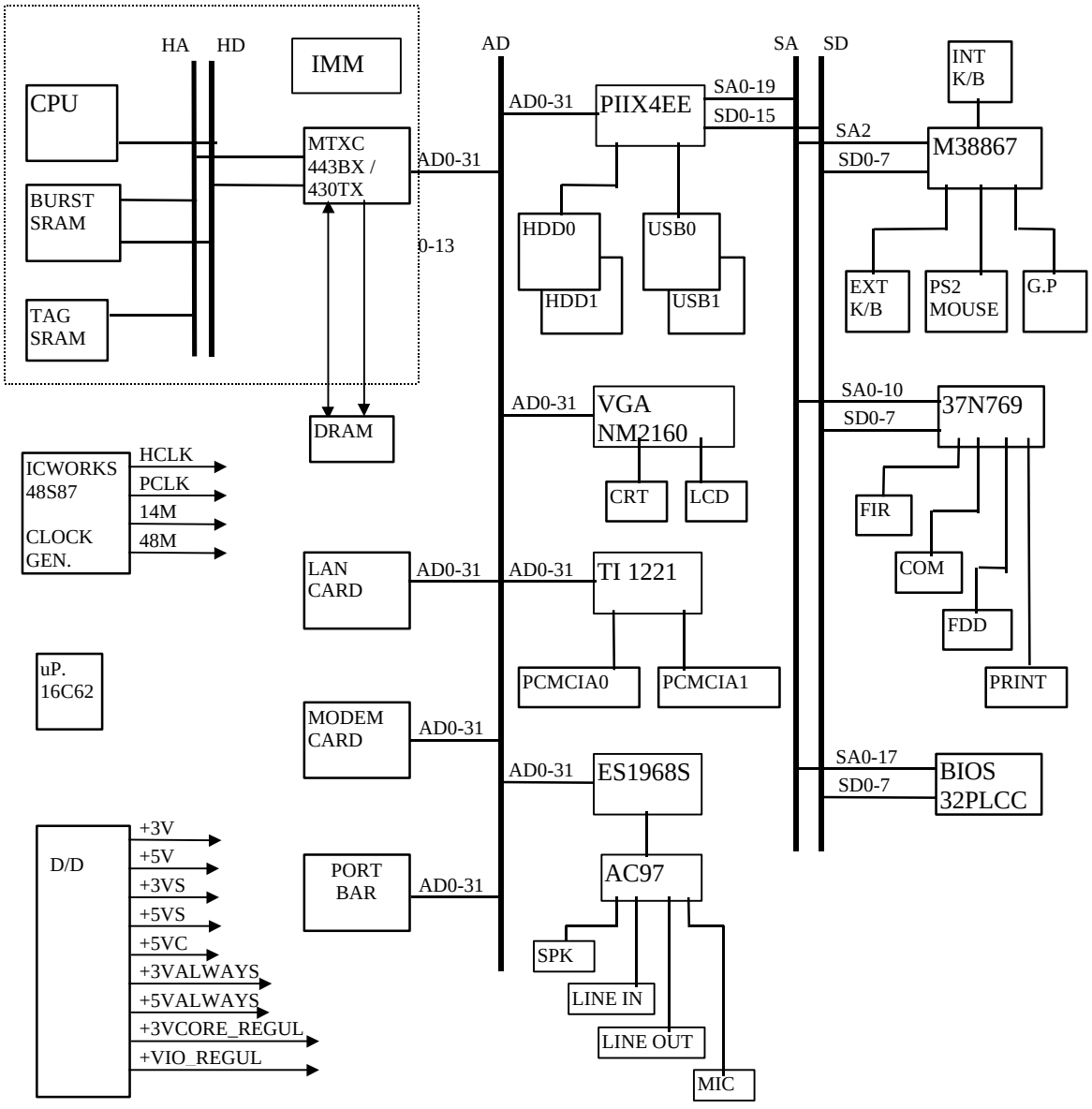
  — Enhanced IDE Interface for HDD, CD-ROM, and IDE Device Bay

  — USB Interface for the CCD Camera and external USB port

- Clock Frequency Generator - implemented on the motherboard using the IMI XG571 clock generator chip.
- Cache Memory Subsystem - implemented on the Intel Mobile Module (IMM) using TAG RAM and DATA RAM.
- Video Subsystem - implemented on the motherboard, and on the LCD Panel for supporting the LCD and CRT.
- PCMCIA Subsystem - implemented on the motherboard using the TI PCI1221 PCMCIA controller chip.
- Audio Subsystem - implemented on the motherboard.
- Keyboard and Pointing Device Subsystem - implemented on the AIO board, the Keyboard assembly, and the Glidepad assembly.
- I/O Subsystem - implemented on the motherboard using the SMC FDC37N769 Super I/O Controller chip.
- Modem Feature Card - implemented on the motherboard via the PCI bus and Modem module assembly.
- Port Bar - implemented on the motherboard and the Port Bar assembly.
- Power Subsystem - implemented on the DC-DC board, LCD Inverter Board, Battery Pack, and AC adapter.
- Micro-P Subsystem - implemented on the motherboard using PIC 16C62.

System Hardware Block Diagram

System Hardware Block Diagram



Note: The Video, PCMCIA, and Sound subsystem are PCI-bus design. All of the core commands are synchronized by PCI clock to improve performance.

Chipset Summary

The notebook consists of the following major chipsets:

Controller Chip	Vendor	Description
Processor	Intel	Tillamook or Pentium-II Intel Mobile Module (IMM) at 233/266 MHz
Core Logic	Intel	440BX - MTXC(82443BX) & PIIX4(82371EB)
Video Controller	NeoMagic	NM2160 (NMG4)
PCMCIA Controller	TI	PCI 1221
Super I/O Controller	SMC	FDC37C769FRLV
Audio Chip	ESS	ES1968S (Maestro-2)
Audio Codec	Audio Codec	WM9701
Audio Amplifier	TI	TDA0102
Keyboard Controller	Mitsubishi	M38867
PMU Controller	MicroChip	PIC16C62 (SSOP)
Gas Gauge IC	Benchmarq	BQ2092
ROM BIOS	SST	29EE020, Boot Block Structure
Clock Generator	IMI	IMI XG571
Modem	Lucent	DSP1646 (Mars II)

System Processor (CPU)

The Versa Note runs on Intel Mobile Module (IMM) based on MMC-1 pin assignment. It supports Intel Pentium-II with 233/266 MHz and Tillamook (IMM) CPU with 233 MHz clock speed. The processor operates in conjunction with the RAM and ROM memory and the system control logic (e.g. Intel 440BX - 82443BX MTXC) to process software instructions (BIOS, Windows, and Applications).

Mobile Pentium II Features

The Intel Pentium II processor Mobile Module (280-pin MMC-1) is a small, highly integrated assembly containing an Intel Pentium II mobile processor and its immediate system-level support. Specifically, the processor module contains a power supply for the processor's unique voltage requirements, a system Level 2 cache memory and the core logic required to bridge the processor to the standard system buses. The module interfaces electrically to its host system via a 3.3-volt PCI bus, a 3.3-volt memory bus and some Intel 443BX Host Bridge control signals.

Features summary of the Mobile Pentium II CPU:

- 233 and 266 MHz clock speeds: Mobile Pentium II processors deliver higher Intel mobile processor performance - offering a 10-35% performance improvement over mobile Pentium processors with MMX technology at equivalent MHz.
- Compact Form-Factors: To accommodate mobile PCs of various sizes, weights, and price points, mobile Pentium II processors are available in Intel Mobile Module or Mini-Cartridge package. This notebook only supports IMM. Intel's Mobile Module combines the CPU, high-speed L1 and L2 cache, and other supporting components, into a convenient all-in-one unit.
- 0.25 Micron Technology: mobile Pentium II processors are built using Intel's breakthrough 0.25 micron manufacturing process. This innovative process makes it possible for these CPUs to include over 7.5 million transistors in the core - resulting in more power in less space.
- Dual Independent Bus: The mobile Pentium II processor's Dual Independent Bus (DIB) architecture offers up to three times the bandwidth performance over single-bus processors. By combining two independent system buses for simultaneous parallel access to data, mobile Pentium II processors provide an open road for high-demand applications.
- Dynamic Execution: Like their desktop counterparts, mobile Pentium II processors combine three innovative data-processing techniques to manipulate data more intelligently and efficiently. These techniques predict and analyze software instructions to optimize processor workload.
- Wired for Management Support: Promoting reduced Total Cost of Ownership, mobile Pentium II processors conform to Intel's Wired for Management (WfM) specification. These processors benefit from features such as self-testing circuitry, advanced power management, and instrumentation for system monitoring.
- Additional Innovations: While advancing mobile PC performance to even higher standards, the family of mobile Pentium II processors now integrate 512K PBSRAM L2 cache, Quick Start and Deep Sleep modes, thermal sensing, and voltage ID encoding.
- Processor Core Voltage Regulation: Supports 5V to 20V input voltage. Both CPU (2.5V) and I/O voltage (3.3V) are supplied by the module.
- Ready for new technologies such as Windows 98 and NT 5.0.

System Core Logic

The system core logic function of the notebook is implemented on the CPU module and motherboard using the Intel 440BX AGPset. This chipset consists of the 82443BX System Controller found on the CPU module (430TX for Tillamook) and the 82371EB PCI ISA IDE Xcelerator (PIIX4) mounted on the motherboard. The 440BX supports both mobile and desktop architectures.

82443BX Features (for Pentium-II)

The Intel 82443BX Host Bridge provides a Host-to-PCI bridge, optimized DRAM controller and data path, and an Accelerated Graphics Port (AGP) interface. AGP is a high performance, component level interconnect targeted at 3D graphics applications and is based on a set of performance enhancements to PCI.

The 82443BX functions and capabilities include:

- Processor/host bus support
  - — Optimized for Pentium II processor at 66/100MHz system bus frequency
- Integrated DRAM Controller
  - — 8 Mbytes to 512 Mbytes main memory
  - — Supports up to 4 double-sided DIMMs
  - — 64-bit data interface with ECC support (SDRAM only)
  - — Unbuffered and Registered SDRAM (Synchronous) DRAM Support
  - — Enhanced SDRAM Open Page Architecture Support for 16- and 64-Mbit DRAM devices with 2k, 4k, and 8k page sizes
- PCI Bus Interface
  - — PCI Rev. 2.1, 3.3V and 5V, 33MHz interface compliant
  - — PCI Parity Generation Support
  - — Data streaming support from PCI to DRAM
  - — Delayed Transaction support for PCI-DRAM Reads
  - — Supports concurrent CPU, AGP and PCI transactions to main memory
- AGP Interface
  - — Supports single AGP compliant device (AGP-66/133 3.3V device)
  - — AGP Specification Rev 1.0 compliant

- AGP-data/transaction flow optimized arbitration mechanism
- AGP side-band interface for efficient request pipelining without interfering with the data streams
- AGP-specific data buffering
- Supports concurrent CPU, AGP and PCI transactions to main memory
- AGP high-priority transactions support

■ Power Management Functions

- Stop Clock Grant and Halt special cycle translation (host to PCI Bus)
- Mobile and Deep Green Desktop support for system suspend/resume (i.e. DRAM and power-on suspend)
- Dynamic power down of idle DRAM rows
- SDRAM self-refresh power down support in suspend mode
- Independent, internal dynamic clock gating reduces average power dissipation
- Static STOP CLOCK support
- Power-on Suspend mode
- Suspend to DRAM
- ACPI compliant power management

■ Packaging/Voltage

- 492 Pin BGA
- 3.3V core and mixed 3.3V and GTL I/O

■ Supporting I/O Bridge

- System Management Bus (SMB) with support for DIMM Serial Presence Detect
- PCI-ISA Bridge (PIIX4E)
- Power Management Support
- 3.3V core and mixed 5V, 3.3V I/O and interface to the 2.5V CPU signals via open-drain output buffers

82371EE (PIIX4) Features

The 82371EE PCI ISA IDE Xcelerator (PIIX4) is a multi-function PCI device implementing a PCI-to-ISA bridge function, a PCI IDE function, a Universal Serial Bus host/hub function, and an Enhanced Power Management function. As a PCI-to-ISA bridge, PIIX4 integrates many common I/O functions found in ISA-based PC systems - two 82C37 DMA Controllers, two 82C59 Interrupt Controllers, an 82C54 Timer/Counter, and a Real Time Clock. In addition to compatible transfers, each DMA channel supports Type F transfers. PIIX4 also contains full support for both PC/PCI and Distributed DMA protocols implementing PCI-based DMA. The Interrupt Controller has Edge or Level sensitive programmable inputs and fully supports the use of an external I/O Advanced Programmable Interrupt Controller (APIC) and Serial Interrupts. Chip select decoding is provided for BIOS, Real Time Clock, Keyboard Controller, second external microcontroller as well as two Programmable bridges or as a Positive Decode bridge. This allows the use of a subtractive decode PCI-to-PCI bridge such as the Intel 380FB PCIset which implements a PCI/ISA docking station environment.

PIIX4 supports two IDE connectors for up to four IDE devices providing an interface for IDE hard disks and CD-ROMs. Up to four IDE devices can be supported in Bus Master mode while PIIX4 contains support for "Ultra DMA/33" synchronous to DMA compatible devices.

PIIX4 contains a Universal Serial Bus (USB) Host Controller that is Universal Host Controller Interface (UHCI) compatible. The Host Controller's root hub has two programmable USB ports.

PIIX4 supports Enhanced Power Management, including full Clock Control, Device Management for up to 14 devices, and Suspend and Resume logic with Power On Suspend, Suspend to RAM or Suspend to Disk. It fully supports Operating System Directed Power Management via the Advanced Configuration and Power Interface (ACPI) specifications. PIIX4 integrates both a System Management Bus (SMBus) and a Host and Slave interface for serial communication with other devices.

Feature summary of the Intel PIIX4:

- Supported Kits for both Pentium and Pentium II Microprocessors
  - — 82430TX ISA Kit
- 82440LX ISA.DP Kit
  - — Multifunction PCI to ISA Bridge
  - — Supports PCI at 30 MHz and 33 MHz
  - — Supports PCI Rev 2.1 Specification
  - — Supports Full ISA or Extended I/O (EIO) Bus
  - — Supports Full Positive Decode or Subtractive Decode of PCI

- Supports ISA and EIO at 1/4 of PCI Frequency

- Supports both Mobile and Desktop Deep Green Environments
  - 3.3V Operation with 5V Tolerant Buffers
  - Ultra-Low Power for Mobile Environment Support
  - Power-On Suspend, Suspend to RAM, Suspend to Disk, and Soft-OFF System States
  - All Registers are Readable and Restorable for Proper Resume from 0V Suspend
- Power Management Logic
  - Global and Local Device Management
  - Suspend and Resume Logic
  - Supports Thermal Alarm
  - Support for External Microcontroller
  - Full Support for Advanced Configuration and Power Interface (ACPI) Revision 1.0 Specification and OS Directed Power Management
- Integrated IDE Controller
  - Independent Timing of up to 4 Drives
  - PIO Mode 4 and Bus Master IDE Transfers up to 14 Mbytes/sec
  - Supports Ultra DMA/33 Synchronous DMA Mode Transfers up to 33 Mbytes/sec
  - Integrated 16 x 32-bit Buffer for IDE PCI Burst Transfers
  - Supports Glue-less Swap Bay Option with Full Electrical Isolation
- Enhanced DMA Controller
  - Two 82C37 DMA Controllers
  - Supports PCI DMA with 3 PC/PCI Channels and Distributed DMA Protocols (simultaneously)
  - Fast Type-F DMA for Reduced PCI Bus Usage
- Interrupt Controller Based on Two 82C59
  - 15 Interrupt Support
  - Independently Programmable for Edge/Level Sensitivity

— Supports Optional I/O APIC

— Serial Interrupt Input

- Timers Based on 82C54

  — System Timer, Refresh Request, Speaker Tone Output

- USB

  — Two USB 1.0 Ports for Serial Transfers at 12 or 1.5Mbit/sec

  — Supports Legacy Keyboard and Mouse Software with USB-based Keyboard and Mouse

  — Supports UHCI Design Guide

- SMBus

  — Host Interface Allows CPU to Communicate Via SMBus

  — Slave Interface Allows External SMBus Master to Control Resume Events

- Real-Time Clock
- Microsoft Win95 Compliant
- 324 mBGA Package

Clock Frequency Generator

The notebook utilizes the IMI XG571 chip to supply the system clock needed to run the computer. The following are the available clock frequencies:

- System clock :

  Clock generator XG571 support: (running on 3.3Vor 2.5V for Tillamook)

  — 60/66 MHz for Intel Tillamook Mobile CPU at 233 MHz

  — 60/66 MHz for Pentium-II Mobile Module at 233/266 MHz

  30/33 MHz for PCI device bus clock use

  48 MHz for PIIX4EB

  14.318 MHz for PIIX4 refresh, VGA NMG4 & Super I/O use

- 14.318 MHz XTAL for XG571 use
- 32.768 kHz XTAL for RTC real time clock
- 8.0 MHz XTAL for K/B controller use
- 49.152 MHz OSC for sound blaster use

Cache Memory

The Intel Mobile Module has two 100pins TSOP footprints for 512KB direct-mapped write-back L2 cache memory.

System Memory

The memory subsystem, implemented on the motherboard, includes System and Video memory. Primary control for the system memory is provided by the Intel 443BX/430TX System Controller chip.

System Memory

The notebook offers two (2) 64-bit SODIMM (Small Outline Dual Inline Memory Module) sockets for main memory configuration. The three memory sockets accept any standard 144-pin SODIMM modules at 8MB, 16MB, 32MB, 64MB sizes. Memory modules are SDRAM type.

> **Note:** Refer to Chapter 2 on System Upgrade to know more about upgrading the system memory and the possible memory configurations.

Video Memory

The video memory of the notebook is embedded inside the VGA controller chip. 128-bit bus (NMG4) interface with 2MB video memory that can support display resolutions of up to 1024 x 768 at 256K colour (TFT LCD).

System BIOS

The notebook utilizes the Phoenix BIOS 4.0 Release 6.0 (Basic I/O System) that contains both the main system BIOS and the VGA BIOS with Shadow BIOS capability. It utilizes Flash EPROM BIOS which allows instant erasing and programming without replacing the EPROM chip.

The BIOS is stored in a 32-pin PLCC package FLASH ROM 29EE020 120ns with 4Mbit size and is mounted into the motherboard. While posting the system, the Shadow RAM will be enabled and the ROM will be disabled.

Video Subsystem

The video subsystem, implemented on the motherboard and the LCD panel, controls the display output to both the LCD Panel screen and to the external VGA port.

Video Chip Controller

The video subsystem utilizes the NeoMagic 2160 (NMG4) MagicGraph 128XD VGA accelerator chip which supports simultaneous display, linear address, PCI local bus, and single 3.3V operation including LCD.

Feature Summary of the NMG4:

- 128-bit integrated graphics and video accelerator with XGA support, MagicPass EMI reduction, and 3D acceleration.
- Small 176-pin package, ultra low power operation, 3.3V or mixed 3.3/5V operation.
- CRT Display Features:
  - VGA: Supports TFT CRT @ 85Hz Simultaneous modes with 75Hz CRT 256, 64K, 16M colours at 640x48
  - SVGA: Supports TFT CRT @ 85Hz Simultaneous modes with 75Hz CRT 256, 64K colours at 800x600
  - XGA: Supports TFT CRT @ 75Hz Simultaneous modes with up to 75Hz CRT 256, 64K colours at 1024x768
  - 16M colours Video playback in all modes
- Video Acceleration Features:
  - Video acceleration over 30fps with 16M displayable colours in all modes
  - Bandwidth designed to support MPEG2 video acceleration at 1024x768 resolution
  - Hardware video overlay with Horizontal and Vertical bilinear scaling and filtering with interpolation. Scaling to any arbitrary ratio up to full screen
- Mobile 3D - Superior 128-bit 3D Acceleration Enhancements:
  - 3D acceleration hardware. First 3D acceleration on notebooks in under 1/2 Watt
  - Bus Master capability allows CPU and accelerator concurrency. First notebook accelerator with Bus Master acceleration
  - 132Mbytes/second PCI bus transfer support
- MagicPass(tm) EMI Reduction Features:
  - MagicPass EMI reduction function reduces panel EMI and cable interface EMI from 5-20 dB (patent-pending)
  - Compatible with standard digital & LVDS & PanelLink panels

— Compatible with XGA, SVGA, and VGA panel types (TFT)

- Video Capture / Live Video Input / MPEG Input Port:

  — MagicVideoPort(TM) multimedia input port, Zoom Video compatible input support

  — Live video capture/MPEG playback with frame double-buffering

  — TV Output and Panel Operation

- Software Support:

  — Microsoft(r) Windows(tm) 3.11 and Win J with DCI(tm) support

  — Windows95(tm) and Windows 95 J

  — DirectDraw(tm), DirectVideo(tm), ActiveMovie(tm), and DCI 1.6 support for Video for Windows(tm)

  — VPM and VPE video capture support under Windows95 and Windows NT 4.0

  — OS/2(r) 2.X, Warp(tm) 3.0 & 4.0

  — Windows NT(tm) 3.5X; Windows NT 4.X

  — ACPI support

- Full-featured VGA(tm) compatible BIOS

  — VESA 1.2 and 2.0 extensions (VBE 2.0)

  — Power Management Interface support

  — VESA Flat Panel Extensions (FPE 1.0)

  — System Management Interface (SMI)

Video Clock

IMI XG571 provides 14.318 MHz input to generate VGA internal slate machine, MCLK, and DCLK. The PIIX4 chip also provides 32.768 kHz O/P for video RAM refresh.

I/O Subsystem

The I/O (Input/Output) Subsystem of the notebook is implemented on the motherboard using the SMC FDC37N769. It is a 3.3V PC97 compliant Super I/O controller with Infrared support. The I/O chip provides the interface for the serial port, printer port, IR port, and floppy disk drive.

The FDC37N769 utilizes SMC's proven SuperCell technology and is optimized for motherboard applications. It incorporates SMC's true CMOS 765B floppy disk controller, advanced digital separator, 16-byte data FIFO, and two 16C550 compatible UARTs. It also incorporates one Multi-Mode parallel port with ChiProtect circuitry plus EPP and ECP support, game port chip select logic and two floppy direct drive support.

Features Summary of the FDC37N769 chip:

- 3.3Volt Operation
- Intelligent Auto Power Management
- 16 Bit Address Qualification (optional)
- 2.88 MB Super I/O Floppy Disk Controller
  - — Licensed CMOS 765B Floppy Disk Controller
  - — Supports Two Floppy Drives Directly
  - — Supports Vertical Recording Format
  - — 16 Byte Data FIFO
  - — 100% IBM Compatibility
  - — Sophisticated Power Control Circuitry (PCC) including Multiple Power-Down Modes for Reduced Power Consumption
  - — DMA Enable Logic
  - — Data Rate and Drive Control Registers
  - — Swap Drives A and B
  - — Non-Burst Mode DMA option
  - — Forceable Write Protect and Disk Change Controls
- Enhanced Digital Data Separator
  - — 2 Mbps, 1 Mbps, 500 Kbps, 300 Kbps, 250 Kbps Data Rates
  - — Programmable Precompensation Modes

- Serial Ports
  - — Two High Speed NS16C550 Compatible UARTs with Send/Receive 16 Byte FIFOs
  - — Supports 230k and 460k Baud
  - — Programmable Baud Rate Generator
  - — Modem Control Circuitry
- Infrared Communications Controller
  - — IrDA v1.1 (4Mbps), HPSIR, ASKIR, Consumer IR Support
- Multi-Mode Parallel Port with ChiProtect
  - — Standard Mode
  - — IBM PC/XT, PC/AT, and PS/2 Compatible Bi-directional Parallel Port
  - — Enhanced Parallel Port (EPP) Compatible
  - — EPP 1.7 and EPP 1.9 (IEEE 1284 Compliant)
  - — Extended Capabilities Port (ECP) Compatible (IEEE 1284 Compliant)
  - — ChiProtect Circuitry for Protection Against Damage Due to Printer Power-On
- Game Port Select Logic
- General Purpose Address Decoder
- 100 Pin TQFP Package

PCMCIA Controller

The PCMCIA controller of the notebook is implemented on the motherboard using the Texas Instruments PCI-1221 PC Card Controller. The notebook supports PCMCIA double deck slots that support insertion of two Type I/II cards at the same time; or one Type III card. The Type III card is inserted into the bottom slot. For ZV function PC cards, you insert it into the top slot.

The TI PCI1221 is a high-performance PC Card controller with a 32-bit PCI interface. The device supports two independent PC Card sockets compliant with the 1995 PC Card Standard. The PCI1221 provides a rich feature set that makes it the best choice for bridging between PCI and PC Cards in both notebook and desktop computers. The 1995 PC Card Standard retains the 16-bit PC Card specification defined in PCMCIA Release 2.1, and defines the new 32-bit PC Card, CardBus, capable of full 32-bit data transfers at 33MHz. The PCI1221

supports any combination of 16-bit and CardBus PC Cards in the two sockets, powered at 5V or 3.3V, as required.

The PCI1221 is compliant with the latest PCI Bus Power Management Specifications. It is also compliant with PCI Local Bus Specification 2.1, and its PCI interface can act as a PCI master device or a PCI slave device. The PCI bus mastering is initiated during 16-bit PC Card direct memory access (DMA) transfers or CardBus PC Card bridging transactions.

Feature Summary of the TI1221:

- Peripheral Component Interconnect (PCI) Power Management Compliant
- ACPI 1.0 Compliant
- Packaged in 256-Pin BGA
- PCI Local Bus Specification Revision 2.1 Compliant
- 1995 PC Card Standard Compliant
- 3.3V Core Logic with Universal PCI Interfaces Compatible with 3.3V and 5V PCI Signalling Environments
- Mix-and-Match 5V/3.3V PC Card16 cards and 3.3V CardBus cards
- Supports Two PC Card or CardBus Slots with hot insertion and removal
- Uses Serial Interface to TI TPS2206 Dual Power Switch
- Supports Burst Transfers to Maximize Data Throughput on Both PCI Buses
- Supports Serialized Interrupt request (IRQ) with PCI Interrupts
- 8-Way Legacy IRQ Multiplexing
- System Interrupts can be programmed as PCI Style or Industry Standard Architecture (ISA-IRQ) Style
- ISA-IRQ Interrupts can be serialized onto a single IRQ Serial (IRQSER) Pin
- EEPROM Interface for loading subsystem ID and subsystem Vendor ID
- Pipelined architecture allows greater than 130Mbytes per second throughput from CardBus to PCI and from PCI to CardBus
- Supports Zoom Video with internal buffering
- Programmable output select for CLKRUN
- Four general purpose I/Os
- Multifunction PCI device with separate configuration space for each socket

- Five PCI Memory Windows and two I/O Windows available to each CardBus socket
- Exchangeable Card Architecture (ExCA) compatible registers are mapable in memory and I/O space
- Supports Distributed DMA (DDMA) and PC/PCI DMA
- Intel 82365SL-DF Register Compatible
- Supports 16-Bit DMA on both PC Card Sockets
- Supports Ring Indicate, SUSPEND, PCI CLKRUN, and CardBus CCLKRUN
- Advanced Submicron, Low-Power CMOS Technology
- Provides VGA/Palette Memory and I/O and Subtractive Decoding Options
- LED Activity Pins
- Supports PCI Bus Lock (LOCK)

Audio Subsystem

The audio subsystem is implemented on the audio board using the ESS ES1968S (Maestro-2) PCI audio controller chip. An internal two-way mini speaker and microphone provide the notebook with mobile sound generation and recording capabilities. In addition, a set of 3.5mm bayonet socket (1/8" minijack) connectors allow for external microphone, line inputs, and headphone outputs.

- The ESS ES1968S (Maestro-2) digital audio accelerator is a highly integrated PCI audio solution that brings advanced audio features to notebook and desktop systems. These features include a 64-voice wavetable synthesizer with Downloadable Sample (DLS) and complete DirectSound acceleration. The Maestro-2 proprietary technology supports both Microsoft PC97 and PC98 logo requirements and DOS game compatibility. WaveCache technology reduces the system cost by storing data in host memory. The data is retrieved using high-speed PCI bus cycles during playback or recording.
- Microsoft's DirectSound API is accelerated by digitally mixing as many as 32 PCM streams of any frequency down to a single output stream of 48 kHz. This final buffer can then be piped to any CODEC available to the system. This acceleration frees up the CPU to perform other tasks.
- The Maestro-2 audio accelerator supports a number of different legacy audio schemes, including Distributed DMA protocol, PC/PCI DMA, and Transparent DMA. This ensures complete DOS game compatibility over the PCI bus.

- The Maestro-2 power management complies with Advanced Power Management (APM) 1.2, Advanced Configuration and Power Interface (ACPI) 1.0, and PCI Power Management Interface (PPMI) 1.0.

Features Summary of the Maestro-2:

- 500-MIPS-equivalent processor performance to accelerate multi-stream PC audio
- 64-Voice wavetable synthesizer
- Proprietary WaveCache technology
- HRTF 3D positional audio under DirectX 5.0
- Enhanced effects (reverb, chorus, echo, vibrato, etc.)
- Distributed and PC/PCI DMA, Compaq/Intel serial IRQ support and Transparent DMA
- AC-3 speaker virtualization
- 2-Button hardware master volume control
- I2S/Zoomed Video Support
- AC'97 CODEC interface
- Up to 20-bit ADC/DAC audio resolution
- Complies with Microsoft's ACPI 1.0 and PPMI 1.0 (D0~D3)
- 3.3V power supply, 5V - input tolerant
- Supports up to 12 GPIO pins
- Secondary CODEC interface
- 100-Pin TQFP package

Keyboard and Pointing Device

The Keyboard Subsystem of the notebook is implemented on the Motherboard and Keyboard Assembly using the Mitsubishi 38867M8 keyboard controller chip and the Phoenix MultiKey/M3886L keyboard controller firmware. This chip controls the internal built-in keyboard, the built-in touchpad pointing device, as well as the external PS/2 keyboard and mouse port. The keyboard controller allows simultaneous use of both the internal and external keyboard and PS/2 mouse.

The Versa Note Series membrane keyboard is an 86-key IBM 101-key enhanced compatible keyboard with standard characters and 12 function keys including an embedded numeric keypad. See Chapter 1 for more information.

The pointing device subsystem consists of the built-in ALPS Touchpad pointing device module on the system top cover assembly and a pre-programmed Mitsubishi 38867M8 micro-controller which connects the mouse device to the Motherboard. The touchpad module is connected to the audio board through a 6-pin FPC cable. An external PS/2 port also supports the use of an external PS/2 compatible mouse which the system automatically detects upon system power up. Both the internal and external mouse run simultaneously.

The ALPS Touchpad, a pointing device for personal computers, detects the position of a finger over a touch-sensitive area. To move the cursor, the user lightly slides a finger over the smooth sensor area. To 'click', the user gently taps on the surface.

The ultra-thin module is the thinnest PCB based touchpad available today. It is a capacitive sensor which detects the finger by measuring its effect on an array of capacitive lines integrated into the PC board. The pad senses both the finger's position and its contact area (X, Y, and Z). The area of contact is a measure of applied pressure. One side of the module PC board is the sensor surface with electronic components mounted on the other side. The sensitive area is protected by a layer of smooth and durable mylar.

The ALPS touchpad communicates with the host via a standard PS/2 mouse or trackball interface. It is fully compatible with the standard Microsoft mouse driver. The module connector includes the PS/2 signal pins, power supply pins and two connections for external button switches.

The ALPS Touchpad includes a special edge-motion feature that allows the user to extend a drag operation when the finger reaches the edge of the sensor pad. The cursor continues to coast in the indicated direction when the finger is held against the edge.

Disk Drives Subsystem

The disk drives subsystem, implemented on the Motherboard, the associated internal hard disk drive assembly and the device bay, provides disk storage for all system software and user files.

The notebook is equipped with a high capacity hard disk drive ranging from 2.1GB to 4.1GB using the Enhanced IDE controller with LBA (Logical Block Addressing) and Ultra DMA mode support.

The PIIX4 controller chip provides the Primary IDE controller for the internal hard disk, and the Secondary Master for the CD-ROM.

The floppy disk drive supports standard 3.5-inch 720KB and 1.44MB mini-diskettes while adding support for 1.2MB (Mode 3) mini-diskettes for the Japanese market.

The notebook uses the TEAC 24X-speed IDE CD-ROM Drive which reads digital data stored on the CD-ROM at a rotational speed which is 24 times faster. The CD-ROM drive supports CD-DA transfer over ATAPI function that the host system can read CD audio data. The drive also supports Photo-CD Multi-session disc compatibility and Multimedia PC-3 specification compatibility.

Power Subsystem

The Power Subsystem consists of the following major sections:

AC Power Adapter

The computer is equipped with a 50W universal AC power adapter that converts AC voltage (100 to 240VAC, 47 to 63Hz) into DC voltage which is used to operate the notebook and charge the batteries.

Internal Battery Pack

When the AC Adapter is not connected to the computer, the computer utilizes Lithium-Ion (Li-Ion) which provides DC power for the notebook and the real time clock battery.

The normal charging time for the Li-Ion battery is approximately 2.5 hours when computer is turned off, and 8 hours when the computer is running. Running time of battery is approximately 2 to 2.5 hours.

DC-DC Module of Motherboard

The DC-DC module receives approximately 12VDC from the battery pack and uses this input voltage to generate multiple regulated output voltages to provide power for all internal notebook board assemblies.

LCD Inverter Board Assembly

The LCD Inverter Board Assembly is located in the LCD Panel Assembly. It converts the +12VDC input directly from the Battery Pack into a high voltage AC output which is used to light the CCFT (Cold-Cathode Fluorescent Tube).

Micro-P Subsystem (PIC-16C62)

The micro controller PIC16C62 acts as a supplement for the power management control. It supports many functions via the SMBus interface.

The system communicates with the PIC16C62 via the SMBus interface. The SMBus host (M38867) should first be initialized before starting the transaction. The following is the procedure used for system communication with PIC16C62:

1. Enable SMBus interface by writing 01h to SmbHstCfg register.
2. Get SMBus I/O port base address by reading from SmbBA register.

3. Clear SMBus status by writing 1Eh to SmbHstSts register.
4. Write the PIC16C62 slave address to SmbHstAdd register.
    - Send command to PIC16C62 -- Slave address is 04h.
    - Read data from PIC16C62 -- Slave address is 05h.
5. Write the desired command to SmbHstCmd register.
6. Write the desired parameters to SmbHstDat0(High byte) and SmbHstDat1(Low byte) registers if the system wants to send command to PIC16C62.
7. Wait for SMBus interrupt occurred by monitoring SmbHstSts register INTR bit.
8. Get the desired data by reading from SmbHstDat0(High byte) and SmbHstDat1(Low byte) registers if the system wants to read data from PIC16C62.

Features Summary of the Micro-P:

- 5 channels 8-bit analogue to digital converter
- Timer0: 8-bit tuner/counter with 8-bit prescaler
- Timer1: 16-bit timer/counter. TMR1 can be incremented during sleep via external crystal/clock
- Timer2: 8-bit timer/counter with 8-bit period register, prescaler and postscaler
- Capture, Compare, PWM module
- Synchronous Serial port (SSP) with SPI and I2C
- Universal Synchronous Asynchronous Receiver Transmitter (USART/SCI)
- Brown-out detection circuitry for Brown-out Reset (BOR)
- 2K bytes program memory
- 128 bytes data memory
- 22 I/O pin
- 8 interrupt sources

5

Maintenance and Disassembly

- Preventive Maintenance
- Required Tools and Equipment
- Field-Replaceable Parts and Assemblies
- Parts Removal and Replacement Procedures

Preventive Maintenance

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

Cleaning the Computer

When it is necessary to clean the plastic case and keyboard, use a soft lint-free cloth, slightly dampened with a mild detergent solution, or use the contents of any commercially available computer cleaning kit.

> ***NOTE:*** Never use alcohol, petroleum-based solvents, or harsh detergents to clean the notebook. Also, do not spray any liquids directly on the computer case, keyboard, or screen. If the liquid-crystal display (LCD) screen is smeared or dusty, clean the screen by first applying a mild glass cleaner to a soft, clean, lint-free cloth, and gently wipe the glass. Never apply liquids directly on the screen surface. Moreover, do not use paper towels to clean the display screen. Paper can scratch the display screen finish.

Protecting the Disk Drives

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

Maintaining the LCD Quality

When it comes to screen problems, heat plays a big part. After a good working session, the typical routine is to shut 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; when you close the cover, you trap the heat against the screen. Leave the computer's cover open for about ten minutes while the heat disperses.

Maintaining the Hard Disk Drive

The hard disk drive is one of the most common parts that which can pose a problem. Here are some preventive maintenance tips to follow when handling the hard disk.

- Always back up the data files from the hard disk.
- Run a virus detection program for possible virus-infected areas on the hard disk.
- Use **SCANDISK** to correct any errors found in the directory and File Allocation Table (FAT). This also frees up space from any unused sectors.
- Never turn the computer off when the hard disk is accessed.

- Never move or raise the computer when the hard disk is accessed. Do not jar the hard disk as this may cause a hard disk crash.
- Use hard disk system tools such as **Disk Defragmenter** for Windows. This reorganizes your hard disk by eliminating fragmentation and improving hard disk access time.

Handling the Computer Battery Packs

The battery packs furnished with the computer require reasonable care and handling to ensure efficient operation and maximum life. The batteries and their terminals should be periodically inspected for evidence of corrosion and 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 or 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 shorten 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 the NEC Versa Note User's Guide.
- Always charge the battery packs as soon as possible after a low battery indication.

Required Tools and Equipment

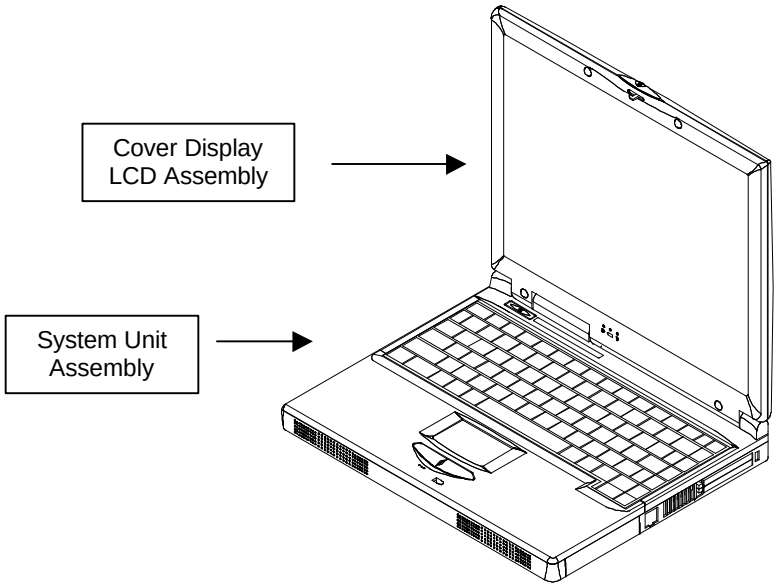
To troubleshoot and repair PC systems properly, you need a few basic tools.

- Tweezers
- Small flat-head screwdriver
- Small Phillips screwdriver
- Regular size 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, use wrist or ankle grounding straps and grounded working mats. When moving or storing items, use the anti-static bags supplied with the items.

Field-Replaceable Parts and Assemblies

The notebook contains two major assemblies: the cover display LCD assembly and the system unit assembly.



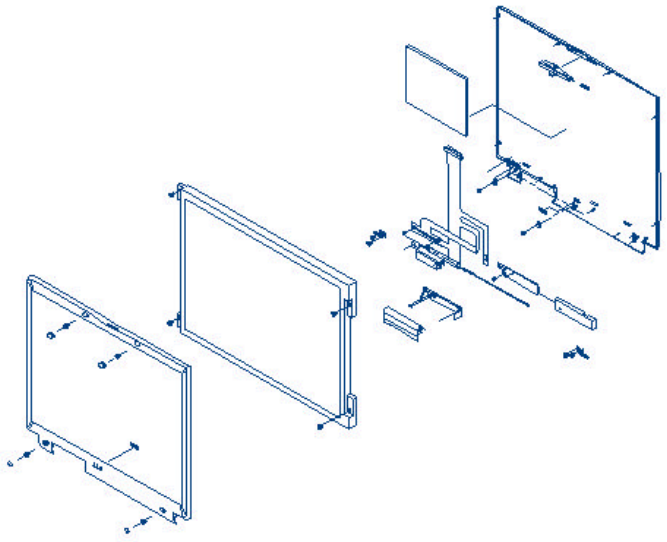
Notebook Assembly

Cover-Display LCD Assembly

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

- LCD Face and Back Panel Cover — These parts cover the entire LCD panel assembly, which includes the LCD display module, the LCD FPC cables, and the inverter board.
- LCD Display Module — 12.1” and 13.3” LCD (Liquid Crystal Display) screen used for output display. This part is assembled together with LCD power inverter board, and LCD cables inside the LCD panel. Handle the notebook carefully to avoid damage to the LCD.

- LCD Power Inverter Board — The Power Inverter Board or PCB (Printed Circuit Board) provides high voltage to the CCFT (Cold Cathode Fluorescent Tube) of the notebook's LCD backlighting. It is connected to the lower side of the LCD display screen and attaches to the back panel by a screw. Exercise safety precautions in handling and servicing this board. The circuit board also includes the function for displaying the power status and battery charge LED indicators.
- LCD FPC Cable — The LCD FPC cable converts output signals from the motherboard in driving the LCD display screen. The cable connects to the back of the LCD panel.



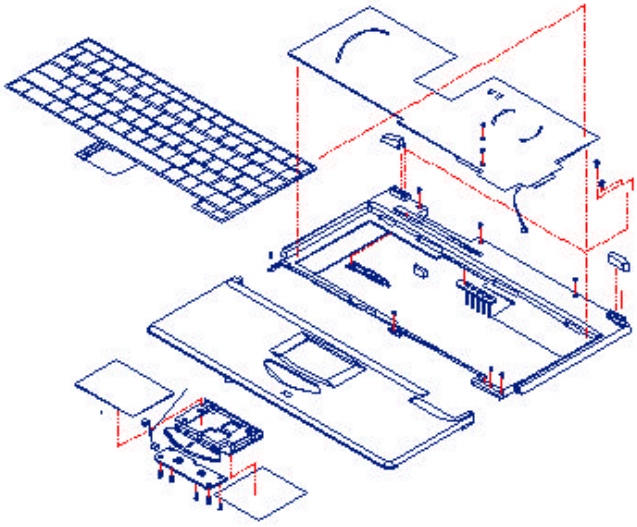
Cover LCD Display Assembly

System Unit Assembly

The system unit assembly consists of several assemblies that are divided into two major sub-assemblies.

- The system top unit assembly.
- The system base unit assembly.

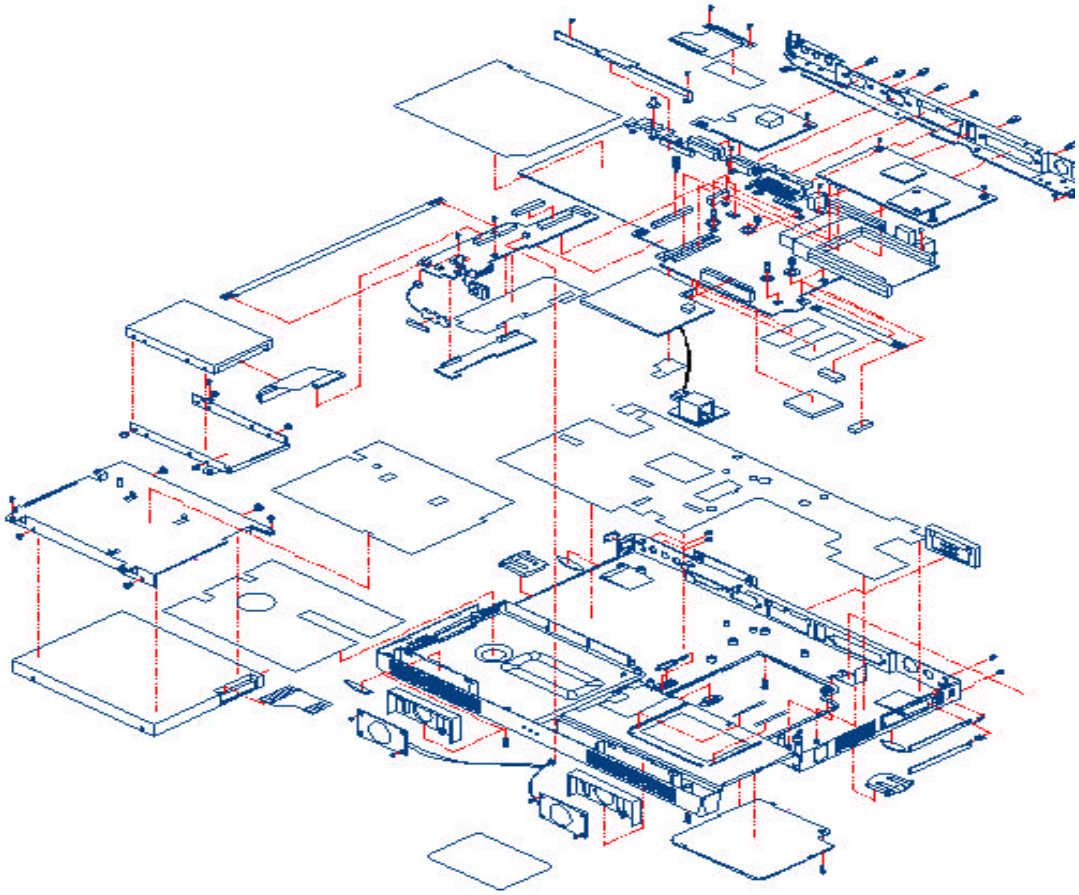
The following system top unit assembly includes the following major field replaceable units/parts (FRUs).



System Top Unit Assembly

- VersaGlide Touchpad Module Assembly — The glidepad pointing device module is assembled at the underside of the palm-rest case with the sensor pad exposed on top. The assembly consists of the glidepad board, the glidepad converter board, the select buttons bracket casing, the insulator sheet, the glidepad FPC cable, and the glidepad wire cable. The glidepad board is assembled just underneath the select button assembly. It provides an FPC cable connector for the glidepad converter board. The converter board on the other hand provides the wire cable connector to the IO board of the system unit.
- Keyboard Panel Assembly — The keyboard is assembled on top of the system unit and connects to the IO board's keyboard FPC type connector. The keyboard is also secured on the system's top unit casing. There are no screws attached to the keyboard.
- Heat Plate and Fan Exhaust Unit — The fan exhaust unit is assembled on the right side of the system unit. It contains a heat plate and a fan. There are two screws securing the heat plate to the CPU module, which is connected to the motherboard, and two additional screws securing the cooling fan to the heat plate.
- System Upper Unit Case Assembly — The system upper unit case assembly contains a thin bracket for holding the keyboard and heat plate as well as acting as a cover for the base unit. It includes the power button and status LED cover mouldings.

The following system base unit assembly includes the following.



System Base Unit Assembly

- Battery Pack — This is an easily replaceable part. The battery pack is found on the right side on the base unit and can be easily removed by pressing the latch under the unit and pulling the battery out by its handle. The battery pack is replaced as a whole and must not be opened for repair.

- Hard Disk Drive Module — The hard disk drive (HDD) is attached to the front left side of the system base unit located just above the floppy disk drive assembly. The HDD is secured by a steel bracket and four screws. The HDD module is a 2.5-inch hard disk drive with a maximum height of 12.7mm. The hard drive module assembly is attached to the motherboard through the FPC cable connector which plugs into the I/O board.
- I/O Board — The I/O board is attached to the system board. This I/O board also contains the charger board which is attached underneath. The I/O board includes the internal microphone and provides connections for the hard drive, floppy drive, keyboard, speakers, CMOS battery, glidepad, and audio cable.
- Charger Board — The charger board provides the circuitry for charging the battery. It is attached underneath the I/O board and can be separated from it. Remove the I/O board first to access the charger board.
- CD-ROM Drive Assembly — The CD-ROM drive assembly is attached on the left end side of the base unit and is only secured with one screw. The CD-ROM drive module includes a metal bracket with six screws and the FPC cable connector.
- Floppy Disk Drive Assembly — The floppy drive assembly is located on the front left side of the base unit. It attaches to the unit with two screws – one on the upper right and one on the lower left corner. The module consists of the metal bracket with four screws, insulation sheet, FDD FPC cable, and the floppy drive.
- DC/DC Board — This unit comprises the power board module and it supplies the needed voltage to operate the notebook. The module is inserted into the pin connector on the motherboard.
- CPU Module (IMM) — The Intel Mobile Module (IMM) is found on the centre of the motherboard using an MMC-1 connector. The module is secured to the motherboard using three screws.
- Speaker Assembly — The two internal speakers of the notebook are located on the front left and right side corners of the system. The speakers are secured into slots and a speaker cable connector is attached to the I/O board.

- Motherboard Assembly — The motherboard assembly is the most important part of the notebook. It contains the entire major chipsets including the VGA controller, memory, I/O, and BIOS to operate the entire computer. It also includes the sockets, connectors and ports which complete its overall functionality.
- Internal Modem Module Assembly — If the computer includes an internal modem module, it is located on the right middle side of the base unit between the battery compartment and the PCMCIA slots. The output jack is inserted into the port just beside the exhaust vent.
- System Base Unit Case — The system base unit case is where the motherboard is placed. It includes openings for the battery, FDD, CD-ROM and PCMCIA equipment.

Parts Removal and Replacement Procedures

This section contains the field service-level removal/ replacement procedures for the notebook. The notebook is designed for optimum modularity in order to make field replacement and maintenance easy and efficient.

Removing the Battery Pack

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

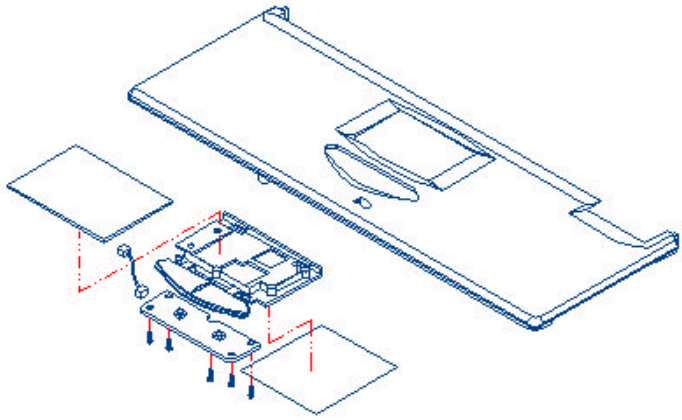
1. The battery pack is located on the right side of the system unit.

Removing the Battery Pack

2. To release the battery pack, locate the battery latch found underneath the unit.
3. Simultaneously, push the latch to release the lock and pull the battery pack out.
4. To replace the battery pack, simply slide in the new battery pack until the latch snaps in.

Removing the Glidepad

The glidepad module is assembled underneath the palm-rest cover case. Follow this procedure to remove the module.



Removing the Glidepad Module Assembly

1. Remove the two screws mounted on the palm-rest assembly found under the unit.
2. Slowly remove the palm-rest cover by unsnapping the sides from the system base unit.
3. Slowly lift the cover case. A cable is connected from the glidepad to the IO board.
4. Pull the glidepad cable from the I/O board to separate the palm-rest cover from the system unit.
5. Underneath the palm-rest cover is the glidepad module assembly. Remove first the four screws on the glidepad converter board that connects the glidepad wire cable. Also remove the FPC cable connected to it.
6. When the converted board is removed, you can remove the select button bracket casing covering the glidepad board.
7. Replace a new glidepad module and reverse the procedure to reassemble.

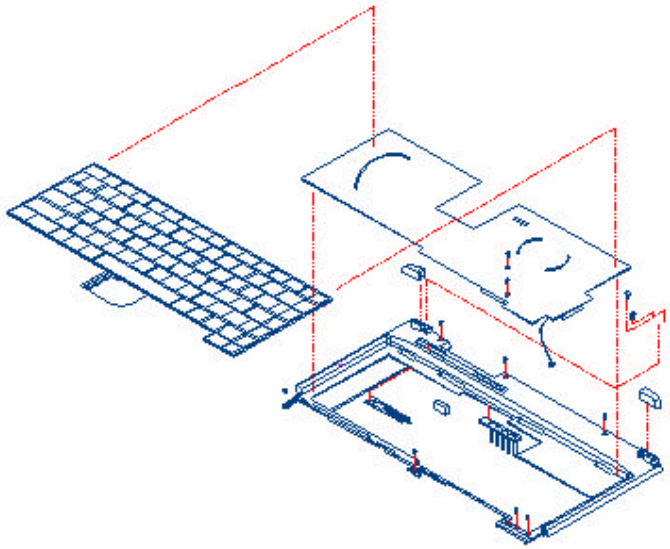
Removing the Keyboard and Heat Plate

The internal keyboard is located just above these system top unit and is fitted in without screws on the top unit case. Follow the steps to remove the keyboard and heat plate.

1. Follow the steps to remove the glidepad assembly (palm-rest cover). There are no screws attached to the keyboard.
2. Flip the keyboard to find the keyboard cable connected to the I/O board underneath the heat plate.

3. The heat plate is secured to the CPU module by two round screws. Do not remove the other two flat screws; these secure the fan underneath. Slightly lift the heat plate and pull the wire cable from the cooling fan which is connected to the motherboard.

4. After you remove the heat plate, release the lock where the keyboard cable is attached and pull the keyboard cable. Remove the entire keyboard.



Removing the Keyboard Assembly

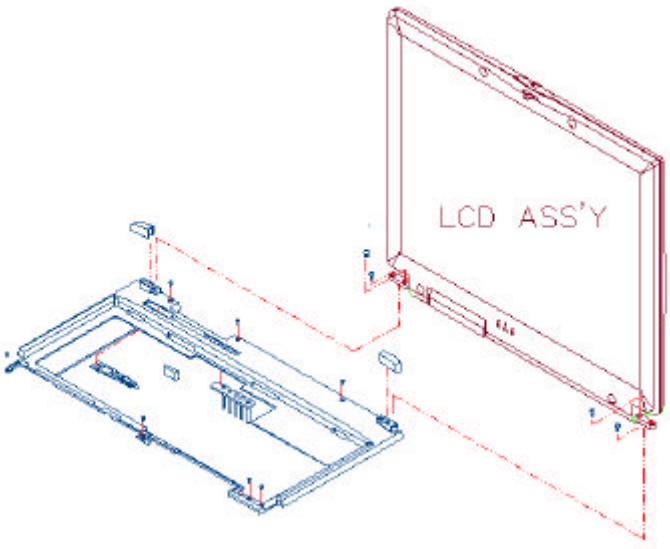
Removing the LCD Panel

The procedure to remove the LCD Panel is as follows.

1. To remove the entire LCD panel, first pull out the LCD hinge cover found at both rear corners of the system unit where the LCD panel is attached.

2. There are two screws securing both LCD hinges to the system unit. Remove the screws to separate the LCD panel from the system unit.

3. There are also two screws securing the back of the LCD transfer connector. Remove the screws and slowly pull out the LCD panel from the system unit.



Removing the LCD Panel and System Upper Case

Removing the System Upper Case

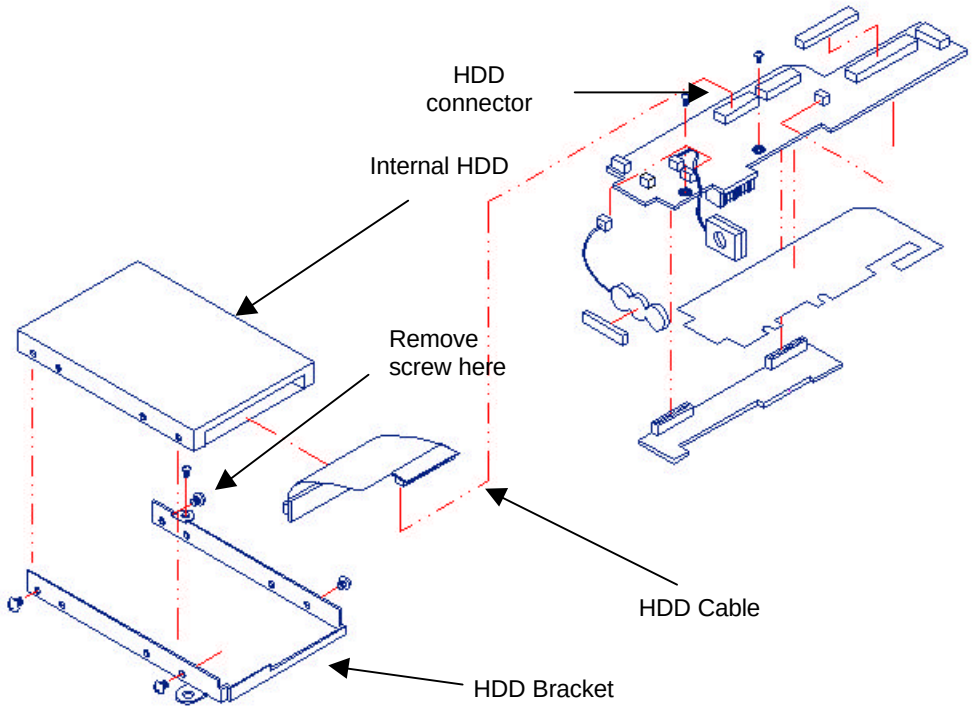
The procedure for removing the system upper case is as follows. (See also the figure on page 5-11.)

1. To complete this disassembly, you first disassemble the glidepad, keyboard, heat plate, and LCD panel.
2. To remove the system top case, first remove the six screws on the top case, three on the rear and three on the front bracket.
3. Remove the round screws secured at both ends at the rear of the system unit on the I/O port.
4. Underneath the base unit, there is an additional screw located on the middle back end near the I/O port which needs to be removed.
5. Slowly unsnap the top case bracket from the bottom case. Pull out the top case.

Removing the Internal Hard Disk Drive

The procedure for removing and replacing the internal hard disk drive is as follows.

1. The internal HDD is located on the left side of the system unit above the floppy disk drive. The HDD is attached to the I/O board and is secured with one screw located on the upper left corner of the HDD.



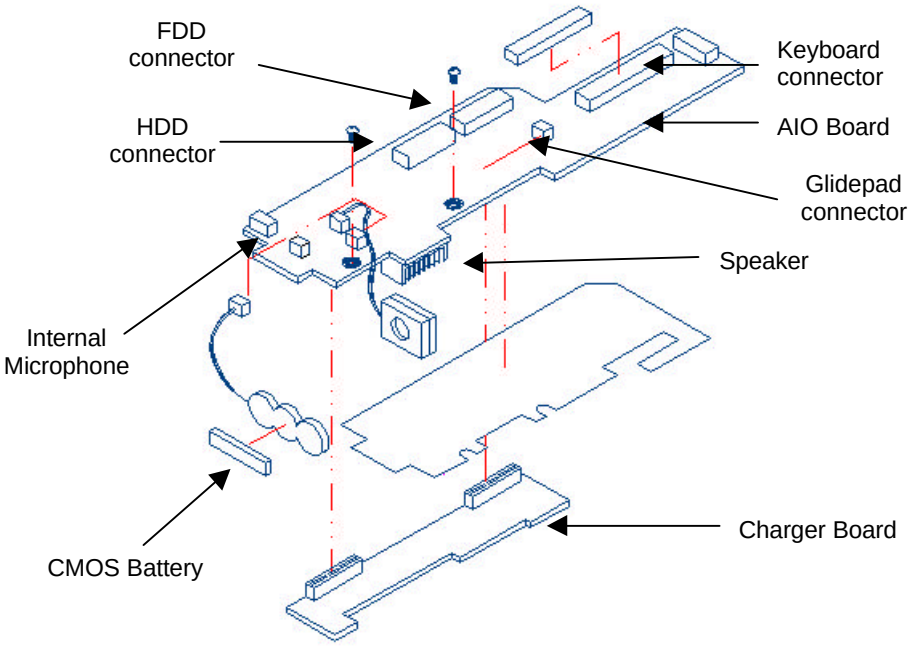
Removing the Internal Hard Disk Drive

2. First remove the round screw secured on the upper left corner of the hard disk module.
3. Slowly pull out the hard disk attached to the I/O board.
4. To replace the hard disk, remove the metal bracket and FPC cable connector attached to it.

Removing the IO Board and Charger Board

The procedure for removing and replacing the I/O board and charger board is as follows.

1. Before removing the I/O board and charger board, first disassemble the glidepad, keyboard, heat plate, hard disk, LCD panel, and upper casing.
2. The I/O board is plugged into the centre of the motherboard. The I/O board is also where the FDD cable, speaker cable, hard disk cable, glidepad cable, audio cable, and CMOS are attached. Remove all cables connected to it.
3. There are two screws securing the I/O board found at the lower left side of the board. Remove the screws and slowly pull out the I/O board.
4. Underneath the I/O board, is the charger board. Pull out the charger board from the I/O board.

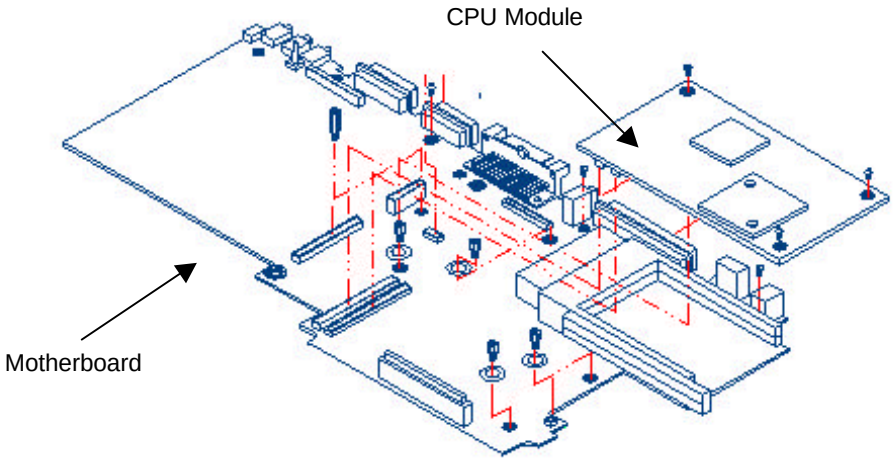


Removing the IO Board and Charger Board

Removing the CPU Module

The procedure for removing and replacing the CPU module is as follows.

1. Before removing the CPU module, first remove the glidepad, keyboard, and heat plate. You do not need to remove the LCD panel and upper case, as the CPU module is easily accessible after the keyboard and heat plate have been removed.
2. The CPU module is located at the lower right side of the motherboard. The CPU module is a rectangular module with two heat sinks on top of the chipset.



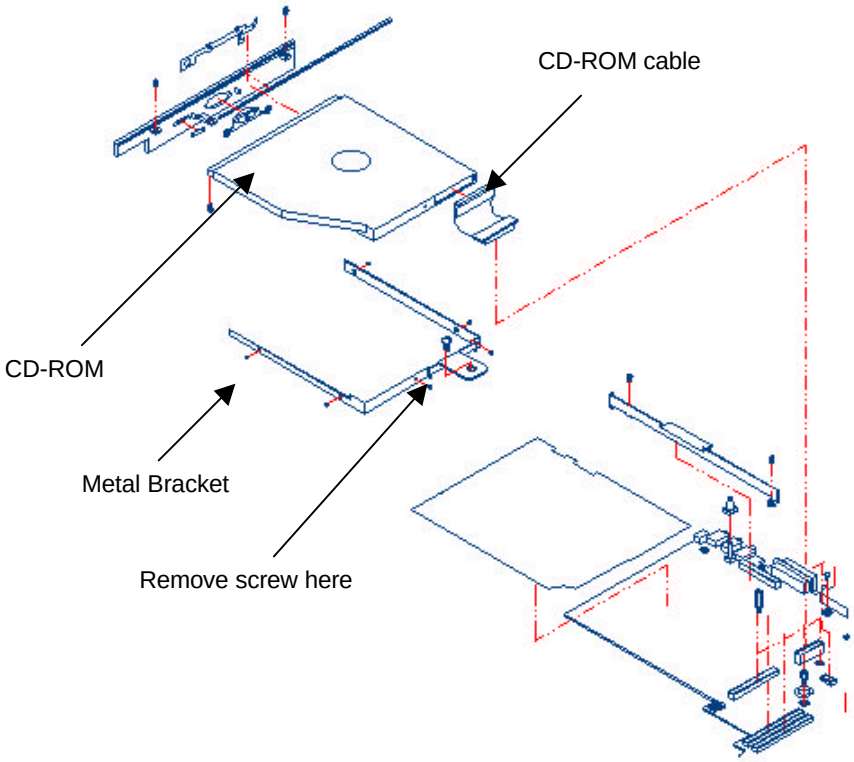
Removing the CPU Heat Plate

3. There are three screws securing the module on top. Remove these screws and slowly pull out the CPU module.

Removing the CD-ROM Module

The procedure for removing and replacing the CD-ROM module is as follows.

1. Before removing the CD-ROM module, you first need to disassemble the glidepad, keyboard, heat plate, hard disk, LCD panel, and upper casing.
2. The CD-ROM module is found at the upper left side of the base unit.



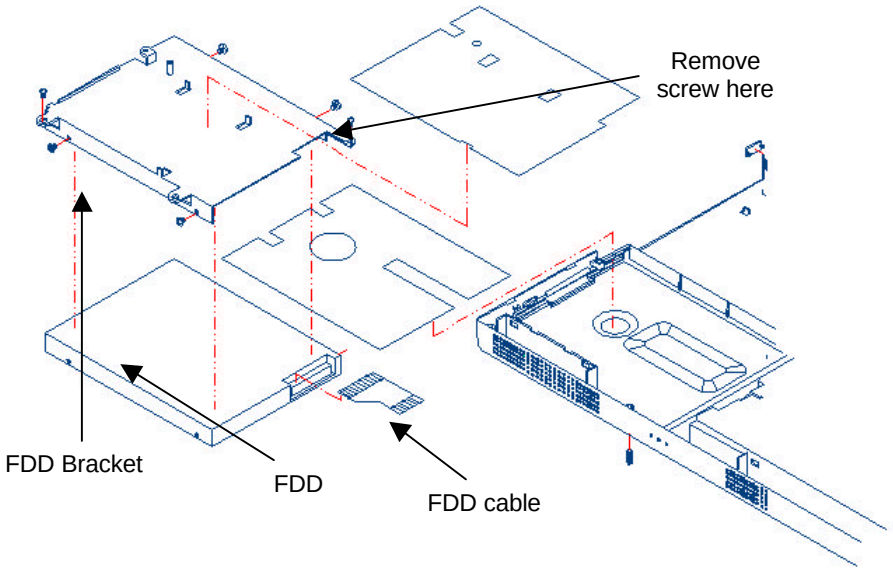
Removing the CD-ROM Module

1. To remove the CD-ROM module, remove the screw securing the CD-ROM bracket and cable (see the figure on page 5-13) and pull out the cable from the connector.
2. Slowly slide the CD-ROM module out of the base unit.
3. To replace the CD-ROM, remove the metal bracket around it.

Removing the FDD Module

The procedure for removing and replacing the FDD module is as follows.

1. Before removing the FDD module, first disassemble the glidepad, keyboard, heat plate, hard disk, LCD panel, upper casing, CD-ROM module, and I/O board. The FDD cable is also connected to the I/O board which needs to be detached.
2. The FDD module is connected to the lower left side of the base unit, just on top of the hard disk drive.

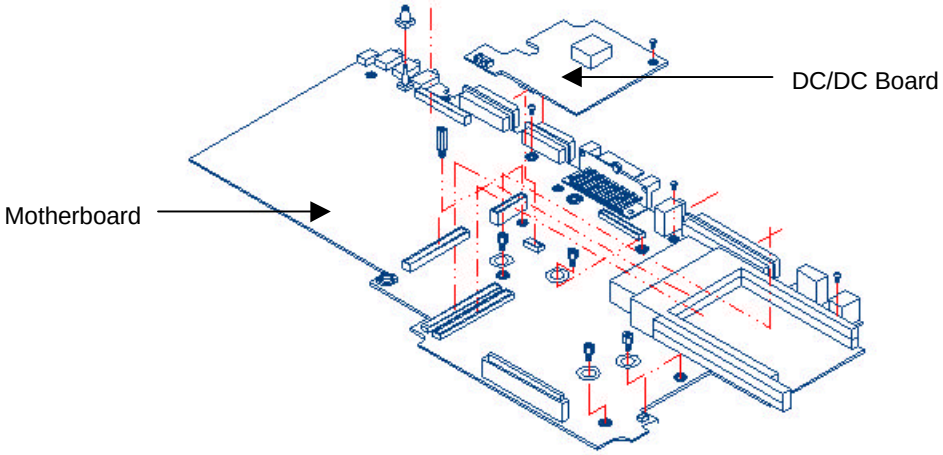


Removing the FDD Module

3. Remove the screw securing the upper right side of the FDD metal bracket.
4. Slowly lift and remove the entire FDD module from the base unit.
5. To replace the FDD, remove the metal bracket and mylar sheet.

Removing the DC/DC Board

The DC/DC board (ADC board) is a small rectangular circuit board connected to the rear centre of the motherboard. To remove the board, follow these steps.



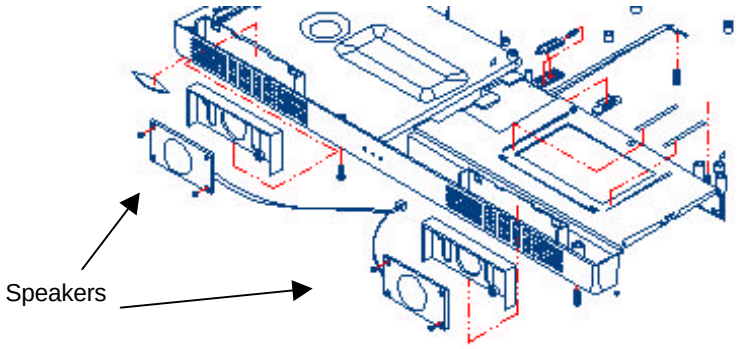
Removing the DC/DC Power Board

1. Before removing the DC/DC board, first disassemble the glidepad, keyboard, heat plate, hard disk, LCD panel, upper casing, and I/O board.
2. Locate the DC/DC board and remove the screw on the upper right side. Slowly pull out the DC/DC board.

Removing the Internal Speaker

The internal speakers are connected to the front left and right side of the base unit assembly. Both speakers are connected to the I/O board with wire cable. Follow this procedure to remove the internal speakers.

1. Before removing the internal speakers, first disassemble the glidepad and the hard disk.
2. The internal speakers are located on the front left and right side of the base unit. (there are no screws attached to the speakers) Unhook the speakers from the speaker compartment case.

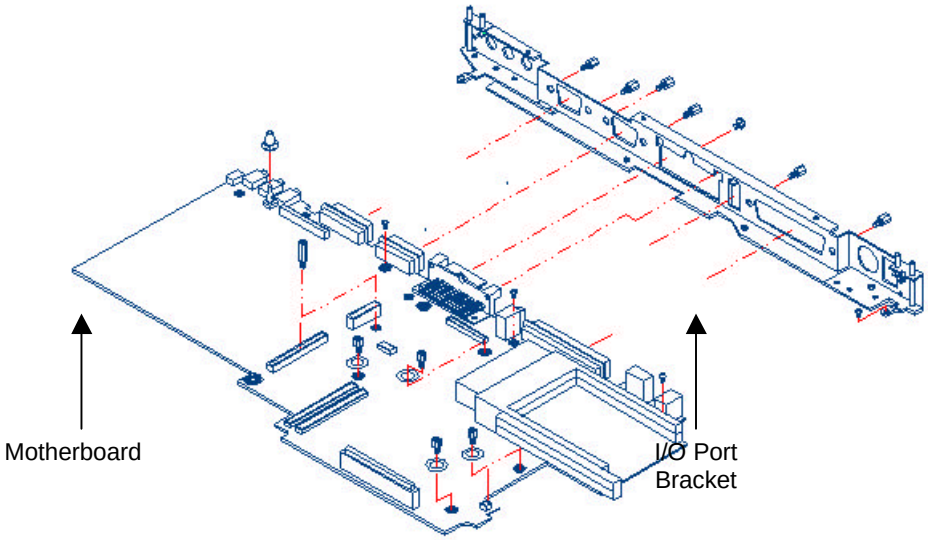


Removing the Internal Speakers

3. The speaker cables are connected to the I/O board. Simply pull the wire cable attached to the speakers and promptly remove them.

Removing / Replacing the Motherboard

The motherboard contains the major chipset and components needed to run the notebook. Follow these steps on how to remove and replace the motherboard.



Removing the Motherboard

1. Before removing the motherboard, first disassemble all base unit modules referenced in the previous sections.
2. On the motherboard, remove the four short hex bolts. Two are located at the right end side, one located near the CPU module connector, and the other located near the nose of the PCMCIA slot connector.
3. Remove the long hex bolt located at the right side of the CD-ROM module connector, just at the centre.
4. Finally, remove the three round screws located at the rear end of the motherboard near the I/O ports. Two of the screws are found near the centre; the third one is located on the right end side.
5. When all screws and bolts are removed, slowly detached the motherboard from the base unit casing.
6. After removing the motherboard, you can also pull out the I/O port bracket.
7. To remove the I/O port bracket, use a hex bolt screwdriver to remove the hex bolts.

6

Troubleshooting and Repair

- Introduction
- System BIOS Related Problems
- Quick Troubleshooting
- Component-Level Troubleshooting

Introduction

This chapter provides the most common problems encountered with the Versa Note notebook computer and some troubleshooting checklists. Common problems include:

- System BIOS Related Problems
- LCD Display Problems
- System Power and Boot-Up Problems
- External Interface Problems (Serial, Printer, CRT, FIR, USB, PS/2)
- Audio Problems
- PCMCIA Problems
- Power Management Problems
- Input Device Problems (Keyboard and Glidepad)

Helpful Starters

Here are a few helpful starters to begin with before troubleshooting the notebook:

- Is there any external power source connected to the computer?
- Is the battery fully charged?
- Is the computer turned on and is the POWER LED activated?
- Are all cables connected properly and securely?
- Have all necessary device drivers been installed properly?
- Have you checked your AUTOEXEC.BAT and CONFIG.SYS files for errors?
- Is the Power Management function enabled under BIOS Setup? Press any key to wake the system up again.

System BIOS Related Problems

This section provides you with information on how the BIOS handles errors encountered during POST (Power On Self Test) and translates them into beep codes and error messages. Refer to this whenever you encounter error messages or beep codes generated by the computer during startup.

POST Messages

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

POST Error Messages

Message	Possible Cause	Action
Diskette drive A failure	The drive failed or is missing.	Check the drive to determine the problem.
Diskette read failure - press F1 to retry boot, F2 for SETUP utility	The diskette is either not formatted or is defective.	Replace the diskette with a bootable diskette and retry.
Display adapter failed, using alternate	The primary video adapter failed.	Check the primary video adapter.
Gate A20 failure	The keyboard controller is not accepting commands, 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 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.
No boot device available - press F1 to retry boot, F2 for SETUP utility	Either diskette drive A:, the fixed disk, or both the diskette and fixed disk are defective.	Try rebooting. If problem persists, replace the diskette or the fixed disk.
No boot sector on fixed disk - press F1 to retry boot, F2 for SETUP utility	The C: drive is not formatted or is not bootable.	Format the C: drive and make it bootable.

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

Message	Possible Cause	Action
Memory failure at *hex-value*, read *hex-value*, expecting *hex-value*	Circuitry associated with the memory chips has failed.	Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Unexpected interrupt in protected mode	Hardware interrupt or NMI occurred while in protected mode.	Check the timer chip or the interrupt controller on the system board.
Real time clock failure	The RTC or battery failed.	Run SETUP and turn the power off and on. If the problem persists, replace the RTC battery. If the problem remains, contact qualified service personnel.

Informational Messages

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

BIOS Informational Messages

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

Beep Codes

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

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

Explanation of test terms for beep code table

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

1. **Pattern test** - One or more particular patterns are written to a location then read back from the same location. Examples of patterns used are 55h and AAh. If the value read does not match the value written, the test is considered a failure.
2. **Rolling ones test** - Several patterns are constructed. These patterns represent a one rolling through the given location. For example, to roll a one through three bits, the following patterns would be constructed: 001, 010, 011, 100, 101, 110, and 111. The patterns are written to the location and then read back, one by one. If the value read does not match the value written, the test is considered a failure.
3. **Rolling zeros test** - Several patterns are constructed. These patterns represent a zero rolling through the given location. For example, to roll a zero through three bits, the following patterns would be constructed: 011, 001, and 000. The patterns are written to the location and then read back, one by one. If the value read does not match the value written, the test is considered a failure.
4. **Checksum test** - All of the values in a given range of locations are added together. The range includes a location which when added to sum of the ranges, will produce a known result, such as zero.

Beep codes for system board errors

BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
None	01h	CPU registers test in progress or failure	Pattern test of most of the 16-bit CPU registers. Failure will result in a system halt.
1-1-3	02h	CMOS write/read test in progress or failure.	Rolling ones test in the shutdown byte (offset 0Eh) of the CMOS RAM. Failure will result in a system halt.
1-1-4	03h	ROM BIOS checksum test in progress or failure.	The range of ROM that includes the BIOS is checksummed. Failure will result in a system halt.
1-2-1	04h	Programmable interval timer 0 test in progress or failure.	Over a period of time, the current count values in timer 0 are read and accumulated by ORing them into the values read so far. It is expected that during the time period, all bits will be set. Failure will result in a system halt.
1-2-2	05h	DMA channel 0 address and count register test in progress or failure.	Rolling ones and rolling zeros test of the address and count registers of DMA channel 0. Failure will result in a system halt.
1-2-3	06h	DMA page register write/read test in progress of failure.	Pattern test of DMA page registers. Failure will result in a system halt.

Beep Code	Diagnostic Code	Description	Test Performed
1-3-1	08h	RAM refresh verification test in progress or failure.	Over a period of time, the refresh bit (bit 4) in port 60h is read and tested. The refresh bit should toggle from 0 to 1, then 1 to 0 within the time period. Failure will result in system halt.
none	09h	First 64K RAM test in progress.	No specific test is performed - just indicates that the test is beginning.
1-3-3	0Ah	First 64K RAM chip or data line failure, multi-bit.	The first 64K of RAM is tested with a rolling ones test and a pattern test. If any of the pattern tests fail, then the BIOS reports that multiple data bits failure. Failure results in a system halt.
1-4-2	0Dh	Parity failure first 64K RAM	At the completion of the rolling ones and pattern tests of the first 64K, the BIOS checks the parity error bits (bits 7 and 6) of port 60h. Failure results in a system halt.
2-1-1 2-1-2 2-1-3 2-1-4 2-2-1 2-2-2 2-2-3 2-2-4 2-3-1 2-3-2 2-3-3 2-3-4 2-4-1 2-4-2 2-4-3 2-4-4	10h-1Fh	First 64K RAM chip or data line failure on bit x	The first 64K of RAM is tested with a rolling ones test and a pattern test. If any of the rolling ones tests fail, then the BIOS reports the specific bit that failed. To determine the bit number from the diagnostic code, subtract 10h. For example, if 12h is displayed at the diagnostic port, bit 2 failed. Failure results in a system halt.
3-3-1	20h	Slave DMA register test in progress or failure.	Pattern test of channels 1 through 3 of the slave controller (starting port address = 02h). Failure results in a system halt.
3-1-2	21h	Master DMA register test in progress or failure.	Pattern test of channels 1 through 3 of the master DMA controller (starting port address = C4h). Failure results in a system halt.
3-1-3	22h	Master interrupt mask register test in progress or failure.	Rolling ones and zeros tests of the mask register of the master programmable interrupt controller (port 21h). Failure results in a system halt.
3-1-4	23h	Slave interrupt mask register test in progress or failure.	Rolling ones and zeros tests of the mask register of the master programmable interrupt controller (port A1h). Failure results in a system halt.
None	25h	Interrupt vector loading in progress.	No specific test is performed - just indicates that the Interrupt Vector table is being initialized.

Beep Code	Diagnostic Code	Description	Test Performed
3-2-4	27h	Keyboard controller test in progress or failure.	The self-test command (AAh) is issued to the 8042 (keyboard controller) and the results are monitored. Failure results in a system halt.
None	28h	CMOS RAM power failure and checksum calculation test in progress.	The power-fail bit in CMOS RAM is tested and the lower CMOS RAM area is being checksummed. A failure does not result in system halt.
None	29h	CMOS RAM configuration validation for video in progress.	No specific test is performed - just indicates that the configuration specified in CMOS for video is being matched against the actual installation. A failure does not result in a system halt.
3-3-4	2Bh	Screen memory test in progress or failure.	The video buffers (B0000h and B8000h) are tested with a pattern test and a rolling ones test. Failure will result in a beep code but not a system halt.
3-4-1	2Ch	Screen initialization in progress.	Until the video installation is confirmed, any calls to INT 10h Function 0 (set mode) will be prefaced with the diagnostic code. There is no expected failure from this.
3-4-2	2Dh	Screen retrace test in progress or failure.	Over a period of time, the retrace bit (bit0) in the appropriate CRT controller status register (either port 3BAh or 3DAh) is read and tested. The retrace bit should toggle from 0 to 1, then 1 to 0 within the time period.
None	2Eh	Search for video ROM in progress.	No specific test is performed by the system BIOS - just indicates that the BIOS is about to jump to the initialization code in the video option ROM.
none	30h	Screen running with video ROM.	No specific test is performed - just indicates that a video option ROM was found and believed to be operating.
none	31h	Monochrome monitor operable.	No specific test is performed - just indicates that the BIOS believes a monochrome monitor is installed and is operating.
none	32h	Colour monitor (40-column) operable.	No specific test is performed - just indicates that the BIOS believes a colour monitor is installed and is operating. The mode has been set to 40-column as selected by the user in CMOS RAM.
none	33h	Colour monitor (80-column) operable.	No specific test is performed - just indicates that the BIOS believes a colour monitor is installed and is operating. The mode has been set to 80-column as selected by the user in CMOS RAM.
4-2-1	34h	Timer-tick interrupt test in progress or failure.	All interrupts expect the timer-tick interrupt are masked off at the interrupt controllers. If a timer-tick interrupt does not occur during a specific time period, an error message is displayed on the screen. The system does not halt.

Beep Code	Diagnostic Code	Description	Test Performed
4-2-2	35h	Shutdown test in progress or failure.	A return address is stored in 40:67h and the processor is reset via the keyboard controller. If a timer tick occurs during this time period, an error message is displayed on the screen. Other failures are hard to detect. If possible, the BIOS will continue with POST, skipping the memory tests.
4-2-3	36h	Gate A20 failure.	To test extended memory, the processor must be placed in protected mode and the A20 line must be enabled. For the memory tests, the BIOS generally uses the keyboard controller to enable A20. If the A20 line is not properly set during the memory test, an error message is displayed on the screen and the memory test are suspended. The system does not halt.
4-2-4	37h	Unexpected interrupt in protected mode.	During the memory tests, the processor is placed in protected mode. All interrupts in the interrupt descriptor table are initialized to point to special handler that displays a message on the screen. All hardware interrupt are disabled. The system does not halt when an unexpected interrupt occurs.
4-3-1	38h	RAM test of memory above 64K in progress or failure.	The memory above the first 64K is tested with a rolling ones test and a pattern test. All success and failure messages are displayed on the screen and POST will continue.
4-3-2	3Ah	Programmable interval timer channel 2 test in progress or failure.	Over a period of time, the current count values in timer 2 are read and accumulated by ORing them into the values read so far. It is expected that during the time period, all bits will be set. If an error is detected, an error message will be displayed on the screen and POST will continue.
4-3-4	3Bh	Real-time clock test in progress or failure.	Over a period of time, the Update-In-Progress bit of Status Register A of the real-time clock is read and tested. The bit should toggle from 0 to 1 within the time period.
4-4-1	3Ch	Serial port test in progress or failure.	Pattern test of one or more of the installed serial ports. If a failure is detected, an error message will be displayed and POST will continue.
4-4-2	3Dh	Parallel port test in progress or failure.	Rolling ones test is done to one or more of the installed parallel ports. If a failure is detected, an error message will be displayed and POST will continue.
4-4-3	3Eh	Math coprocessor test in progress or failure.	An integer load and store is performed with the math coprocessor. If the values do not match, an error message will be displayed and POST will continue.

Run-time Error Messages

BIOS Run-time Error Messages

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

Quick Troubleshooting

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

Quick Troubleshooting

Problem or Symptoms	Corrective Actions
No power	Check that the AC adapter is plugged into the DC-IN connector of the notebook. Also, that the AC adapter is plugged into a properly grounded AC power outlet. If using the battery as main power source, check if the battery pack is of the right type, charged and is inserted correctly. Check the internal DC-DC board of the notebook if it is inserted into the motherboard connector properly. Otherwise, replace the DC-DC board.
Power LED is on but no display and system does not turn on	Check memory module if it is inserted properly. Try to place the module also on the other slot. Check also the memory module underneath the CPU module. Check CPU module if it is inserted properly. Replace memory module, CPU module, or DC-DC board.

Problem or Symptoms	Corrective Actions
Display on the LCD is unreadable	Adjust the brightness and contrast display controls.
	Check if installed VGA driver is correct and resolution is set according to LCD size and type.
	Check if the LCD cables are inserted properly. Check also connections inside the LCD panel.
	Check the VGA controller chip on the motherboard if there is any cold or loosed soldering.
	Replace the motherboard.
LCD screen does not show display	Check the LED Status Bar if Power Saving mode is activated. Press any key or press the power button to resume operation and display.
	Check if the display output is switched to the external monitor.
	Check if the Contrast level is set to minimum.
	Check if there is power.
	Check if LCD cables are disconnected or loosed.
	Replace LCD Inverter board found inside the LCD Panel.
Battery Power does not last or does not read properly under Win95/Win98	Make sure that the power management options under BIOS Setup are enabled and set properly.
	Recharge the battery pack for at 3 least hours before using again.
	Discharge and recharge the battery twice (Battery Low-Low Suspend Off) to allow more accurate reading of battery meter under Windows 95 or Windows 98.
	Replace the battery pack.
System halts during boot sequence	Check condition of selected bootload device (diskette or hard disk) for bad boot track or incorrect OS files.
	Try booting from a new bootable diskette and recopy or repartition hard disk.
	Check for any BIOS error messages on the display.
	Replace motherboard.
I/O processing malfunctions	Check the connections of all internal devices.
	Replace motherboard.
Diskette drive does not work	Check if FDD option is DISABLED under BIOS Setup program.
	Check if floppy drive cable is connected properly.
	Check diskette type if correct and not faulty.
	Replace diskette drive.
	Replace motherboard.

Problem or Symptoms	Corrective Actions
Hard disk drive malfunction	Check if hard disk drive is set properly on BIOS SETUP.
	Check cables and connections.
	Check if disk drive is good. Replace the drive.
	Replace the motherboard.
CD-ROM drive malfunction	Check if drive is set properly on BIOS Setup.
	Check if device driver is installed properly. Do not use other CD-ROM driver.
	Check cables and connections.
	Replace drive or motherboard.
Memory malfunction	Check if the memory module is inserted properly. Try to insert it also to the other slot.
	Replace the memory module.
	Replace the motherboard.
External keyboard or PS/2 mouse doesn't work	Check if keyboard or mouse is connected properly. Check PS/2 Y-cable if it is being used. Power off system first before plugging in the device.
	Check PS/2 mouse driver if it is installed properly.
	Replace the keyboard or mouse.
	Replace the motherboard.
PCMCIA card does not work	Check if the PCMCIA card is inserted properly and all cables and connections are set.
	Check the PCMCIA card driver installation for any IRQ or IO address conflict. Try to disable the COM2 port (FIR) inside the BIOS Setup menu to free up unused IRQ.
	If PC card is not detected, insert it to the other PCMCIA slot. Otherwise, replace PC card.
	Contact the PC card manufacturer for support.
	Replace the motherboard.
Glidepad does not work	Check if Intellimouse Support is ENABLED under BIOS Setup (Advanced Menu) and there is an external PS/2 mouse connected. Set option to DISABLED.
	Check if PS/2 mouse driver is properly installed. Remove any external PS/2 mouse.
	Check the glidepad cable inside the system if it is inserted properly.
	Replace the glidepad module.
	Check the keyboard controller chip for any cold or loosed soldering.
	Replace the motherboard.

Problem or Symptoms	Corrective Actions
Serial device does not work	Check if Serial Port is set to ENABLED under BIOS Setup program (Advanced menu).
	Check if serial device is connected properly.
	If using serial mouse, check if Internal Touchpad is disabled under BIOS Setup. On Windows 95 or 98, check if it detects the serial mouse in System Device Manager under the Control Panel.
	Check if mouse driver is installed properly.
	Replace serial device.
	Check the I/O controller chip on the motherboard for any cold or loosed soldering.
	Replace the motherboard.
Parallel device does not work	Check if Printer is set to ENABLED under BIOS Setup program (Advanced menu).
	Check if all connections are properly set.
	Check if external device is turned on.
	Check if Printer Mode is set properly.
	Check the I/O controller chip on the motherboard for any cold or loosed soldering.
	Replace the motherboard.
FIR Port does not work.	Check if FIR port (COM2) is enabled under BIOS Setup (Advanced Menu).
	Check if FIR driver is properly installed under Win95. Refer to Chapter 2.
	Check if File Sharing and Computer name is set properly on both sides.
	Check if Infrared Monitor is activated.
	Check if FIR ports on both ends are not blocked or obstructed.
	Check the FIR module.
	Check the I/O controller chip on the motherboard for any cold or loosed soldering.
	Replace the motherboard.
USB Port does not work	Check if USB port option under BIOS Setup is ENABLED.
	Check if USB device connection is OK. Unplug and re-plug the device.
	Check if the USB port driver and the USB device driver are installed.
	Replace USB device or contact USB device manufacturer for support.
	Replace motherboard.
Audio components does not work	Check external connections if OK and volume mixer is set properly.
	Check audio source (CD, tape, etc.) if faulty.
	Check if audio driver is installed.
	Check internal connections for speaker and microphone if not working.
	Check audio board, cables and connections.
	Replace motherboard.

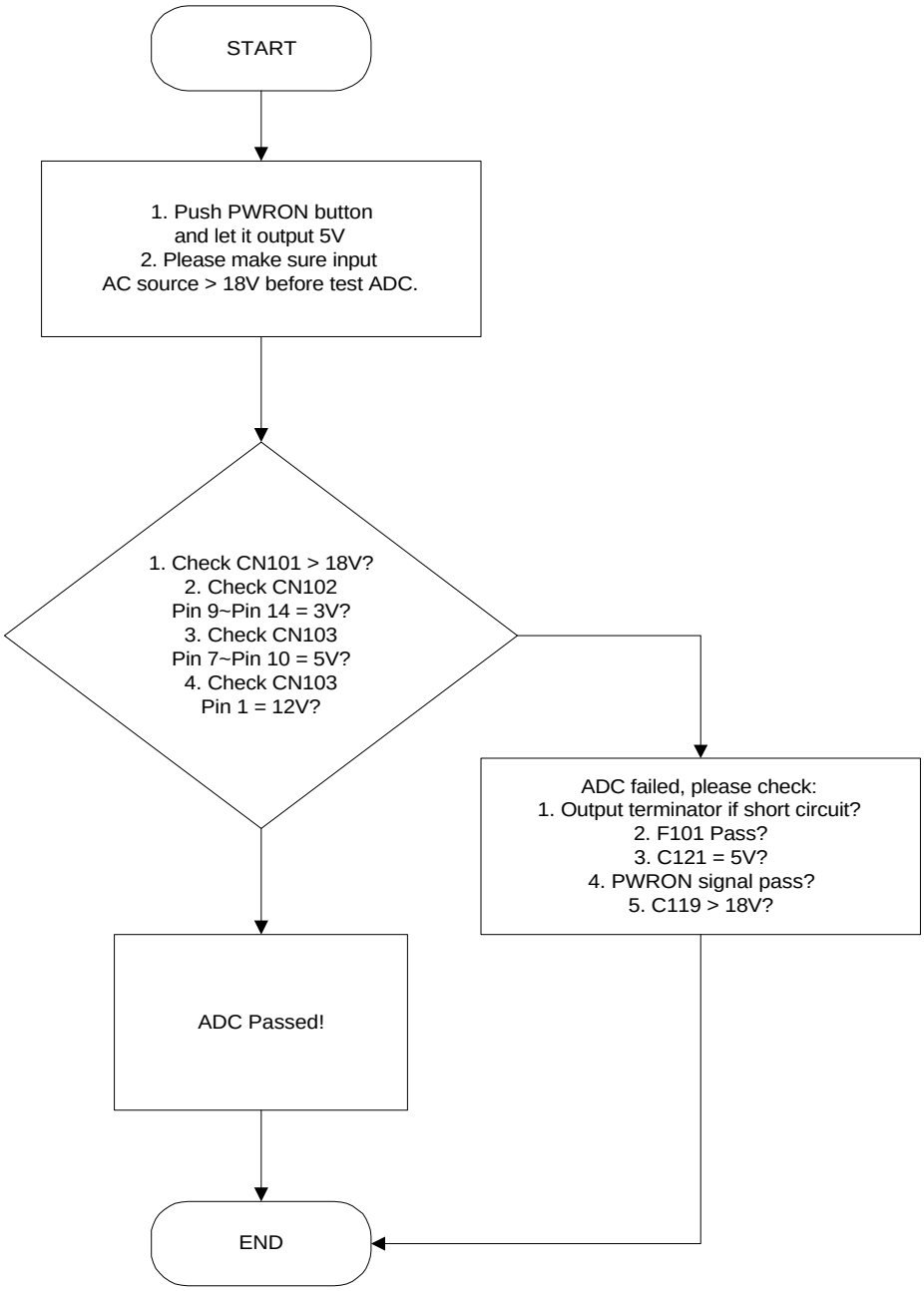
Component-Level Troubleshooting

This section provides an easy to follow flowcharts for performing component-level troubleshooting on the Versa Note notebook.

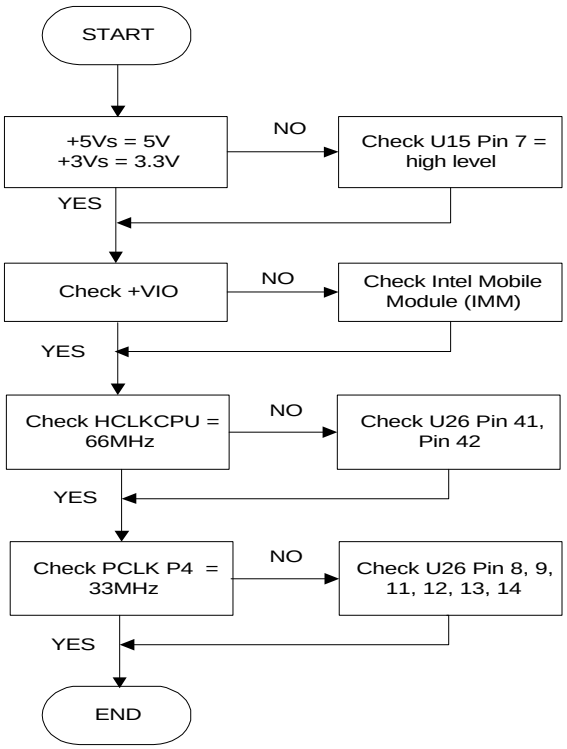
General Overview

The component-level troubleshooting is broken down as follows:

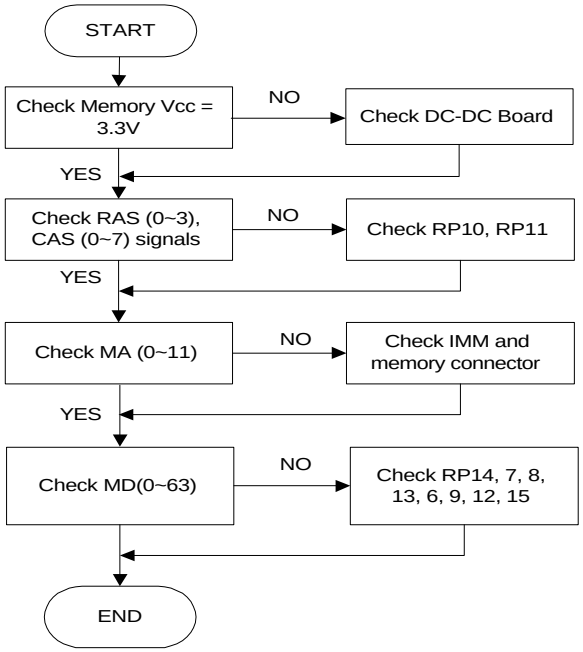
ADC Test Check



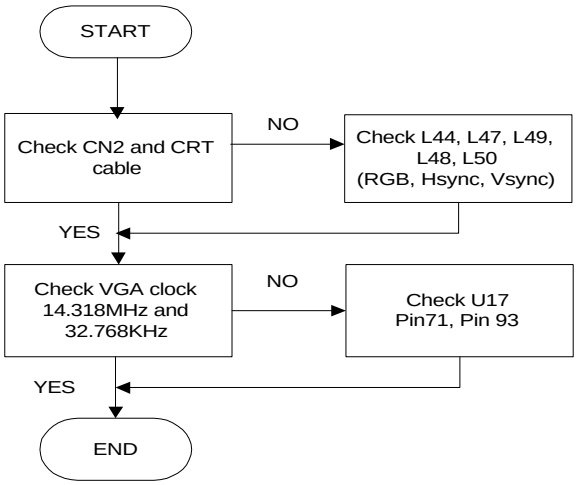
Starting Check



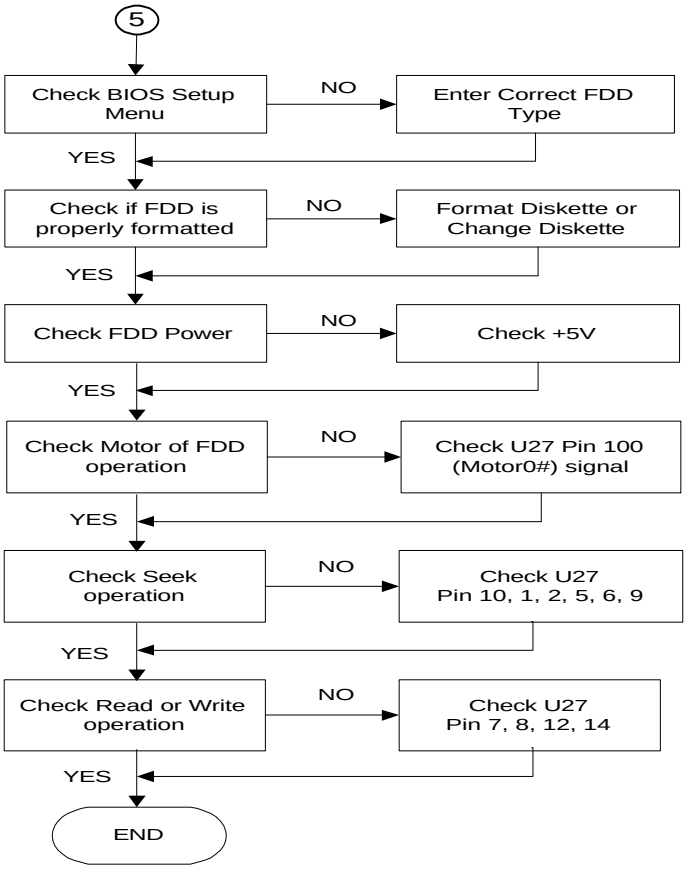
Memory Interface Check



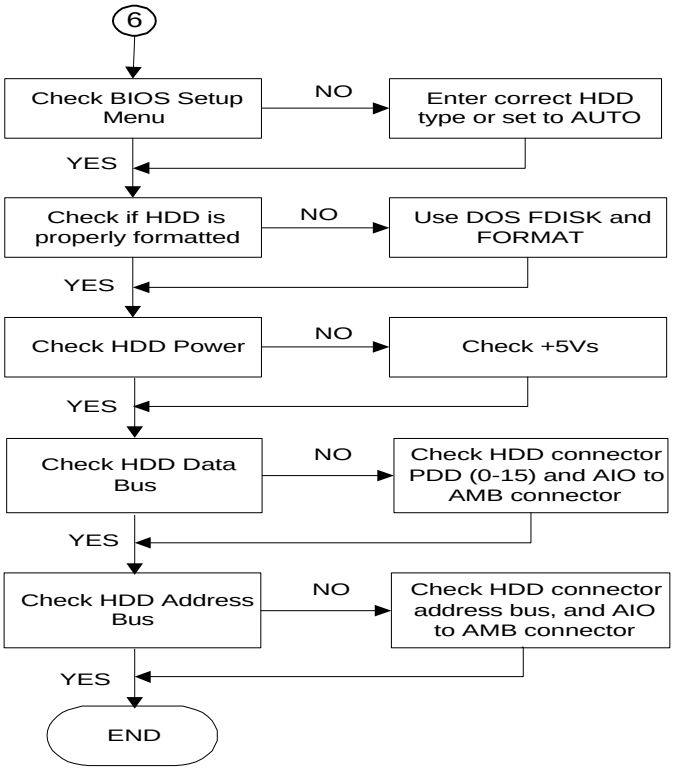
CRT Interface Check



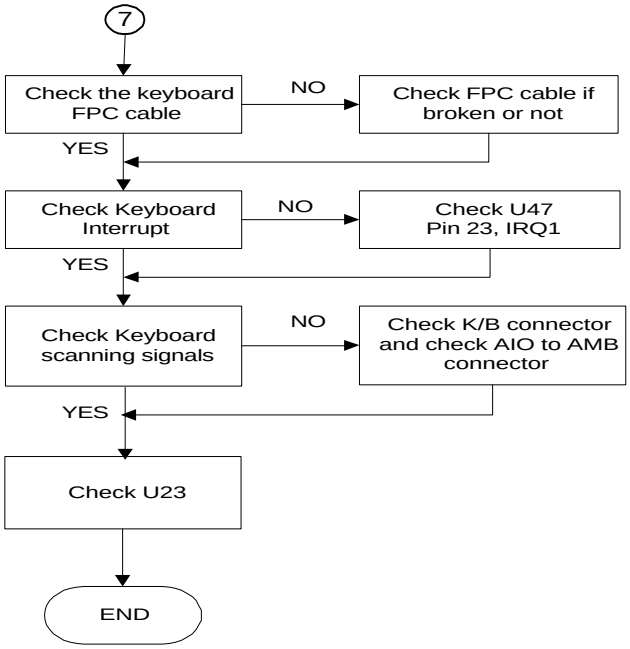
FDD Interface Check



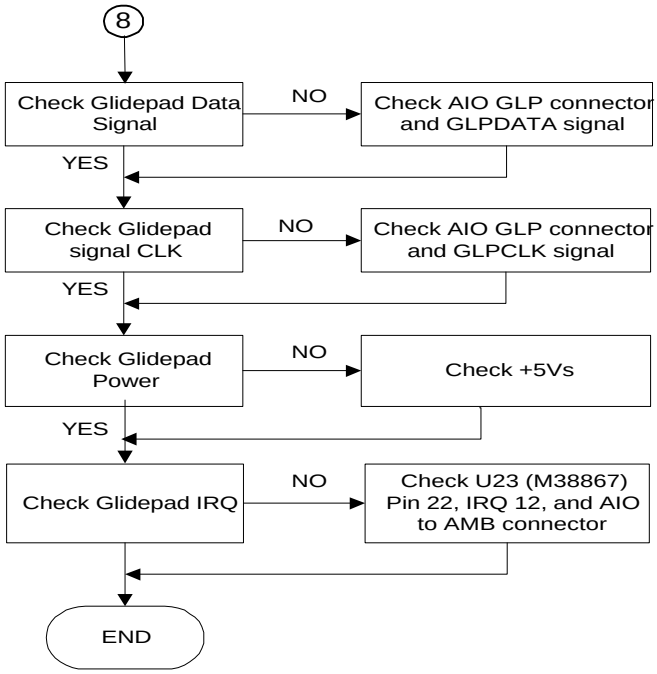
HDD Interface Check



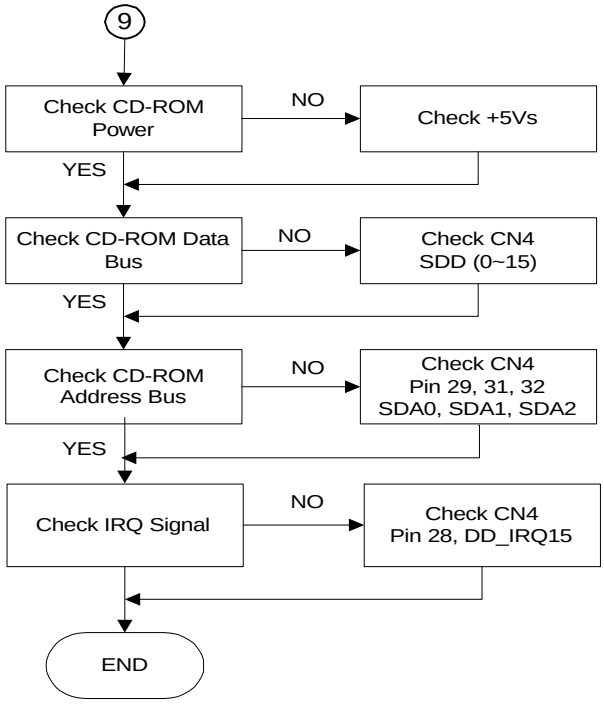
Internal Keyboard Check



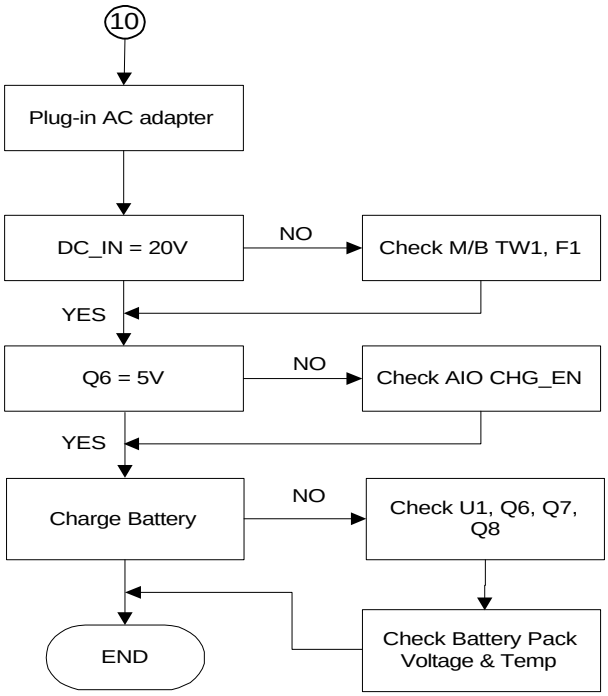
Glidepad Interface Check



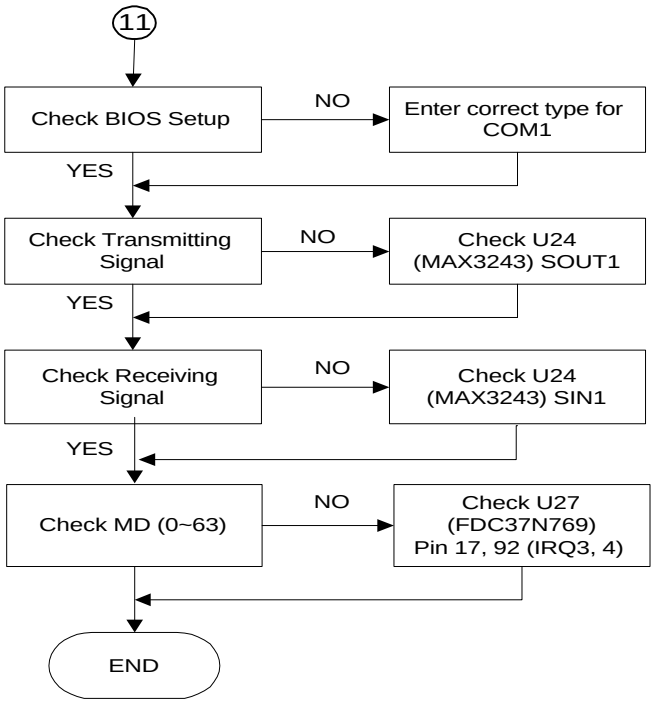
CD-ROM Interface Check



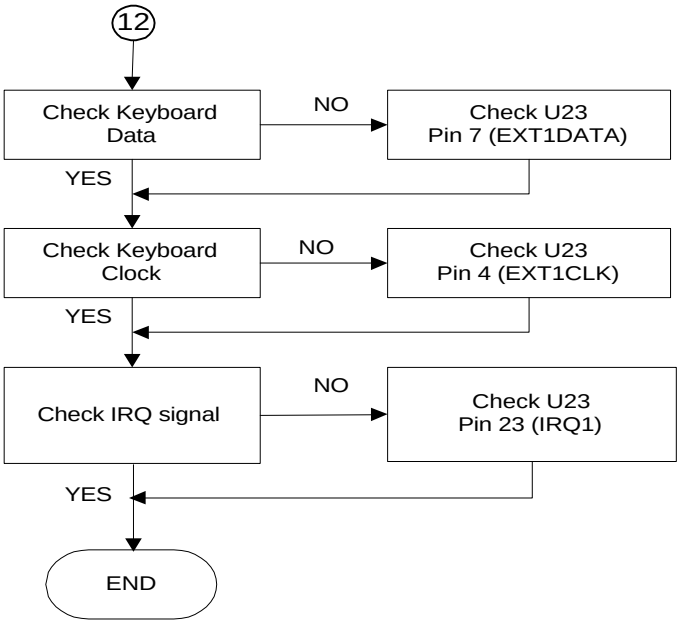
Charger Board Interface Check



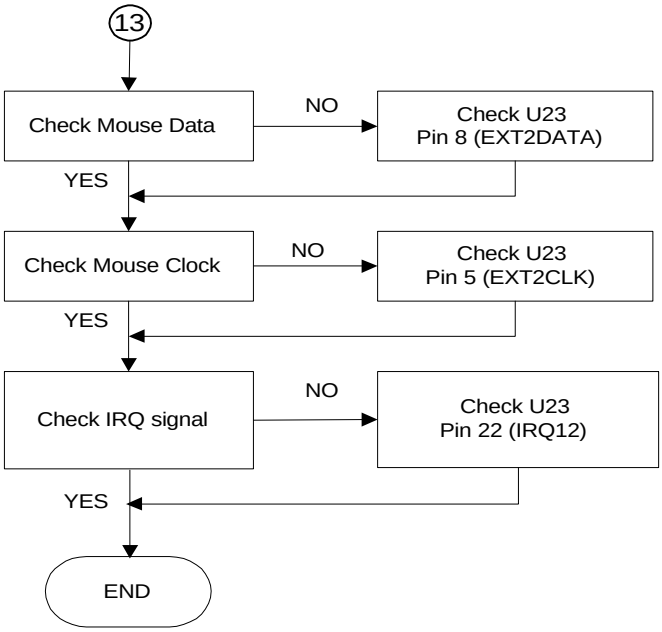
Serial Port Interface Check



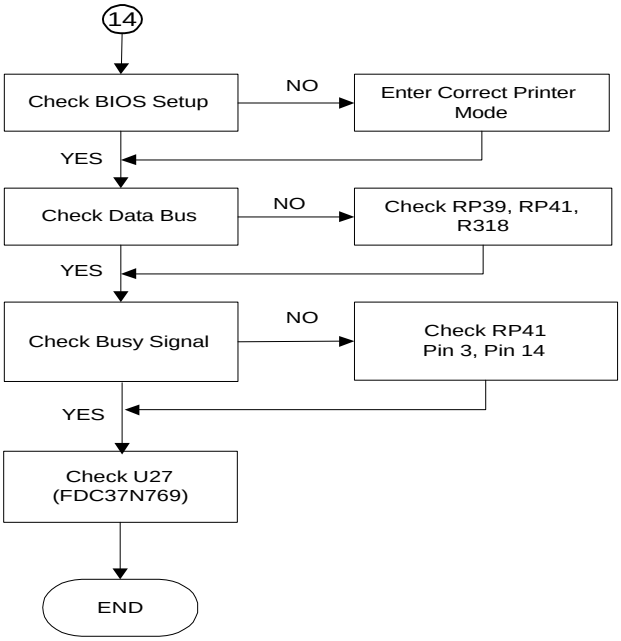
External Keyboard Check



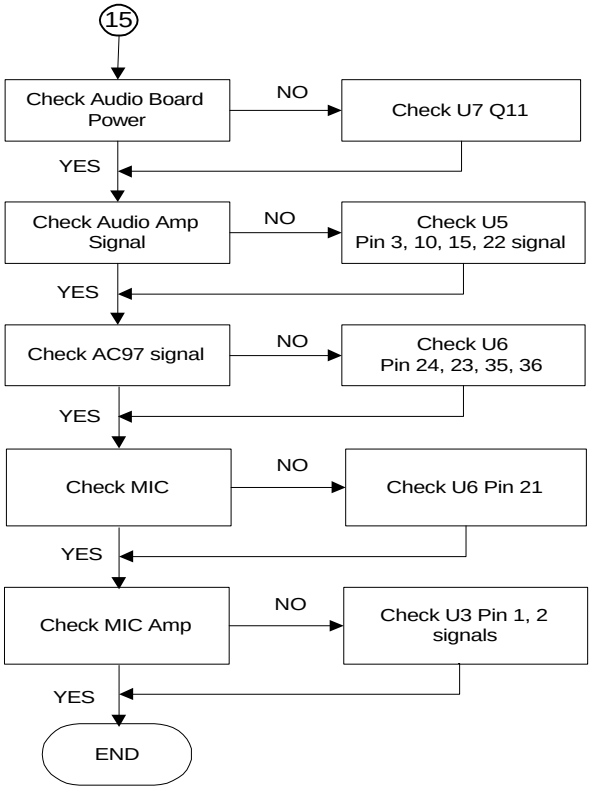
PS/2 Mouse Interface Check



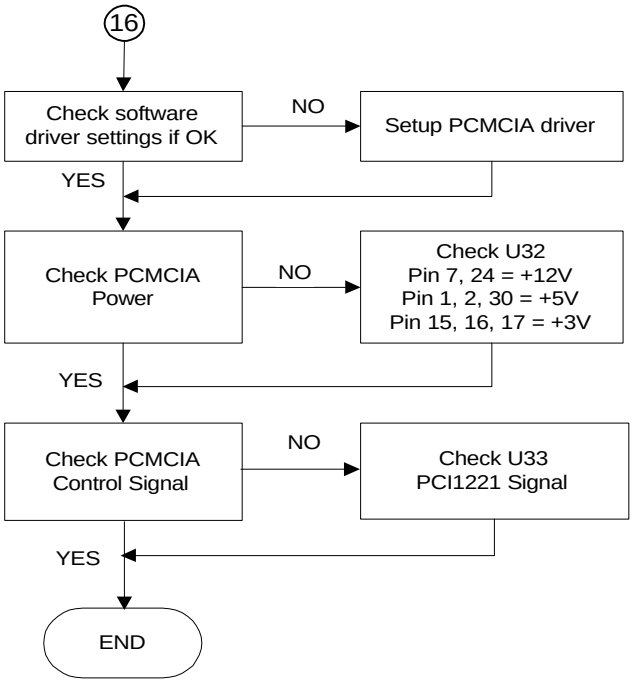
Printer Port Interface Check



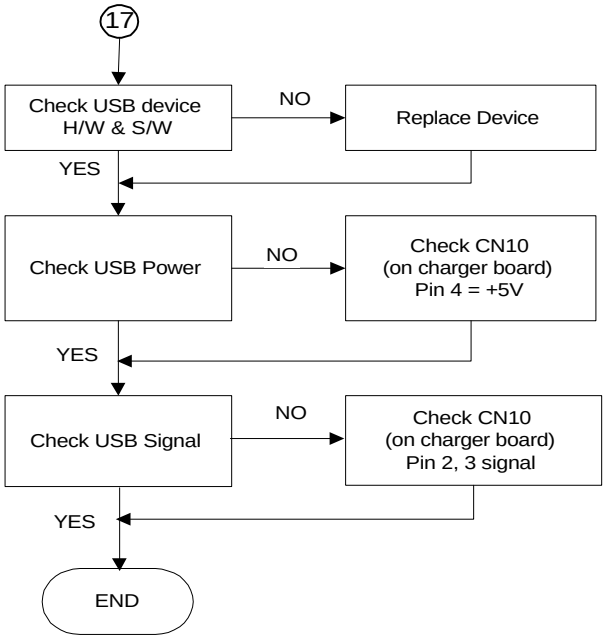
Audio Port Interface Check



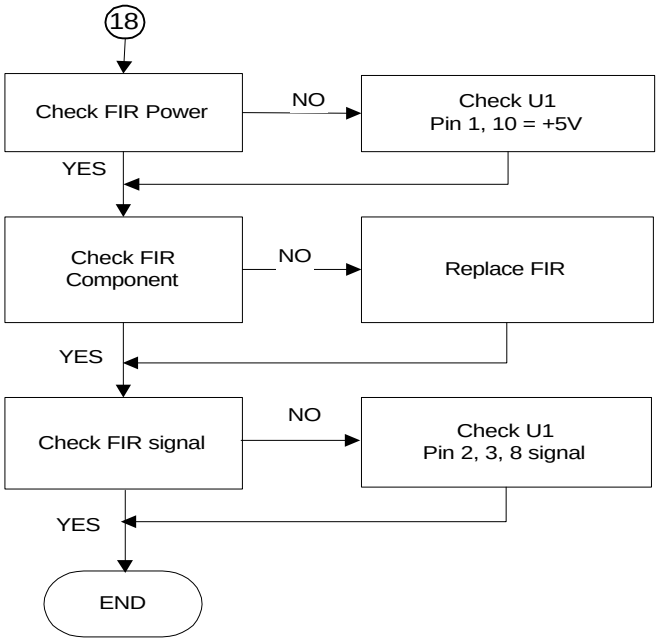
PCMCIA Interface Check



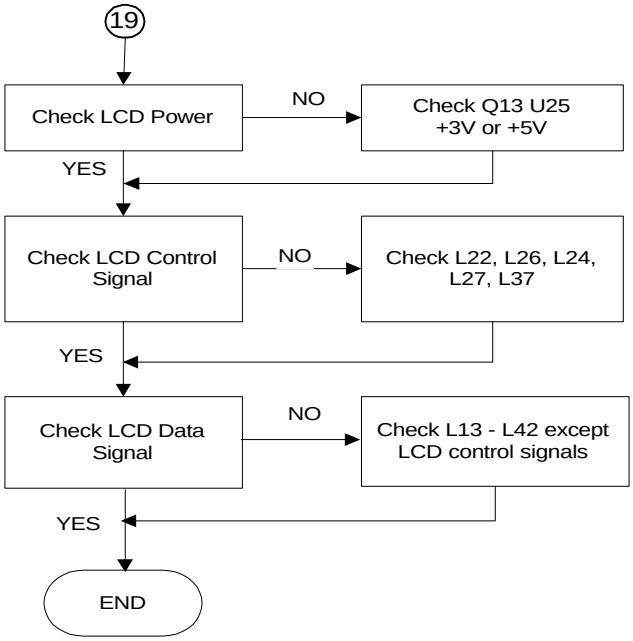
USB Port Interface Check



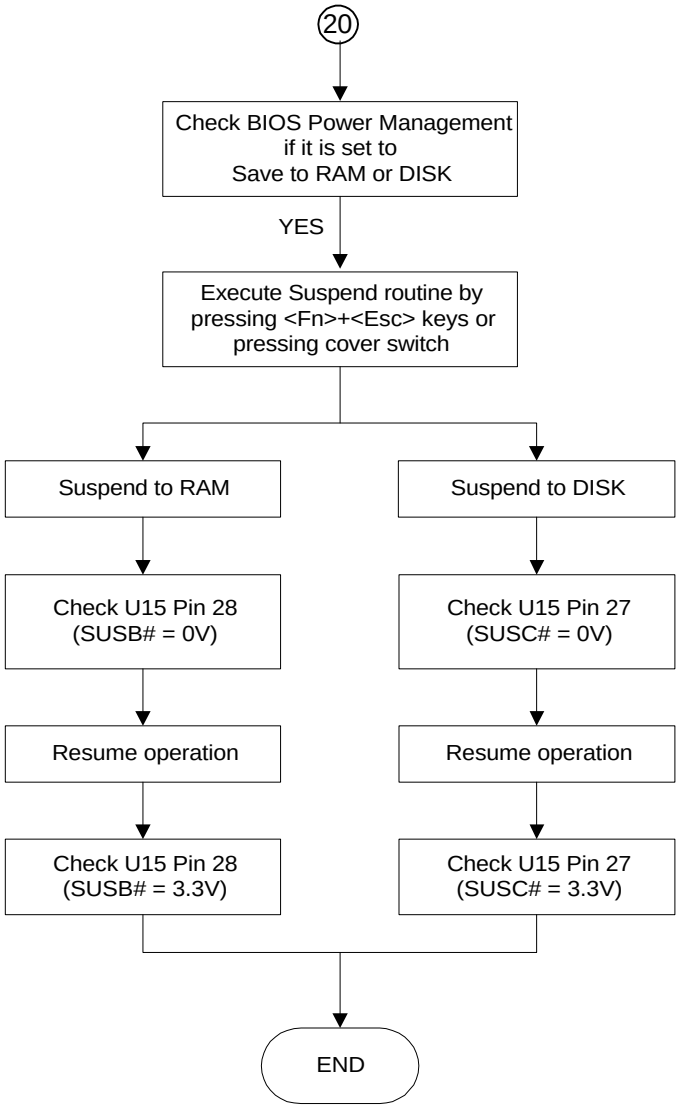
FIR Interface Check



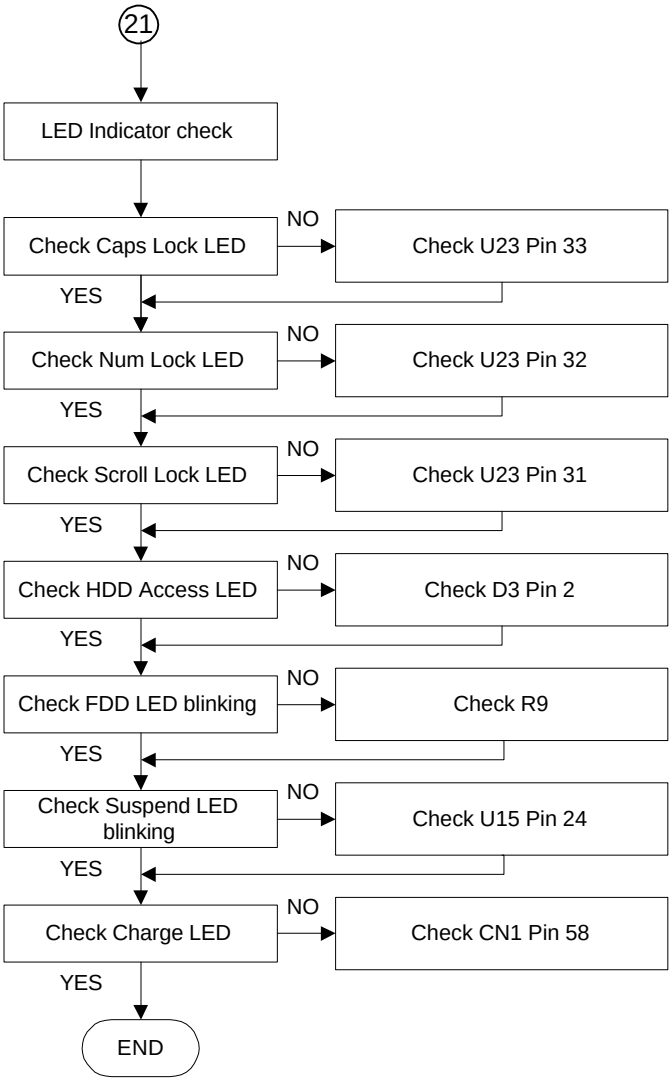
LCD Panel Interface Check



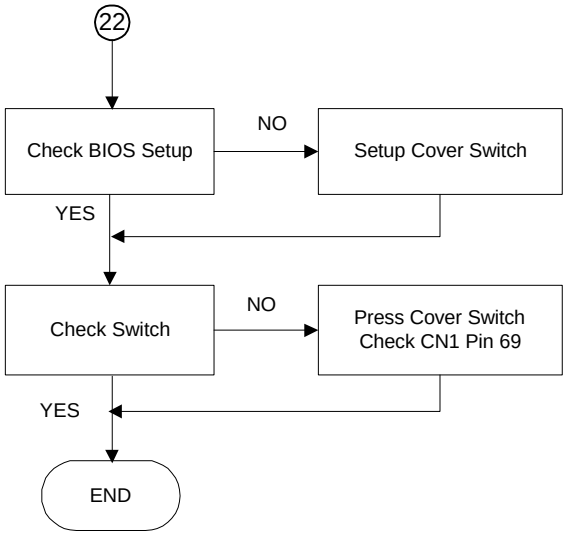
Suspend Function Check



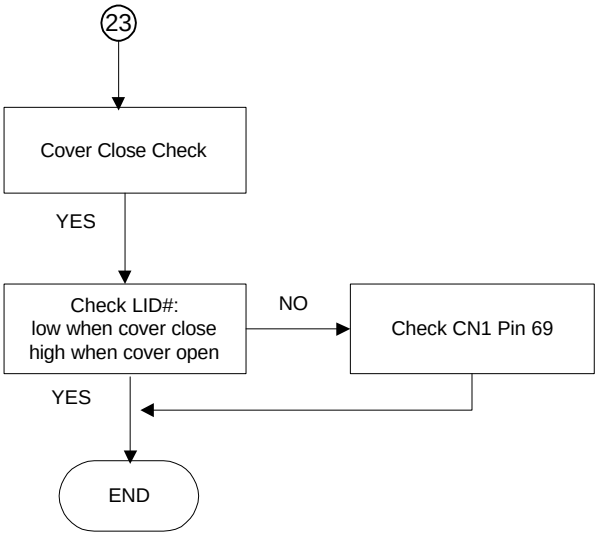
LED Indicator Function Check



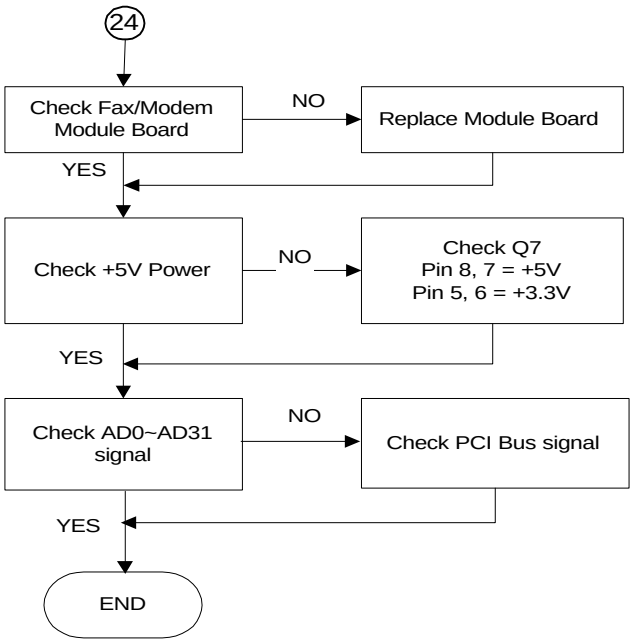
Cover Switch Function Check



Cover Close Function Check



Internal Fax/Modem Port Check



7

Notebook Specification

- System Specification
- Display Specification
- Floppy Disc Drive Specification
- CD-ROM Drive Specification
- Keyboard Specification
- Touchpad Specification
- Power Supply
- Mechanical Specification
- Environmental Requirements

System Specification

This section provides the technical specifications of the Versa Note Series notebook:

Microprocessor

- CPU Type — Intel Mobile Module (Pentium II or Tillamook)
- Clock Speed and Voltage
  - — 233 MHz (3.3V) - Tillamook
  - — 233 or 266 Mhz - Pentium-II
- Integrated L2 Cache — 512KB PBSRAM
- CPU Package — 280-pin MMC-1 (Mobile Module Connector Slot-1)

System Logic Chipset

- Chipset Type — Intel Mobile Triton:
- 82443BX (Pentium-II module) or 430TX (Tillamook module)
- 82371EB (PIIX4) BGA 324-pin
- Thermal controller
  - — LM75 (430TX) - Tillamook module
  - — MAXIM 1617 (440BX) - Pentium-II module

System Clock

- System Clock — ICWORKS running at 3.3/2.5V
- Package — SSOP 48-Pin
- Clock Summary
  - — CPUCLK = 60/66 MHz
  - — PCICLK = 30/33 MHz
  - — PIIX4 / NMG4 / SMC27C769 = 14.318 MHz
  - — PIIX4 = 48 MHz
- Supply Current — Icc Max = 90mA (CPU = 66.6 MHz, PCI = 33 MHz)

Memory Module

- Memory DRAM Module — Samsung KMM466S424AT-10ns (4Mx16 x 4pcs)
- Package — DIMM 144-pin
- Operation Mode — Synchronous Dynamic Mode
- Refresh — Auto and Self Refresh
- Slow Refresh — 4096 refresh cycle / 64ms
- Supply Voltage — 3.3V
- Configuration
  - — Standard DIMM DRAM Module - 2 pieces
  - — 640KB Conventional RAM
  - — 128KB BIOS Shadow
  - — 256KB reserved for Power Management usage
  - — 7168KB Extended RAM
  - — Upgradable to 16, 32, 64, 80, 128MB
- Parity Support — No parity bit for all memory

BIOS ROM

- ROM Type — 256K x 8 CMOS Flash Memory - 28SF040-15 (SST)
- ROM Size — 4M-bit
- Boot Code Sector — Top Sector
- Package — PLCC 32-lead
- Erase / Program
  - — 8 second typical chip erase
  - — 3.6 second chip program
  - — 100,000 erase/program cycles minimum
- Program Voltage — 5V
- Supply Current
  - — Icc Max = 30mA (operating)
  - — Iccsb Max = 1uA (standby)

Video Subsystem

- Video Chipset — NeoMagic 2160 MagicGraph 128XD (NMG4)
- Video RAM — Integrated 2Mbit Video DRAM (128-bit bandwidth)
- Bus Interface — 32-bit PCI Local Bus
- Addressing — Linear Addressing
- Simul Scan — Yes
- Package — BGA 329-pin
- Supply Voltage — 3.3V for core and video RAM
- Maximum Resolution at CRT — 1024 x 768 at 16-bit colour (65,536 colours)
- Maximum Colour at CRT — 800 x 600 at 24-bit colour (16 million colours)
- External CRT connector — 15-pin D-Sub female

I/O Subsystem

- I/O Controller Chip — SMC FDC37N769
- Parallel / Printer Port (LPT1) — 25-pin D-sub female connector (with EPP/ECP support)
- Serial / COM Port (COM1)

  — Type: 9-pin D-sub male RS-232 connector

  — Baud Rate: 300 - 38400 bps (UART 16C550)

  — Drivers / Receiver: Maxim MAX3243 (SSOP, 28-pin)
- FIR Port (COM2)

  — Type: IrDA (Temic)

  — Communication: Full-Duplex

  — Operating Distance: 1 meter

  — Data Rate: 2.4 to 115.2Kbps (SIR)

  — Data Rate: 1.15Mbps to 4.0Mbps (FIR)

Sound Subsystem

- Audio Chip — ESS 1968 Maestro-2
- Supply Voltage — 3.3V
- Bus Interface — 32-bit PCI Bus (AC'97 CODEC interface)
- Compatibility — Sound Blaster (Pro) & 3D Surround Sound

- Wavetable Function — Software
- Connection — Full-Duplex
- Built-in Speaker — 2-way (left and right) mini speakers
- Built-in Microphone — Mono
- Line-In Jack — 1 x line-in jack
- Line-Out Jack — 1 x line-out jack
- Microphone Jack — 1 x 3.5p microphone jack
- Game / MIDI Port — 15-pin D-sub female connector

Keyboard Subsystem

- Keyboard Controller — Mitsubishi M38867
- Package — QFP 80-Pin
- Host Interface — 8042-style host interface
- Keyboard Scan — Local 16 x 8 keyboard switch matrix
- External PS/2 Keyboard — Mini-DIN PS/2 connector

Pointing Device Subsystem

- Chipset Controller — Mitsubishi M38867
- Package — QFP 80-Pin
- Touchpad Type — ALPS Glide Point
- Interface — PS/2
- External PS/2 Mouse — Mini-DIN PS/2 connector (share with PS/2 keyboard)

PCMCIA Subsystem

- Chipset Controller — Texas Instruments (TI) PCI-1221
- PCMCIA Slot Configuration — 2 Type I or Type II at the same time, or 1 Type III
- Bus Type — 32-bit PCI CardBus
- Compatibility — Register Compatible with Intel 82365SL
- ZV Port Support Slots — Support Zoomed Video (ZV) port on top slot

Power Management Unit (PMU)

- PMU Modes — Doze mode, Video Timeout, Hard Disk Timeout, Standby mode, Suspend to RAM mode, Suspend to Disk mode
- Others — LCD Close/Open, LCD Backlight, ACPI, DMI 2.0, Thermal Control.

Status LED Indicators

- Number of LEDs — 8 LEDs (LCD Panel x 3 + Machine Base x 5)
- Power Status LED

  — Green colour for system power on

  — Yellow colour when battery warning

  — Amber colour when battery low
- Battery Charge LED

  — Amber colour when charging

  — Off when fully charged or not charging
- Sleep LED — Green colour and blinking when system enters suspend mode
- IDE LED — Green colour when accessing the HDD or CD-ROM/DVD-ROM
- FDD LED — Green colour when accessing the FDD
- Num Lock LED — Green colour for Num Lock activate on keyboard
- Caps Lock LED — Green colour for Caps Lock activate on keyboard
- Scroll Lock LED — Green colour for Scroll Lock activate on keyboard

Hot-Key Definition

- Number of hot-keys — 11 <Fn> key combinations
- LCD/CRT Simul — Fn + F3 (toggle)
- Standby mode — Fn + F4
- Display Scretch/Normal — Fn + F5 (toggle)
- PC Speaker Volume — Fn + F6 (4 steps: Mute / Low / Mid / Max)
- PMU Level — Fn + F7
- Brightness Up — Fn + F8
- Brightness Down — Fn + F9
- Contrast Up — Fn + F10

- Contrast Down — Fn + F11
- Scroll Lock — Fn + F12 (US / Canada is supported by direct key)
- Save to Disk — Fn + Suspend

Display Specification

12.1" SVGA TFT LCD

- LCD Model — NEC NL8060BC31-13A
- LCD Type — 12.1" SVGA TFT
- Display Area — H246 x V184.5 [mm]
- Display Pixels — H800 x V600 pixels
- Pixel Pitch — H 0.3075 x V 0.3075
- Pixel Arrangement — RGB vertical stripe
- Display colours — 262K Colours
- Module Size — H275 x V199 x t6.5 MAX [mm]
- Weight — Approx. 430g
- Contrast Ratio — 120:1 (typ.)
- Power Supply — 5.0V
- Power Consumption — 3.3W
- Response Time — 40ms (max)
- Operating Temperature — 0 to 50 degrees Celsius
- Storage Temperature — -25 to 60 degrees Celsius

13.3" XGA TFT LCD

- LCD Model — NEC NL10276BC26-11A
- LCD Type — 13.3" XGA TFT
- Display Area — H270.3 x V202.75 [mm]
- Display Pixels — H1024 x V768 pixels
- Pixel Pitch — H 0.264 x V 0.264
- Pixel Arrangement — RGB vertical stripe
- Display colours — 262K Colours
- Module Size — H291 x V214 x t6.4 MAX [mm]
- Weight — Approx. 545g
- Contrast Ratio — 120:1 (typ.)

- Power Supply — 5.0V
- Power Consumption — 3.6W
- Response Time — 40ms (max)
- Operating Temperature — 0 to 50 degrees Celsius
- Storage Temperature — -20 to 60 degrees Celsius

Floppy Disk Drive Specification

- Drive Manufacturer — NEC FD1238T-010 (3-Mode)
- Floppy Diskette Type — 3.5" Double Sided, High Density
- Physical Dimension — 126 x 96 x 12.7 [mm]
- Weight — 160g
- Capacity

  — 1.44MB / 1.2MB / 720KB High Density (Formatted)

  — 2MB / 1MB (Unformatted)
- Transfer Rate — 500 / 250 Kbits/sec
- Recording Method — MFM / FM
- Track to Track Seek Time — 3 ms
- Seek Settling Time — 15 ms
- Average Access Time — 94 ms
- Disk Revolution — 300 rpm
- FDD Indicator — LED on drive and Media Access LED on LED Indicator
- MTBF — 30,000
- Operating Temperature — 4 to 46 degrees Celsius

CD-ROM Drive Specification

- Drive Manufacturer — TEAC CD-224E-A92
- Physical Dimension — 128.0 x 129.0 x 12.7 [mm]
- Weight — 280g or less
- Loading — Manual tray loading
- Ejection

  — Manual eject using the eject button

— Auto eject using the eject command on software

- Host Interface — IDE (ATAPI)
- Average Access Time — 130msec. average (x24-speed)
- Full Stroke Access Time — 300msec (x24-speed)
- Disc Speed — 5,136rpm typ.
- Data Transfer Rate (burst) — 16.7 Mbytes/sec. Max.
- Data Transfer Rate (sustained) — 1,545 ~ 3,600KB/sec
- Starting Time — 12 sec. max.
- Data Buffer Capacity — 128 KB
- Supply Voltage — +5VDC
- MTBF — 60,000POH or more

Keyboard Specification

- Keyboard Type — JME K9801
- Type of key switch — Membrane (PE) Switch
- Number of keys — 87 keys with embedded numeric keypad
- Compatibility Enhanced 101/102 emulation
- Travel2.5 mm
- Keyboard Height

  — 6.5 ± 0.3 mm

  — 7.0 ± 0.3 mm (SPACE Key)
- Keycap Pull Off Force — > 800g
- Supply Voltage — 6V
- Operating Temperature — -10 to 60 degrees Celsius

Touchpad Specification

- Touchpad Type — ALPS GlidePoint KGDDBA941A-2
- Interface — PS/2 (compatible with Microsoft Mouse Driver)
- Supply Voltage — 5V
- Supply Current — 4.0mA (Max) Operating
- Dimension — W56 x H40 x D0.69 (2.5 w/ PCB) mm

- Weight — 20g max.
- Operating Temperature — 0 to 50 degrees Celsius
- Storage Temperature — -20 to 60 degrees Celsius

Power Supply

AC Power Adapter

- Adapter Type —Delta ADP-50MB
- Input Voltage — 85 to 276VAC
- Input Frequency — 47 to 63 Hz
- Input Current

  — 2A Max at 90VAC

  — 1A Max at 180VAC
- Efficiency — 83% Min at 115VAC input full load
- In-Rush Current (Cold Start) — 42A Max at 100 VAC
- Turn-On Delay Time — 3 sec max.
- Output Power — 50W
- Output Voltage — +19Vdc (main)
- Output Current — 2.64A (Max)
- Over Voltage Protection — 24V Max
- Over Current Protection — 3.4A (max)
- LED Display — Green LED (On / Off)
- Dimension — L107 x W60.5 x H30 [mm]
- Weight — 250g

Lithium Ion (Li-Ion) Battery Pack

- Model — Panasonic Li-Ion Rechargeable Smart Battery
- Cell Type — CGR18650
- Rating (Nominal) Voltage — 3.7V
- Typical Capacity — 1400 mAH
- Minimum Capacity — 1300 mAH
- Standard Charging — 4.2V, 260mA for 8 hours
- Quick Charging — 4.2V, 910mA for 2 hours

- Rating Discharging — 260mA constant current
- Continuous allowable discharging
  - — 2000mA (25° C or under)
  - — 1500mA (45° C or under)
- Quick Charging Temperature — 10° C to 45° C at 85% relative humidity
- Storage Temperature / Humidity
  - — Within 1 week: -20° C to 50° C at 45 ~ 85% RH
  - — Within 1 month: -20° C to 45° C at 45 ~ 85% RH
  - — Within 6 months: -20° C to 40° C at 45 ~ 85% RH
  - — Within 1 year: -20° C to 35° C at 45 ~ 85% RH
- Weight — 37.2 ~ 38.8 g

Mechanical Specification

- Unit Dimensions (WxDxH) in millimetres — 299 x 247 x 39 mm
- Unit Weight — Under 6.6 lbs.

Environmental Requirements

- Temperature
  - — Operating Temperature — 5° C to 35° C
  - — Storage Temperature — 20° C to 60° C
- Humidity
  - — Operating — 10% to 80% RH without condensation
  - — Storage — 5% to 90% RH without condensation
- Altitude
  - — Operating / Non-operating — 10,000 feet / 40,000 feet
- Shock (Non-operating)
  - — Unpacked — 240 G, 1/2 sine wave, 2p3 ms
  - — Packed — 40 G, 1/3 sine wave, 10p3 ms
- Drop

— Packed — 10 drops (6 faces, 3 edges, 1 corner) at 42 inches height, after 6 hours at -10.5° C and 50.5° C

— Loose — Cargo11800 impact at 1/16"

- Electro-Static Discharge (ESD)

  — Under 8KV — No soft error is allowed for 10 discharges

  — 8.5KV to 15KV — No component damaged for 5 discharges

Glossary

A

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

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

B

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

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

bit
Binary digit. The smallest unit of computer data.

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

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

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

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

byte
Group of eight contiguous bits.

C

clock
Electronic timer used to synchronize computer operations.

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

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

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

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

D

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

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

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

E

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

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

F

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

H

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

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

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

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

I

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

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

interface
A connection that enables two devices to communicate.

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

K

kilobyte
(KB) 1024 bytes.

L

LAN
Local Area Network.

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

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

M

megabyte
(MB) 1,048,576 bytes.

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

menu
A video display of programs or options.

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

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

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

N

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

O

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

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

P

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

parallel interface
Interface that communicates eight bits at a time.

parallel printer
A printer with a parallel interface.

parameter
A characteristic of a device or system.

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

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

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

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

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

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

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

R

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

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

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

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

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

RS-232C
Standard interface for serial devices.

S

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

serial interface
An interface that communicates information one bit at a time.

serial printer
A printer with a serial interface.

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

super video graphics array (SVGA)
A colour bit-mapped graphics display standard, that provides a resolution of 1024x 768 with up to 256 colours displayed simultaneously.

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

T

TFT
Thin Film Transistor. A type of Versa LCD colour screen that supports 256 colours and provides exceptional screen display.

V

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

volatile memory

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

W

warm boot

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

write

To record or store information to a storage device.

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