FIC A360 Intel® FC-PGA Pentium-III / Celeron Notebooks

A360 Model Reference and Service Manual

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FIC A360 MODEL
INTEL FC-PGA PENTIUM-III / CELERON NOTEBOOKS

Reference and Service Manual

July 2001, Volume 1

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Preface

This manual contains operation, specifications, technical references, maintenance and troubleshooting instructions for the FIC A360 notebook.

Intended Audience

This manual is primarily intended for use by qualified service technicians assigned to FIC notebook PC repair operations. However, several sections contain overview technical information useful to a general (less-technical) audience.

Contents

This manual contains the following:

- **Chapter 1: Outline of the A360** - Introduces the notebook and identifies all standard and optional features including outlines on the BIOS SETUP program.
- **Chapter 2: Installation and Upgrade** - Provides information on installing the device drivers and utility programs of the notebook as well as important system upgrade procedures.
- **Chapter 3: Software Functional Overview** - Provides a functional overview of the notebook's BIOS and software operation. This includes the power management function and system resource listing.
- **Chapter 4: Hardware Functional Overview** - Provides a functional overview of the notebook's hardware and sub-assemblies as well as description of every component and chipset used to control each operation.
- **Chapter 5: Maintenance & Disassembly** - Describes the preventive and corrective maintenance procedures for the notebook. This includes primarily the disassembly and assembly procedures of the notebook.
- **Chapter 6: Troubleshooting and Repair** - Provides instructions in handling BIOS POST Error codes and messages as well as guidelines in doing board-level troubleshooting.
- **Appendix A: Notebook Specification** - Provides detailed information on the entire notebook's specification including system specification, mechanical specification, and environmental specification.
- **Appendix B: Pin Assignment** - Contains lists of all pin assignments for ports, connectors, and slots.
- **Appendix C: FRU Parts Listing** - Contains lists of field replaceable parts for RMA purpose.

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Appendix C FRU Parts Listing

Chapter 1

Outline of the A360

1.1 Introduction

This chapter provides the outline features and operation of the A360 including the BIOS Setup program and other system options.

The A360 all-in-one notebook offers the latest in advanced portable computing and multimedia technology that even outperforms most desktop computers. It incorporates the latest Intel Pentium-III FC-PGA 370 Processor or Intel Celeron FC-PGA 370 processor and fully compatibles with an entire library of PC software based on operating systems such as MS-DOS, Windows 98/Me, and Windows NT/2000. It also runs on future versions of Windows. It comes with a built-in Windows 98/Me keyboard, glide pad pointing device, sound system, PCMCIA slots, USB (Universal Serial Bus) port, IEEE 1394 port, advanced power management and more new multimedia features.

1.2 Feature Highlights

The A360 includes a variety of innovative features:

Features	Description
CPU	Intel ® Pentium-III, Celeron Processors using FC-PGA 370 packaging at 933 MHz/1GHz/1.13GHz+ for Pentium-III at 766/800/850/900/950+ MHz for Celeron
Cache Memory	• On-die secondary level cache (256-KB) for Pentium-III, Tualatin • On-die secondary level cache (128-KB) for Celeron
Bus Architecture	32-bit PCI / PCI-to-ISA Bus Architecture
Bus Speed	100 / 133 MHz Front Side Bus
System Memory	• Two memory slots for 144-pin SODIMM SDRAM (3.3V) • Use PC-100/133 SDRAM (64 / 128 / 256 MB) • Upgradeable to 512 MB
Display	• 12.1” SVGA TFT Color LCD at 800x600 pixel resolution • 13.3"/14.1” XGA TFT Color LCD at 1024x768 pixels resolution • Maximum 32-bit True Color display at 1024x768 pixel resolution • Brightness controls via hot-key function • LVDS Interface
VGA	• High performance S3 Savage4 (Integrated in Twister) with AGP 4X and SMA support. • 0/8/16/32 MB VRAM sharing from SDRAM (Using system memory; SMA Technology) (Twister spec is 2~32 MB). • Up to 1280x1024 resolution for external CRT monitor at 16M colors (32-bit True Color) • 128bit Graphics Engine • Support Dual View and Dual Video

Formatiert: Nummerierung und Aufzählungszeichen

HDD	• Built-in (internal) 2.5-inch Format; 9.5mm in Height Enhanced IDE hard drive • Supports Bus Mastering Ultra-DMA 33/66 feature for LBA
CD-ROM / DVD-ROM / CD-RW	• Built-in ATAPI IDE 24X+ Speed CD-ROM drive; or • Built-in ATAPI IDE 8X+ Speed DVD-ROM drive; or • Built-in ATAPI IDE 4X+ Speed CD-RW drive; or • Built-in ATAPI IDE Combo CD/DVD/CD-R/CD-RW drive
FDD	Built-in 3.5-inch 1.44MB floppy disk drive
Keyboard	• 19mm Pitch and 3mm Travel • Built-in 87 / 90-key Windows keyboard • Compatible with IBM enhanced 101 / 102-key keyboard
Pointing Device	• Integrated Touch pad (Glide pad) with 2 select click buttons and 1 scroll button • 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)
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 DC-in Jack ✓ 1 x mini-DIN 6-pin PS/2 Port (K/B or Mouse) ✓ 1 x 15-pin VGA Port (CRT) ✓ 2 x standard USB 1.1 Ports ✓ 1 x RCA TV-Out ✓ 1 x IEEE1394 Port (Reserved) ✓ 1 x IR Port (Reserved)
Audio System	• 16-bit full-duplex sound controller with Woofer (heavy bass) voice output, software wavetable function, and FM stereo synthesizer. • Compatible with Sound Blaster and Sound Blaster Pro • Integrated 2-way high quality paper cone stereo speakers (>1W) with sound boxes and mono microphone • Supports optional Audio-DJ to play audio CD like CD player without powering on the whole computer. • Includes the following: ✓ Microphone-in jack (MIC-IN) ✓ Headphone / Audio line-out jack (S/PDIF OUT) • Volume thumb-wheel knob control

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Formatiert

Features	Description
Power System	• Universal Auto-switching 60W/65W AC Adapter (100V – 240V) / Auto-charging capability • Rechargeable Ni-MH (4500mAh/9.6V) / Li-Ion (3800mAh/14.4V) Battery Pack • Battery Life: 2 ~ 2.5 hours (Power Management Off) • Charging Time: 2.5 ~ 3 hours quick charge (computer off)
Power Management	• ACPI 1.0B Ready • SMM (Intel System Management Mode) fully supported • Suspend-to-RAM and Suspend-to-Disk feature Suspend hot-key function / Battery Low Auto Suspend • Cover Switch (Suspend/CRT-only) function
LED Indicator	8 x LED Status Indicators for Power Source, Battery Charge, E-Mail, IDE, FDD, Caps Lock, Scroll Lock, Num Lock (LCD x 3 + Machine Base x 5)
Optional Module	• 56Kbps Fax / Data Internal Modem with V.90 support • 10 Base-T / 100 Base-TX LAN Mini PCI • Combo Modem / LAN Mini-PCI • Bluetooth Module • DVD-ROM Device Pack • CD-RW Device Pack • Combo DVD / CD-RW Device Pack • Audio DJ Panel • USB Port Replicator

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1.3 System Configuration

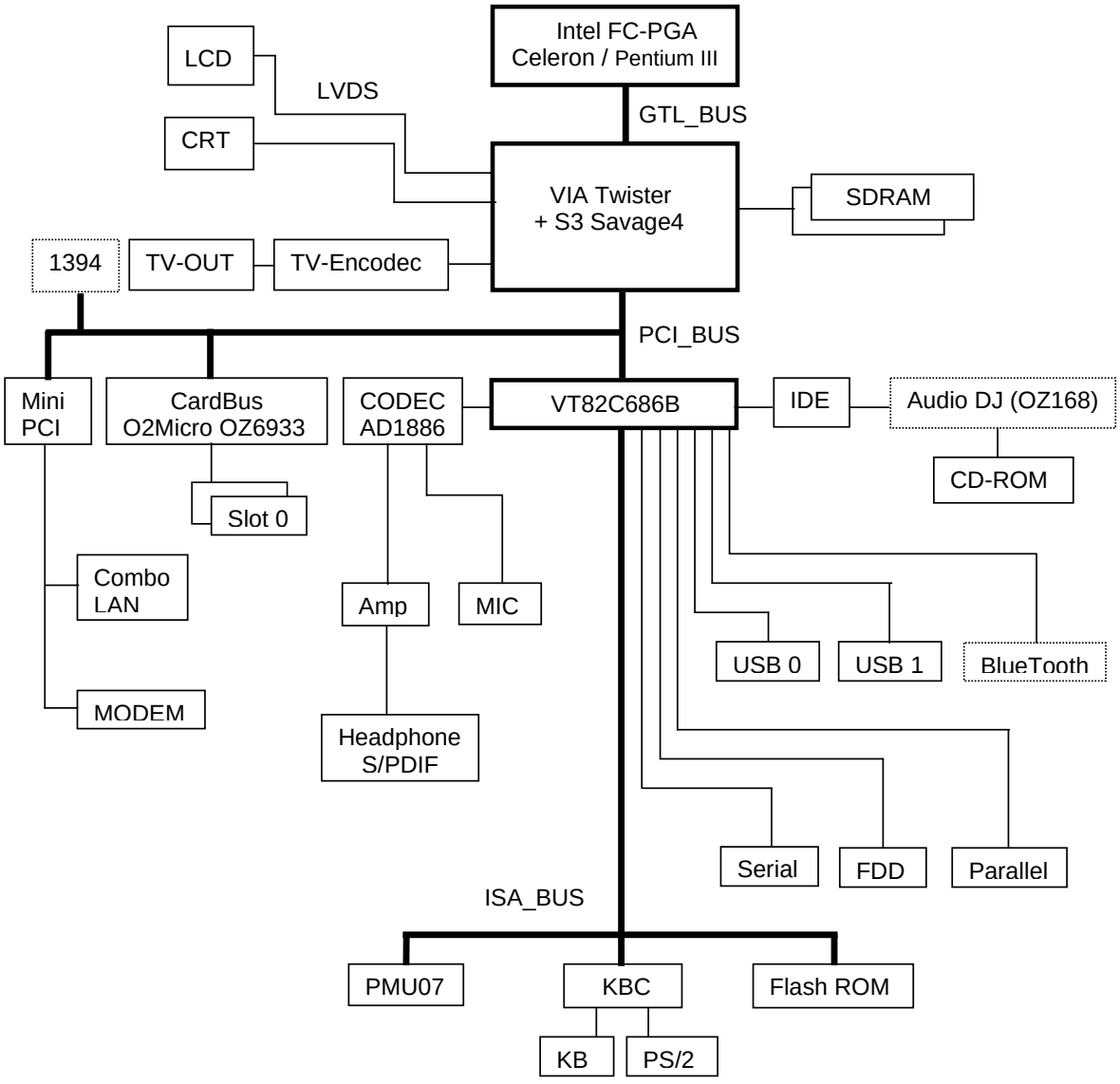
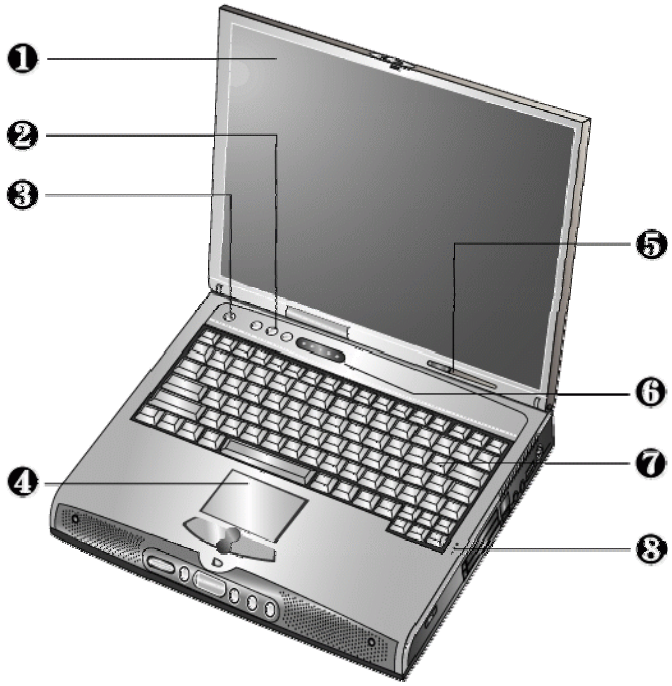


Figure 1-1 System Configuration Diagram

1.4 Quick Tour of the Notebook

Please take a moment to become familiar with the location and purpose of every control, the LED status panel, connectors and ports, which are illustrated in this section. It is recommended to first go through the User Guide of the notebook, which is shipped together with the notebook for information on how to operate its features.

1.4.1 Inside the Notebook



To open the LCD cover of the notebook, find the cover latch located at the front center of the LCD cover. Push the latch to the right to release and tilt the LCD cover up. Inside, you will see the LCD display panel, keyboard, touch pad, status LED, and power switch.

❶	Color LCD Panel	❷	Easy Buttons	❸	Power On / Resume Button
❹	Glide Pad Pointing Device	❺	Power Status LED Indicator	❻	Status LED Indicator
❼	Keyboard	❽	Integrated Microphone		

Figure 1-2 Inside the Notebook

Color LCD Display Panel

The notebook comes with several LCD option sizes at SVGA (800x600) or XGA (1024x768) active-matrix TFT color liquid crystal display (LCD). The LCD can be a 12.1” TFT (Thin Film Transistor) color LVDS with 800x600 SVGA (Super Video Graphics Array) resolution panels, or 13.3” or 14.1” TFT color LVDS with 1024x768 XGA (Extended Graphics Array)

resolution panels. You can adjust and tilt (up to 180°) the LCD screen panel to your desired viewing position.

The notebook uses S3 4X AGP VGA graphics controller that owns maximum 32MB video memory with SMA technology. All LCD models can support 16M colors or maximum 32-bit true color at 1024x768 resolution. The notebook also supports simultaneous display of the LCD with the external VGA monitor.

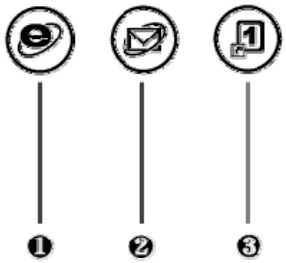
The LCD screen also uses CCFT (Cold Cathode Fluorescent Tube) backlighting which consumes much of the electrical power of the notebook. To save battery power, the system has an advanced power management feature that switches off the LCD when there is no system activity for a predetermined amount of time.

You adjust the brightness level of the LCD by pressing the display control hot-keys. You activate the hot-keys by pressing the **<Fn>** key along with another function key:

- <**Fn**> + <**F8**> Key = Increases the brightness of the LCD display
- <**Fn**> + <**F9**> Key = Decreases the brightness of the LCD display

Easy Buttons

There are three easy buttons, two use for accessing Internet and e-mail functions instantly and easily, the other one lets you define certain functions by yourself. Descriptions of the easy buttons appear in the latter part of this section.



❶	Internet Button	❷	E-Mail Button	❸	User-Defined Button

Figure 1-3 Easy Button

– Internet Button
  This technology is designed specifically for providing a very convenient way in connecting Internet only by pressing Internet button as shown in the graphics. For more understanding and interesting, you can refer Section 2.5 of user manual to recognize the driver installation procedures in activating Internet button.

– E-mail Button
  This is the most convenient way to access the outlook utility just by pressing this button. You can simplify several procedures in entering into Microsoft Outlook environment.

– User-Defined Button
  You can define this button to activate command file (like execution file or batch file) by yourself.

Power Button

Press the Power button either 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. If in Suspend mode, pressing the Power button will bring it out of Suspend mode and resume to the system's last state. You can set the function of power button from the power management setting in Windows Control Panel. Always check the Power LED after pressing the power button to know the power status of the notebook.

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

Glide Pad Pointing Device

Built in just below the keyboard panel is the glide pad pointing device. The left and right select buttons of the glide pad is found below the glide pad surface. The left select button is configured (by default) as the left button you normally click on the mouse while the select key to the right is configured as the right button. The scroll button makes it easy to browse upwards or downwards in the software screen.

To move cursor, place your finger lightly on the glide 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 glide pad is compatible with the standard PS/2 mouse and can be activated using the normal DOS or Windows PS/2 mouse driver. You can also disable the glide pad in the BIOS Setup program.

ⓘ You can execute a left button click function by simply tapping on the glide pad surface once. Refer to the User Guide of the notebook for more information.

Power Status LED Indicator

Located just in front of the palmrest assembly, you will find three LEDs for the power and battery charge status. These LEDs are positioned to be visible even if the LCD cover is closed.

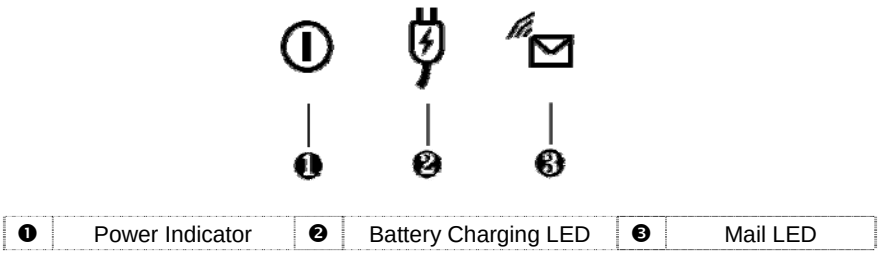


Figure 1-4 Power Status LED Indicator

1. **Power Indicator** – lets you know if power to the system is turned on and if system is in Suspend-to-RAM mode. This LED is positioned so that you can see it on both sides whether the LCD panel is opened or closed.

   – Lights green when the system is powered on using the AC adapter or battery.
   – Lights green blinking when in Suspend to RAM (or Suspend to Disk) if you already created Save to Disk partition/file in HDD mode and critically low battery power. We strongly recommend that users create the partition/file "Save to Disk" as this will prevent your data from loss when power is critically low.
   – Lights orange when the battery power is low.

2. **Battery Charging LED** – lights to indicate battery in charging status.
   – Lights green to indicate the battery is charging.
   – Lights off to indicate the battery is fully charged or no battery installed.

3. **Mail LED** – Lights green to indicate that a new mail is arrived.

Status LED Panel

The Status LED Panel keeps you informed of the notebook's current operating status. Each LED is marked with an icon to designate a system status.

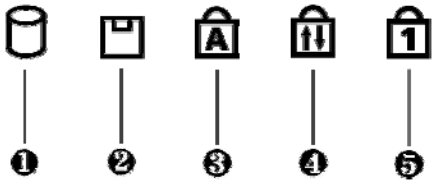
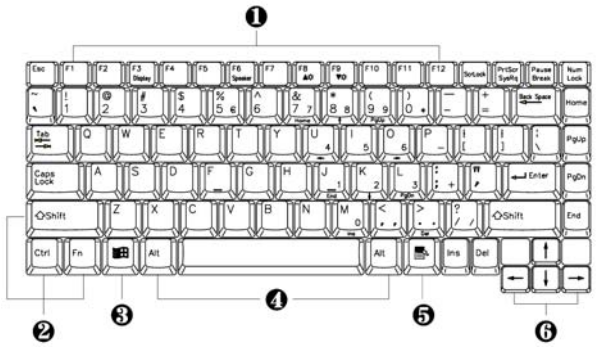


Figure 1-5 Status LED Panel Icons

Icon	Represents	Indicates
❶	**IDE Drive Access**	This LED will turn on when the system is accessing the hard disk drive (HDD) or CD-ROM / DVD-ROM / CD-RW.
❷	**Diskette Drive Access**	This LED will turn on when the system is accessing the floppy disk drive (FDD).
❸	**Caps Lock**	This LED will turn on when the Caps Lock key is activated. When activated, all alphabet keys typed in will be in upper case or in capital letters.
❹	**Scroll Lock**	This LED will turn on when the Scroll Lock key is activated.
❺	**Num Lock**	This LED will turn on when the Num Lock key is activated. When activated, the embedded numeric keypad (blue print numeric keys) will be enabled.

Keyboard Panel

- Standard QWERTY-key layout and full-sized 87/90 keys keyboard with Windows hot-keys, embedded numeric keypad, hot keys, inverted "T" cursor arrow keys, and separate page screen control keys.
- Wide extra space below the keyboard panel for your wrist or palm to sit-on comfortably during typing. (The keypad F4, F5, F7 on the following keyboard should no words print on it.)



❶	Function Keys	❷/❹	Control Keys	❸	Windows Start Menu Key
❺	Windows Short-cut Key	❻	Cursor Control Keys		

Figure 1-6 Keyboard Layout

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

(1) **Function Keys** — These function keys, out of **<F1>** through **<F12>**, are available on the notebook keyboard. These keys also work together with the **<Fn>** key to activate special functions. The following function-key combinations are pre-programmed:

Hot Key	Function	Handler
Fn + F3	Toggle Display (LCD/CRT/Simul)	BIOS Handler
Fn + F5	Display stretching	BIOS Handler
Fn + F6	Speaker On/Off	BIOS Handler
Fn + F8	Brightness Increase	Controlled by PMU07
Fn + F9	Brightness Decrease	Controlled by PMU07
Fn + F12		
Fn + Power button	System Suspend to disk	BIOS Handler

(2) **Control keys** – **<Ctrl>**, **<Alt>**, **<Fn>**, and **<Shift>** keys are controls 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>**.

(3) **Windows keys (Windows Start Menu Key) –** Use this key to activate the Start Menu of Windows.

(4) **Shortcut/Application key** – provides quick access to shortcut menus. (This key acts like a right mouse button.)

(5) **Cursor Control keys** – Cursor control keys let you position the cursor on the screen where you want. On the screen, the cursor is a blinking underline, block, or vertical bar depending on the application.

(6) **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.

(7) **Numeric Keypad** – Pressing **<NumLock>** on the keyboard activates the embedded numeric keypad numbers and functions printed in blue on top of the keys. When you press **<NumLock>** again, the keys revert to their normal functions as typewriter keys.

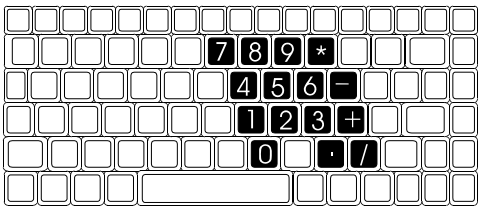
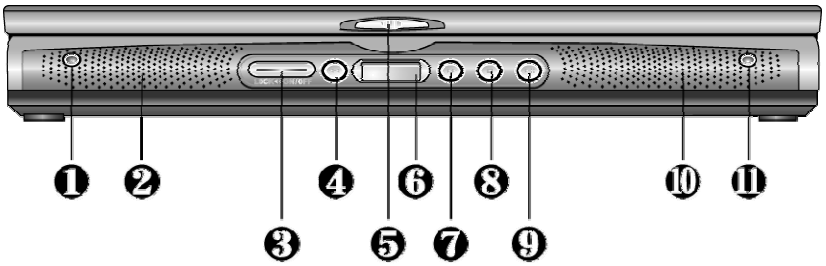


Figure 1-7 Embedded Numeric Keypad

Integrated Microphone

This allows you to instantly record voice annotations (normally saved as WAV files) and later attached them to documents and presentation using the notebook 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 speakerphone modem, Internet live chat, or video conferencing.

1.4.2 Front Side of the Notebook



❶/⓫	Woofer	❷/❿	Built-in Stereo Speakers	❸	Lock On / Off Switch
❹	Rewind Button	❺	Cover Switch	❻	Audio DJ Display
❼	Forward Button	❽	Stop Button	❾	Play Button

Figure 1-8 Front Side of the Notebook

Woofer

These speakers produce heavy bass voice output for music listening.

Built-in Stereo Speakers

At the front left and right sides of the base unit are two built-in stereo mini speakers with sound boxes. The speakers are controlled by the audio controller of the notebook and activated by installing the audio driver. For adjusting the volume of the speakers, you can use the volume control program under Microsoft OS or by adjusting the thumb-wheel volume knob also found on the left side of the notebook.

Lock On / Off Switch

This Lock Switch executes two functions as to power on/off the Audio DJ CD player and to lock or unlock the Audio DJ status. To power on or off the Audio DJ CD player, slide the switch right aside. To lock or unlock the status of your Audio DJ, slide the switch left aside. When your Audio DJ is in locking status while the music is playing, no matter what button is pressed, the music still continues to play. The function of this switch is to prevent you from touching any button accidentally.

Remind Button

Press the button for reverting to previous music. Press and hold this button to fast rewind the audio CD.

Cover Switch

The Cover Switch is found inside the notebook assembly just underneath the latch opening where you insert the LCD cover hook. Whenever the LCD cover is closed, it activates the Suspend mode or switches the display to CRT if there is an external monitor connected.

ⓘ When Suspend-to-RAM mode is activated, make sure not to leave the system for a long period when running at battery mode. The battery will continue to drain some power even in Suspend mode. It is better to save all files and shutdown the power instead or run Suspend-to-Disk mode.

Audio-DJ Display

The display shows the number of the music currently playing.

Forward Button

Press the button for playing the next music. Press and hold this button to fast forward the audio CD

Stop Button

Press the button to stop the music.

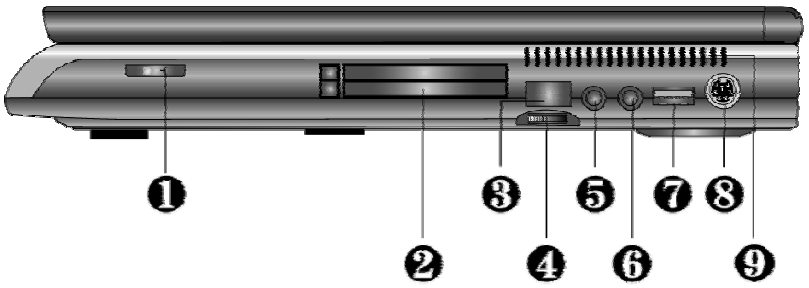
Play Button

Press the button to play the music.

> The function of Audio DJ can be workable either in Windows system or operate it without powering on the computer. For execute this function, you should first install the Easy Button driver. Please refer to Section 5 of Chapter 2 of user manual for installation procedures. However, if your OS is Windows 98, you should download and install the "Windows Media Player 7" from Microsoft's Website to activate this function.

1.4.3 The Right Side of the Notebook

The right side of the notebook computer offers the features shown in the following figure.



❶	BlueTooth LED	❷	PC Card Slots	❸	IR Port
❹	Thumb Wheel Volume Control	❺	Headphone / SPDIF Jack	❻	Microphone Jack
❼	USB Port	❽	PS/2 Port		Air Inhalant

Figure 1-9 Right Side of the Notebook

BlueTooth LED

The LED is light when you activate with the Bluetooth function.

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. The PCMCIA slot

compartment comes with vertical 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 top slot.
To remove the inserted PC card, slightly push the button found on the right 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 right 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.

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

ⓘ For network PC cards, you need first to stop the device under the PC Card properties of Windows Control Panel. Otherwise, this may cause system hang or system fatal error.

IR Port

Wireless data transfer of files between your notebook computer and an IR-equipped device or notebook computer. You can also print to an IR-equipped printer without using cables. The SIR mode provides up to 115.2Kbps of data transfer rate.

Thumb-Wheel Volume Control

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.

Headphone Jack

This jack (1/8-inch mini-jack) allows you to connect an external headphone, earphone, or powered speakers for personal listening.

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

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

Microphone Jack

The microphone jack (1/8-inch mini-jack) allows you to connect an external microphone with 600-ohm dynamic in place of the built-in microphone of the notebook for monophonic sound recording directly into your notebook computer. The external microphone provides lesser recording noise compared to the built-in microphone of the notebook.

ⓘ Plugging in an external microphone disables the internal microphone.

USB (Universal Serial Bus) Ports

The USB (Universal Serial Bus) Port is a port with the symbol ⇽. This 4-pin slim port allows you to connect multiple USB devices through daisy chaining or through a USB hub and use them all simultaneously. The USB specification states it can support up to 127 USB devices running at

up to 12Mbps. This notebook provides two USB ports.

ⓘ When you resume the system from suspend mode, the USB port may not initialize properly. If in case the USB device does not work, unplug and plug the USB device again. This is a known bug released by Intel and Microsoft Windows.

PS/2 Port

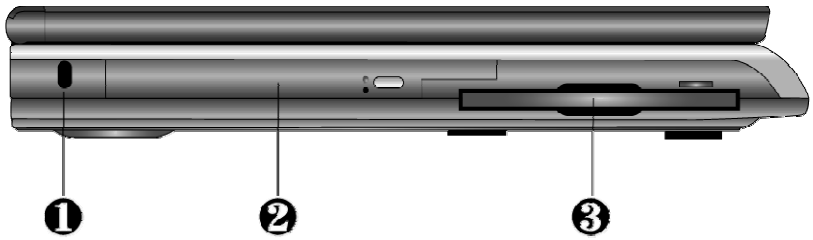
Use the standard PS/2 port to connect an external PS/2-style mouse, PS/2-style keyboard, or PS/2 style Numeric Keypad to the system. With a Y-cable adapter which user can purchase at local electronic store, user can connect any combination of two of these devices at the same time. For non-PS/2 keyboard, you need to use a keyboard adapter that converts the DIN-type connector to PS/2 connector.

Air Inhalant

Inhale the air into your computer to keep it within operating temperature.

ⓘ Do not block the fan while the notebook is in use.

1.4.4 The Left Side of the Notebook



❶	Locking Device Keyhole	❷	CD ROM / DVD ROM / CD-RW	❸	Diskette Drive

Figure 1-10 Right Side of the Notebook

Locking Device Keyhole

Lets you attach a Kensington security system or a compatible lock to secure your notebook computer.

CD-ROM / DVD-ROM / CD-RW Drive

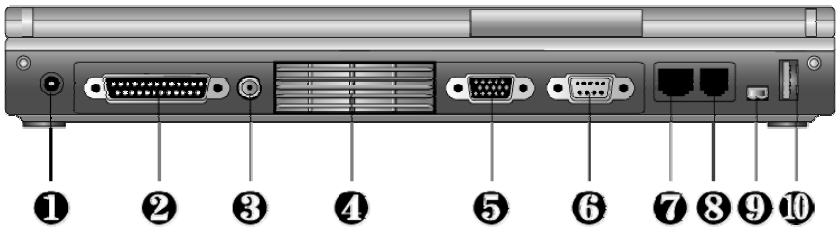
The notebook comes with a standard 24X+ speed ATAPI IDE CD-ROM drive that supports all major CD formats like CD-R, Photo CD, and Video CD. The drive utilizes a pop-out tray loading mechanism and supports bootable CD by setting the BIOS Setup program. Refer to Chapter 2 of User Manual on how to install the CD-ROM driver. The notebook also comes with the 8X+ speed DVD-ROM drive or 4X+ speed CD-RW driver options.

Floppy Diskette Drive (FDD)

The built-in 3.5 inch FDD allows you to use any standard double-sided high-density (DSHD)

diskette for copying and transferring data files. In the BIOS Setup program of the notebook, you also could disable the FDD option or set a password option when accessing the drive.

1.4.5 The Rear Side of the Notebook



❶	AC Power Port	❷	Printer Port	❸	TV-Out Port
❹	Air-Outlet Vent	❺	CRT Port	❻	Series Port
❼	LAN Port	❽	Modem Port	❾	IEEE1394 Port
❿	USB Port				

Figure 1-11 Rear Side of the Notebook

AC Power Port

Lets you attach the notebook to the 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 will activate whenever the battery is being recharged.

Printer Port (LPT1)

The printer port lets you connect a 25-pin parallel device such as printer, ZIP drive, or remote data transfer cable. Many operating systems and software applications refer to this port as LPT1. You can run the BIOS setup program to change the configuration of the parallel port to Uni-directional, ECP or EPP mode.

ⓘ The default setting for the parallel port on your notebook computer is set to EPP mode. Some parallel devices may not function with the default setting. You need to run the BIOS Setup program to adjust the settings.

TV-Out Port

Lets you connect to a RCA TV connector for presentation or VCD, DVD watching.

Air-Outlet Vent

Emits the heat out of your computer and keeps it within operating temperature.

VGA Port (CRT)

The VGA port lets you connect an external VGA (CRT) monitor to the 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 switch to CRT only, you can set the display resolution up to 1280x1024 at 16M colors (32-bit true color).

Series Port (COM 1)

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

> When connecting an external serial mouse, you must first power off the system before connecting the external mouse. It can auto-detect the serial mouse hardware and run both glide pad and serial mouse simultaneously.

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

LAN Port

If you purchase an internal 10Base-T/100Base-TX LAN module, it connects your computer to other computers/networks through a local area network (LAN).

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 PCI modem and supports the latest V.90 standard and sort of a PCI add-in card reduced into a smaller compact form. The internal module uses mini-PCI technology and is inserted into the mini-PCI socket found on the underside of the notebook. It keeps you connected to the outside world through networks.

IEEE1394 Port

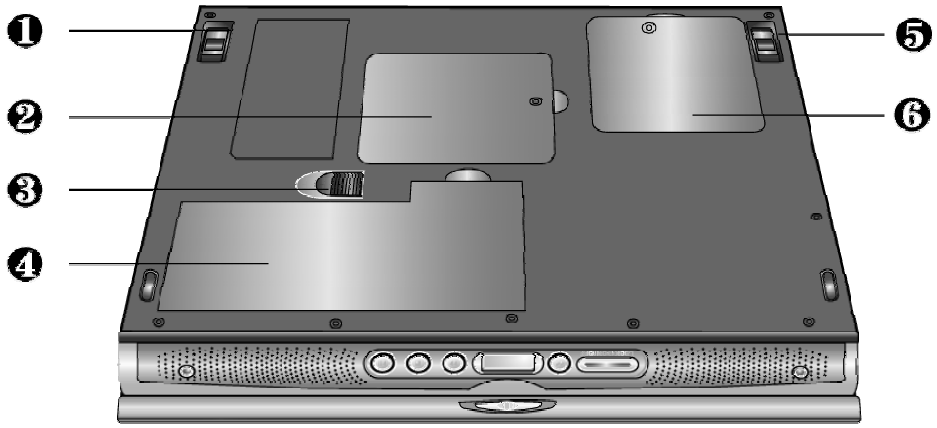
IEEE 1394 port is a high speed I/O port that can transfer high levels of data in real-time, such as external hard disk, Digital Video Camera.

USB (Universal Serial Bus) Ports

The USB (Universal Serial Bus) Port is a port with the symbol . This 4-pin slim port allows you to connect multiple USB devices through daisy chaining or through a USB hub and use them all simultaneously. The USB specification states it can support up to 127 USB devices running at up to 12Mbps. This notebook provides two USB ports.

> When you resume the system from suspend mode, the USB port may not initialize properly. If in case the USB device does not work, unplug and plug the USB device again. This is a known bug released by Intel and Microsoft Windows.

1.4.6 The Under Side of the Notebook



❶/❺	Tilt Foot	❷	Memory Compartment
❸	Battery Release Latch	❹	Battery Bay
❻	Mini-PCI Socket Compartment		

Figure 1-12 Under Side of the Notebook

Tilt Foot (Left and Right)

Allow you to tilt the rear of the notebook upward to provide flexible keyboard angle for more comfortable typing.

Memory Compartment

Found on the underside of the notebook is the memory compartment. Underneath the cover are two 144-pin SODIMM memory slots for inserting and upgrading the system memory using 64MB, 128MB, or 256MB SODIMM. The notebook uses PC-100/133 SDRAM modules for faster memory access. You can upgrade the total memory up to 512MB. One is inserted with a SDRAM configured by the factory. The other is empty for upgrade use. Refer to Chapter 7 on how to upgrade the system memory.

Battery Release Latch

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

Battery Bay

The battery bay stores the Lithium-Ion (Li-Ion) or Nickel Metal-Hydride (NiMH) battery pack for off-the-cord operation. The battery pack is instantly charge whenever you connect the AC adapter to the notebook. It is very important to always have the battery installed on the notebook to have it always charged and conditioned by the AC adapter.

Mini-PCI Socket Compartment

This compartment provides the mini-PCI socket for inserting optional built-in Modem, LAN, or Combo card. Refer to Chapter 2 of User Manual for installing the Modem module.

1.5 Notebook Accessories and System Options

It is also important to understand the accessories that come along with the notebook and the options for fully utilizing the capabilities of the computer. This section describes briefly what these accessories and options are.

1.5.1 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 outlets. Connect the adapter to the AC wall outlet using the power cord. You just change the power cord if you are going to use your notebook in other countries with different connector outlets. When you connect the AC adapter, it charges the battery whether or not the notebook computer is powered on. There is an LED on the AC adapter to indicate if DC power is already available.

1.5.2 Battery Pack

Aside from the AC adapter, your computer can also be powered through the removable battery pack. The battery pack uses rechargeable Nickel Metal-Hydride (NiMH) or Lithium-Ion (Li-Ion) battery cells that can run for 2 to 2.5 hours when fully charged and power management enabled. Recharging the battery takes around 2.5 to 3 hours when the computer is off.

You should always leave the battery inside your computer even when using the AC adapter as it also acts as 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, it is advisable to remove the battery pack from the notebook to prevent any current leak.

1.5.3 Internal Modem Module

The notebook allows you to insert a proprietary internal 56Kbps-modem card to the notebook found on the underside of the notebook. The internal modem card supports only fax and data communication and is V.90-compliant. You connect the telephone line to the RJ-11 jack found on the rear side of the notebook.

1.5.4 Internal Ethernet LAN Module

This notebook comes with an optional 10Base-T/100Base-TX LAN module that supports data transfer rates at 10Mbps and can be up to 100Mbps.

1.5.5 DVD-ROM Drive

Other than the internal CD-ROM drive, the notebook also provides optional factory built-in DVD-ROM drive. DVD-ROM drives are also backward compatible with CD-ROM, so you can also use any audio CDs, video CDs, photo CDs, and CD-R. Using a software MPEG-2/DVD program, the notebook can playback any commercial DVD movie titles.

1.5.6 CD-RW Drive

This device pack can write data to CD-R or CD-RW CD for you to backup the data.

1.5.7 Audio-DJ

This notebook comes with optional built-in Audio DJ panel. It can play your Audio CD like the CD player without powering on the whole computer.

1.5.8 Blue Tooth Module

This notebook is ready for Bluetooth technology. This is a wireless connection standard in a short-range radio technology. It aims at simplifying communication between each device with bluetooth module. Bluetooth is in essence a “personal-area network” technology for connecting computers to peripherals and mobile phones.

1.6 System BIOS SETUP Program

The notebook uses the Phoenix BIOS (Basic Input-Output System) Setup program that allows you to set several system configurations in changing the way the system performs. This includes your system time and date, disk drive configuration, I/O device controls, boot drive sequence, and power management settings. The information is then stored in the CMOS RAM chip and will remain permanent unless you change it again. The notebook also uses EPROM Flash BIOS that allows you to update the system BIOS by simply overwriting it using the Phoenix Flash programming utility.

Before boot-up, the system will read the BIOS settings and compare them to the equipment check conducted during the POST (Power-On Self-Test). As the POST (Power-On Self Test) executes during the boot up process or if an error occurs, an error message will be displayed on the screen, the screen will display the following message: ”Press <F2> to Enter SETUP”. You will then be prompted to run the BIOS Setup Program by pressing the <**F2**> key to run the BIOS Setup program.

The BIOS Setup program is organized into five menus which you can select using the ← and → keys. To move from one option to another, you use the up and down arrow keys while using the <F5> and <F6>, or <+>and <-> keys to change the settings. On the right hand side of the screen are some brief help descriptions of each item you want to change.

On the BIOS Setup program, you will find the following parts on the screen:

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

To exit the BIOS Setup program, simply press the <Esc> key and select from the Exit menu whether you want to Save changes and exit; Discard Changes and exit.
The following table lists the keys on how to edit and move around the setup menus inside.

KEY	WHAT IT DOES
<F1>	Shows on-line help on key functions.
↑ ↓	Moves the cursor between the displayed parameters.
- / +	Modifies the current parameter settings.
<F9>	Load default configuration.
Esc	Exits the current menu and returns to the main menu or go directly to the Exit menu.
←→	Changes between displayed menus.
<Enter>	For some parameter settings, select and moves the cursor between the sub-menu. Also moves the cursor to the next line or selection.
<F10>	Save changes and exit.

ⓘ Some information here may not be available or different from other date code versions of the notebook BIOS. Always check for the latest BIOS update from the FIC Internet homepage. ftp://pcg.fic.com.tw/NBTECH

1.6.1 Using the Main Menu

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

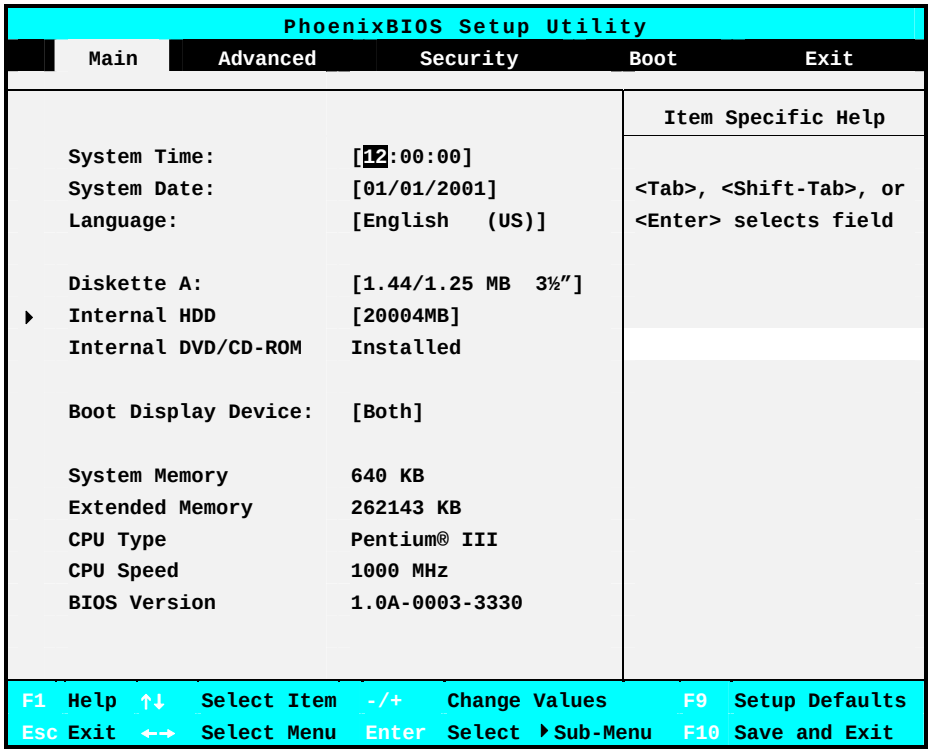


Figure 1-13 BIOS Setup Main Menu

System Time:	[12:00:00]	<Tab>, <Shift-Tab>, or <Enter> selects field.
System Date:	[01/01/2001]	<Tab>, <Shift-Tab>, or <Enter> selects field.
Language:	[English (US)]	
Diskette A:	[Disabled] / **[1.44/1.25MB 3½"]**	Select floppy type.
▶ Internal HDD	[10056MB]	
Internal DVD/CD-ROM	Installed / Not installed	(BIOS auto detect, for information only)
Boot Display Device:	**[Both]** / [CRT] / [LCD]	Choose the display device.
System Memory	640 KB	(BIOS auto detect, for information only)
Extended Memory	262143 KB	(BIOS auto detect, for information only)
CPU Type	Pentium (R) III	(BIOS auto detect, for information only)
CPU Speed	900MHz	(BIOS auto detect, for information only)
BIOS Version	1.0A-0221-0713	(BIOS auto detect, for information only)

- **`System Time`** –Allows you to change the system time using the hour:minute:second format of the computer. Enter the current time for reach field and use the <Tab>, <Shift>+<Tab>, or <Enter> key to move from one field or back to another. You can also change the system time from your operating system.

- **`System Date`** – This field lets you set the system date using the month/date/year format. Enter the current time for reach field and use the <Tab>, <Shift>+<Tab>, or <Enter> key to move from one field or back to another. You can also change the system time from your operating system.

- **`Language`** – This field allows you to select the display language for the BIOS by the <Tab>, <Shift>+<Tab>, or <Enter> key to move from one field or back to another..

- **`Diskette Drive A`** – This field allows you to enable or disable the built-in 1.44 3½ " Diskette by pressing the <**Enter**> key.

- **`Internal HDD`** – This field 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 DVD/CD-ROM`** –This field is for information only as the BIOS automatically detects the internal CD-ROM or DVD-ROM Drive.

- **`Boot Display Device`** – This field allows you to set the output boot display to the LCD, CRT, or Both.

- **`System Memory, Extended Memory, CPU Type, CPU Speed and BIOS Version`** – These fields are for information only as the BIOS automatically detects related values during Power-On Self-Test (POST).

Internal HDD Sub-Menu

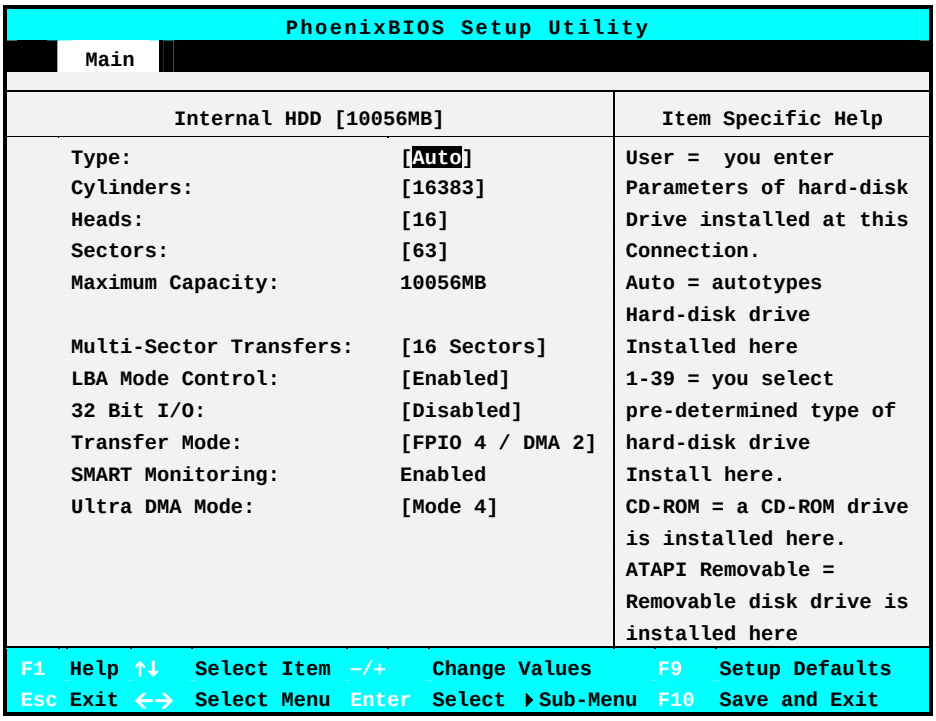


Figure 1-14 Internal HDD/CD-ROM Sub-Menu

Type:	[None] / [CD-ROM] / [User] / **[Auto]**	Select the drive type corresponding to the fixed disk installed in your system. If type USER is selected, Cylinders, Heads & Sectors edited directly.
Cylinders:	[16383]	(BIOS auto detect, for information only)
Heads:	[16]	(BIOS auto detect, for information only)
Sectors:	[63]	(BIOS auto detect, for information only)
Maximum Capacity:	10056MB	(BIOS auto detect, for information only)
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
Transfer Mode:	[Standard] / [Fast PIO 1] / [Fast PIO 2] / [Fast PIO 3] / [Fast PIO 4] / [FPIO 3 / DMA1] / [FPIO 4 / DMA2]	Select the method for moving data to/from the drive. Autotype the drive to select the optimum transfer mode
SMART Monitoring	[Disabled] / [Enabled]	HDD provides the function of SMART Monitoring
Ultra DMA Mode:	[Mode 1] / [Mode 2]	(BIOS auto detect, for information only)

1.6.2 Using the Advanced Menu

The Advanced Menu allows you to configure the OS and I/O device settings.

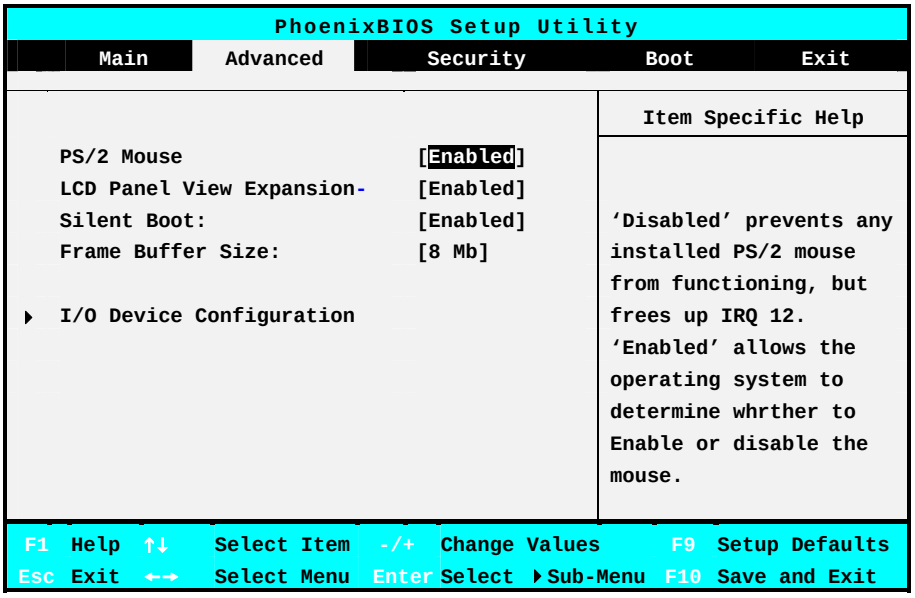


Figure 1-15 BIOS Setup Advanced Menu

PS/2 Mouse	[Disabled] / **[Enabled]**	[Disabled] prevents any installed PS/2 mouse from functioning, but frees up IRQ12. [Enabled] allows the operating system to determine whether to enable or disable the mouse.
LCD Panel View Expansion-	[DISABLED] / **[ENABLED]**	[Disabled] Reduces the panel view in some video mode. [Enabled] Expands the panel view, but it may adversely affect the graphic/text quality
Silent Boot:	**[Enabled]** / [Disabled] / [Black]	Select boot screen using options: [Enabled] – Logo screen on boot [Disabled] – POST screen on boot [Black] – Black screen on boot
Frame Buffer Size	[None] / [8 Mb] / [16 Mb] / [32 Mb]	Sharing VGA memory size from SDRAM. Recommend you setting the default value to 8MB. If you want to play DVD with Power DVD, please set the size of VGA frame buffer size to 16MB or 32MB and enable Hardware accelerator function under Power DVD.
▸I/O Device Configuration	Submenu	Peripheral Configuration

- **PS/2 Mouse** – [Disabled] prevents any installed PS/2 mouse from functioning, but frees up IRQ12. [Both] allows both internal and external PS/2 mouse to be active. [Auto] will only allow the external PS/2 mouse to be active if it is detected.

- LCD Panel View Expansion-
- **Silent Boot** – Select boot screen during POST.
- **Frame Buffer Size** – Allows you to select sharing VGA memory size from SDRAM. If you want to play DVD with Power DVD, please set the size of VGA frame buffer size to 16MB or 32MB and enable Hardware accelerator function under Power DVD.
- **I/O Device Configuration** – Lets you configure input/output device such as Serial Port, Parallel Port, and Floppy disk controller.

Gelöscht: <#>~~Local BUS IDE adapter~~ – ~~Enable the integrated local bus IDE adapter.~~¶

Formatiert

```
                    PhoenixBIOS Setup Utility
                       Advanced
 I/O Device Configuration                  Item Specific Help

 Serial port A:                [Enabled]   Configure serial port
   Base I/O address            [3F8 IRQ4]  using options:
 Infrared port:                [Enabled]
   Mode:                       [IrDA]      [Disabled]
   Base I/O address            [2F8 IRQ3]    No configuration
 Parallel port:                [Enabled]
   Mode:                       [EPP]       [Enabled]
   Base I/O address            [378]         User configuration
 Floppy disk controller:       [Enabled]
                                           [Auto]
                                             BIOS or OS chooses
                                             configuration
 F1  Help ↑↓  Select Item  -/+   Change Values     F9   Setup Defaults
 Esc Exit ←→  Select Menu  Enter Select ▸Sub-Menu  F10  Save and Exit
```

Figure 1-16 I/O Device Configuration Sub-Menu

Serial port A	[Disabled] / **[Auto]** / [Enabled]	Configure serial port A using options: Disabled - No configuration, Enabled - User configuration, Auto - BIOS or OS 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] / **[Auto]** / [Enabled]	Configure Infrared port using options: Disabled - No configuration, Enabled - User configuration, Auto - BIOS or OS configuration.
Mode	**[IrDA]**	Set the mode for Infrared port
Base I/O address	[3F8 IRQ4] / **[2F8 IRQ3]** / [3E8 IRQ4] / [2E8 IRQ3]	Set the base I/O address for Infrared port.

Parallel port	[Disabled] / **[Auto]** / [Enabled]	Configure parallel port using options: Disabled - No configuration, Enabled - User configuration, Auto - BIOS or OS configuration.
Mode	[ECP] / **[EPP]** / [Uni-directional]	Set the mode for the parallel port using options: Uni-directional, EPP, and ECP
Base I/O address	**[378]** / [278] / [178]	Select the base I/O address for the parallel port when port is Enabled.
Floppy disk controller	[Disabled] / **[Enabled]**	Configure the floppy disk controller using options: Disabled - No configuration, Enabled - User configuration

ⓘ If you disable a device in BIOS Setup, you cannot enable or assign it using the Windows (98 or 2000) Device Manager. The device is not listed in the Windows device list. You need to select any setting other than “Disable” in Setup.

- **`Serial Port`** A – You can press <**Enter**> to select Enabled, Disabled, or Auto option for enabled or disabled this port, or automatically sensed the address assignment by BIOS or OS. When you set the configured parallel port to Enabled rather than Auto, you should also set the parameter of Base I/O address for this port.

- **`Infrared Port`** – You can press <**Enter**> to select Enabled, Disabled, or Auto option for enabled or disabled this port, or automatically sensed the address assignment by BIOS or OS. When you set the configured parallel port to Enabled rather than Auto, you should also set the parameter of Base I/O address for this port.

- **`Parallel Port`** – Allows you to press <**Enter**> to select the Enabled, Disabled, or Auto option for enabled or disabled this port, or automatically sensed the address assignment by BIOS or OS.

- **`Mode`** – Allows you to press <**Enter**> to select a parallel mode as Uni-directional, EPP, or ECP when the parallel port is configured. When you set the configured parallel port to Enabled rather than Auto, you should also set the parameter of Base I/O address for this port.

- **`Floppy Disk Controller`** –Allows you to press <**Enter**> to select the Enabled or Disabled option for configured or not configured the floppy disk controller.

1.6.3 Using the Security Menu

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

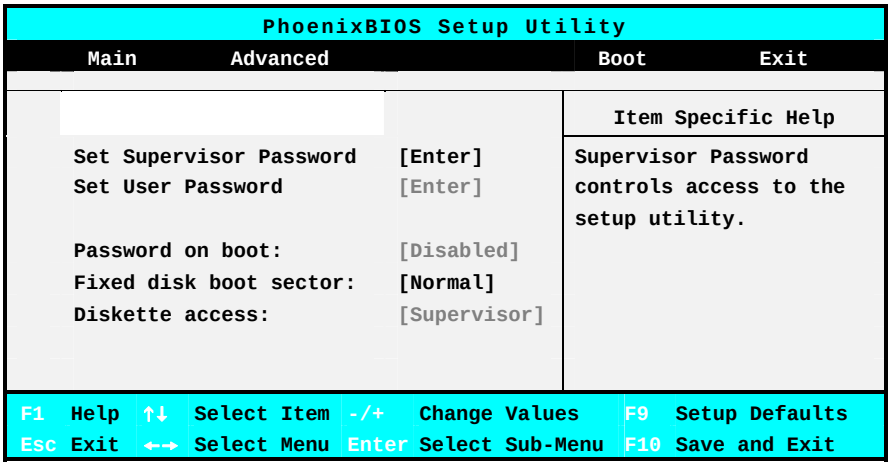


Figure 1-17 BIOS Setup Security Menu

Set Supervisor Password	Press Enter	Supervisor Password controls access to the setup utility.
Set User Password	Press Enter	User Password controls access to the system.
Password on boot	**[Disabled]** / [Enabled]	Enabled password entry on boot
Fixed disk boot sector	**[Normal]** / [Write protect]	Write protects boot sector on hard disk, to protect against viruses.
Diskette access	[User] / **[Supervisor]**	Control access to diskette drives.

- **Set Supervisor Password** – Specifies if the system prompts you to enter a password when entering Setup.
- **Set User Password** – Specifies if the system prompts you to enter a password when accessing the system. The Set User Password function will be enabled once a Supervisor password is set. Enter a new password with up to eight alphanumeric characters, and then enter this same new password again for confirmation.
- **Password on boot** – Enables password check when booting.
- **Fixed disk boot sector** – [Write Protect] enables write protect boot sector on hard disk to prevent against viruses. [Normal] disables this write protect function.
- **Diskette access** – Controls access to diskette drive.

1.6.4 Using the Boot Menu

The Boot menu lets you decide the boot order of booting devices including:

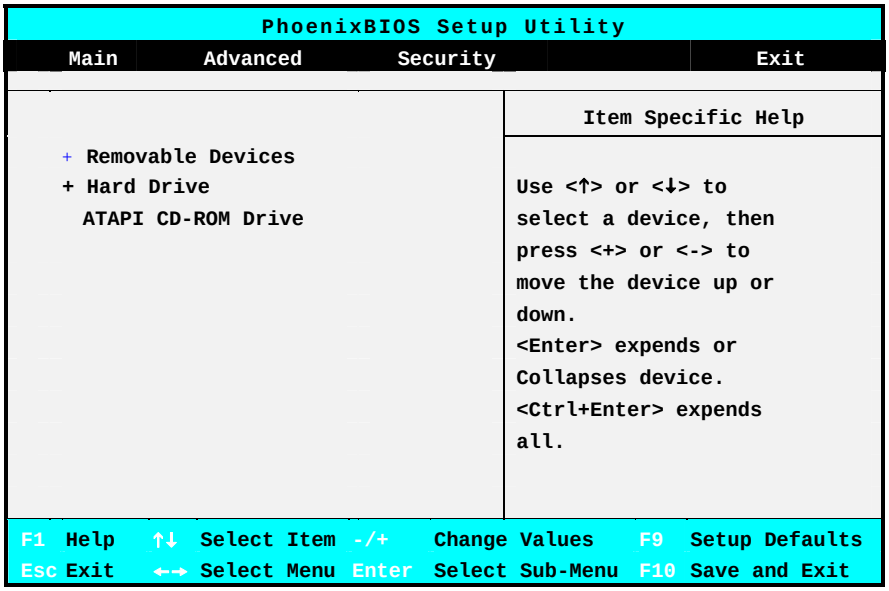


Figure 1-18 BIOS Setup Boot Menu

- **Removable Devices** – put this option on top if you want to boot from a bootable floppy diskette (Drive A:\).
- **Hard Drive** – put this option on top if you want to boot from a bootable hard disk drive (Drive C:\)
- **ATAPI CD-ROM Drive** – put this option on top if you want to boot from a bootable CD-ROM like Windows NT /2000 (Drive D:\).
- **Network Boot** – put this option on top if you want to boot from LAN network

1.6.5 How to Exit the Setup Program

There are three choices to escape from the Setup program.

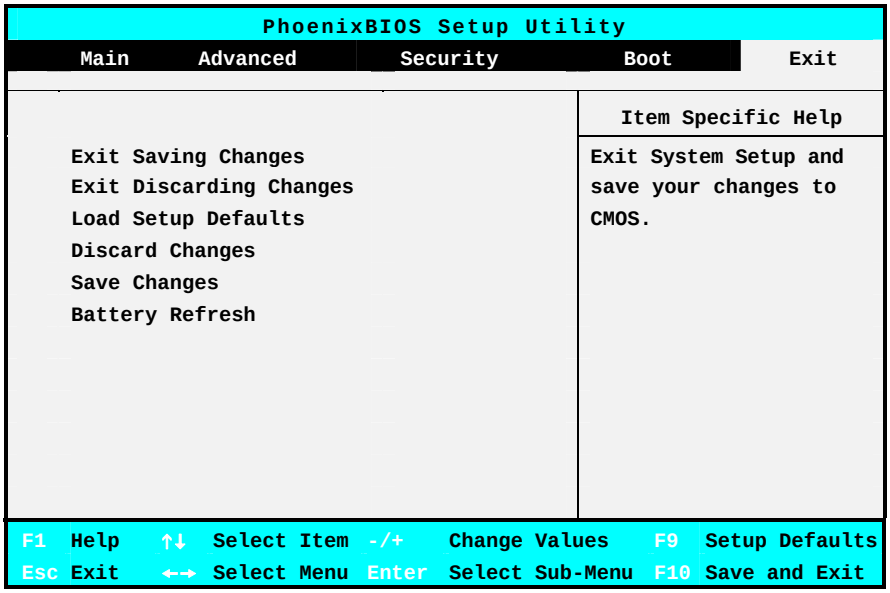


Figure 1-19 BIOS Setup Exit Menu

- **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.
- **Save Changes** – Saves Setup data to CMOS.
- **Battery Refresh** – Reactivate the battery.

Chapter 2

Installation and Upgrade

2.1 Overview

This chapter provides guidelines on installing the device drivers for the built-in features of the A360. Most of the driver installation procedures mentioned here are only for Windows 98 / Me and Windows 2000. This chapter also includes procedures on how to upgrade major internal system components like CPU, memory, hard disk, and feature card modules.

2.2 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
- S3 Savage4 (Integrated in Twister) VGA Driver – Windows 98 / Me / 2000
- VIA PCI audio (Integrated in VT82C686B) Driver – Windows 98 / Me / 2000
- Synaptics Touch Pad Driver – Windows 98 / Me / 2000
- O2Micro OZ6933 PCMCIA Driver – Windows 98
- VIA Twister chipset Driver – Windows 98 / Me / 2000
- Easy Button Driver – Windows 98 / Me / 2000
- Easy Mail Driver – Windows 98 / Me / 2000

The notebook also comes with other option devices that requires driver installation:

- Askey 1456VQL19R-4 Data Fax Modem – Windows 98 / Me / 2000
- Ambit Intel 82562EH LAN – Windows 98 / Me / 2000
- Askey Combo Modem / LAN – Windows 98 / Me / 2000

ⓘ Visit FIC Support website ftp://pcg.fic.com.tw/NBTECH/ for the latest driver updates.

2.2.1 Running the PHDISK STD Utility

The PHDISK utility (version: 4 .32) of the notebook allows you to create a suspend-to-disk (STD) file or partition that is used to save the opened files when you activate STD mode and power off the computer. If you want to make use of the STD feature under Windows 98, you need first to run the PHDISK utility.

ⓘ Since Windows Me, Windows 2000, or above version would be enabled Hibernate Mode in place of suspend-to-disk (STD) Mode, it's not necessarily to run the PHDISK utility.

Running the PHDISK STD Utility

Load the notebook driver CD, look for the PHDISK program file, and run PHDISK under **Safe mode command prompt only** in windows system. When you execute "**PHDisk.exe**" first time, the program will ask you to choose one action from (1,2,3,4). Action 1 is "Create partition". Action 2 is "Create File". Action 3 is "Reboot". Action 4 is "Exit". You can use either of the following two options for executing PHDISK utility:

1. **PHDISK /Create /Partition** - you can choose to run Suspend-to-Disk and save your work into an allocated fixed disk partition. This option should be done before partitioning and formatting your hard disk. The advantage of this option is that it is more secure since the files are saved in a separate partition and has no risk of being deleted. The disadvantage of this is that you need to allocate enough disk partition for future memory upgrade. The STD partition should always be larger than the system memory RAM.

2. **PHDISK /Create /File** - you can also choose to run Suspend-to-Disk and save your work into a STD file. You do not need to allocate an extra disk partition when running this option. The advantage of this is that you do not need to allocate or waste extra disk partition. The disadvantage of this option is that it is less secure since there is risk of deleting the STD file although the file is hidden.

It's better to choose action 2 to create the **SAVE2DSK.BIN** file. The program will ask you to input the size of this file. You just only input the value according to the suggestion. After executing "**PHDisk.exe**", you will get some information about the **SAVE2DSK.BIN** file created by PHDISK program. The size of this file will depend on the installed RAM memory of your computer. This file also is hidden and has read-only attributes.

After doing so or executing it next time, the program will ask you to choose one action from (1,2,3,4). Action 1 is "Create File". Action 2 is "Delete File". Action 3 is "Reboot". Action 4 is "Exit". Choose action 1 to create another **SAVE2DSK.BIN** file or action 2 to delete it. After PHDISK has completed the STD partition, you will be prompted to reboot the system.

ⓘ Whenever you upgrade the memory, you need to delete the existing STD file and create a new one according to the new memory size. Run PHDISK and choose action 2 to delete existing STD file.

2.2.2 Installing Windows 98 / Me / 2000 from CD / DVD ROM

This section provides Windows 98 / Me / 2000 installation guide from the CD-ROM or DVD-ROM device.

Installing Windows 98 / Me from CD-ROM / DVD-ROM

The easiest way to install Windows 98 / Me is to boot from Windows 98 start-up disk. With Windows 98 / Me start-up disk, you don't need to install CD-ROM driver since the start-up disk can support virtually all CD-ROM device. Insert Windows 98 / Me Installation CD into CD-ROM drive and run "**setup.exe**".

If you don't have Windows 98 / Me start-up disk, you need to install CD-ROM /DVD-ROM driver under DOS. Then, insert Windows 98 / Me Installation CD into CD-ROM drive and run "**setup.exe**".

Installing Windows 2000 from CD-ROM / DVD-ROM

To install Windows 2000 directly from your CD-ROM, insert the Windows 2000 installation CD into CD-ROM drive with following the instructions on the screen to finish the installation. You could go to **Boot** menu of **BIOS** setup menu to confirm the priority of boot device. Use arrow key to select "ATAPI CD-ROM Drive", and then use "+" or "-" to move it to the top. Go to **Exit** menu and select **"Exit Saving Changes".**

2.2.3 Installing the VGA Device Driver

Your notebook computer uses the high-performance S3 Savage4 VGA controller, which is an AGP 4x video local bus, 2D/3D Graphic Engine. Following is the procedure for installing the VGA Driver for Windows 98, Windows Me and Windows 2000:

Installing VGA Driver for Windows 98

1. Boot Windows 98 from your hard disk and insert the disc containing the VGA driver for Windows 98.
2. Click the **Start** button, then click **Settings**, and **Control Panel**. Double click **System** and click **Device Manager** tab. Under **Display Adapters,** you'll see **Standard PCI Graphics Adapter (VGA)**. Select it and double click it.
3. Choose **Driver** button and then click **Update Driver, Next,** and **Next** again to search for the driver.
4. Tick **Specify a location** and click **Browse** button. Then, navigate to "**\Drivers\Win98\VGA**" and click **Next**.
5. Click **Next** to accept the updated driver for **S3 Graphics Inc Twister** driver.
6. Click **Next** to continue with VGA driver installation.
7. Click **Finish** to complete installation.
8. Restart Computer to finish setting up VGA.

Installing VGA Driver for Windows Me

1. Boot Windows Me from your hard disk and insert the disc containing the VGA driver for Windows Me.
2. Click the **Start** button, then click **Settings**, and **Control Panel**. Double click **System** and click **Device Manager** tab. Under **Display Adapters,** you'll see **Standard PCI Graphics Adapter (VGA)**. Select it and double click it.
3. Choose **Driver** button and then click **Update Driver, Next,** and **Next** again to search for the driver.
4. Select "**Specify the location of the driver**" and click **Next** to continue.
5. Tick on **"Specify a location box"**. Then, click **Next** and **Browse** buttons and navigate to the VGA driver location as **"\Drivers\ WinMe\VGA"**. Click **OK** and **Next** to begin searching the driver.
6. The **Update Device Driver Wizard** will found **S3 Graphics Inc. Twister**. Click **Next** to continue installing the driver.
7. Click **Finish** button to finish installing VGA driver and **Yes** to restart the computer.

Installing VGA Driver for Windows 2000

1. Click the **Start** button, then point to **Settings,** and click **Control Panel.**
2. Double-click on the **System** icon, **Hardware,** and then click on the **Device Manager** folder tab.
3. Under the **Other Devices** line, you will find the **Video Controller (VGA compatible)**, and then **Scan for Hardware Changes** buttons to appear the **New Hardware Found** Message Box.
4. In the Found New Hardware Wizard message box which shows searching **Video Controller (VGA compatible)** driver. Click **Next** to proceed the further step.
5. Select **"Search for a suitable driver for my device"**, and click **Next**.
6. Tick on **"Specify a location box"**, then, click **Next** and **Browse** buttons, and then navigate to the VGA driver location as **"\Drivers\ Win2K\VGA"**.
7. Click **OK** and **Next** to begin searching the driver. The Add New Hardware will found **S3 Graphics Inc. Twister**.

8. Click **Next** to continue installing the driver.
9. Click **Finish** button to finish installing VGA driver and Click **Yes** to restart the computer.

2.2.4 Installing the Audio Device Driver

Your notebook computer uses AD1886 AC97 Codec 2.1 Audio controller.

Installing Audio Driver for Windows 98

1. Boot Windows 98 from your hard disk and insert the disc containing the Audio driver for Windows 98.
2. Click **Start**, **Settings**, and **Control Panel**. Double click **System** and click **Device Manager** tab. Under **Other Devices,** you'll see **PCI Multimedia Audio Device**.
3. Click **Refresh** button. The **Add New Hardware Wizard** will detect **PCI Multimedia Audio Device**.
4. Click **Next** to search for the driver. Click **Next** to continue.
5. Tick **Specify a location** and click **Browse** button. Then, navigate to "**\Drivers\Win98\Audio**" and click **Next**.
6. Click **Next** to accept the updated driver for **SoundMAX Integrated Digital Audio** driver.
7. Click **Finish** to complete installation. Restart Computer to finish setting up Audio.

Installing Audio Driver for Windows Me

1. Boot Windows Me from your hard disk and insert the disc containing the Audio driver for Windows Me.
2. Click **Start**, **Settings**, and **Control Panel**. Double click **System** and click **Device Manager** tab. Under **Other Devices,** you'll see **PCI Multimedia Audio Device**.
3. Click **Refresh** button. The **Add New Hardware Wizard** will detect **PCI Multimedia Audio Device**. Click **Next** to search for the driver.
4. Select "**Specify the location of the driver**" and click **Next** to continue.
5. Tick on **"Specify a location box"**, then click **Next** and **Browse** buttons and navigate to the Audio driver location as **"\Drivers\WinMe\ Audio"**.
6. Click **OK** and **Next** to begin searching the driver. The **Update Device Driver Wizard** will found **SoundMAX Integrated Digital Audio**. Click **Next** to continue installing the driver.
7. Click **Finish** button to finish installing Audio driver and **Yes** to restart the computer.

Installing Audio Driver for Windows 2000

1. Click the **Start** button, then point to **Settings,** and click **Control Panel.**
2. Double-click on the **System** icon, **Hardware** and then click on the **Device Manager** folder tab.
3. Under the **Other Devices** line, you will find the **Multimedia Audio Controller**, and then **Scan for hardware changes** buttons to appear the **New Hardware Found** Message Box.
4. In the Found New Hardware Wizard message box which shows searching **Multimedia Audio Controller** driver. Click **Next** to proceed to the next step.
5. Select **"Search for a suitable driver for my device"**, and click **Next**.
6. Tick on **"Specify a location box"**, then click **Next** and **Browse** buttons, and navigate to the Audio driver location as **"\Drivers\ Win2K\Audio"**.
7. Click **OK** and **Next** to begin searching the driver. The Add New Hardware will found **SoundMAX Integrated Digital Audio**.
8. Click **Yes** to continue installing the driver.
9. Click **Finish** button to finish installing Audio driver.

2.2.5 Installing Touch Pad Driver

Following is the procedure for installing Synaptics touch pad driver.

Installing Touch Pad Driver for Windows 98 / Me / 2000

1. Boot Windows from your hard disk and insert the diskette containing touch pad driver.
2. Click the **Start** button, then click **Run**. In the Run dialog box, click **Browse** button and navigate to the directory as **"\Driver\Win98\Touch Pad\setup.exe", "WinMe",** or **"Win2K"** path according to your Operating System and run **"Setup.exe"**.
3. Execute the setup program and then select the language for this installation. After that, a **Welcome** dialog box appears.
4. Click **Next** continuously three times when the screen appears the **Next** button.
5. Click **OK** to restart your system.

2.2.6 Installing PCMCIA Driver

Following is the procedure for installing O2Micro OZ6933 CardBus driver on Windows 98. Under Windows Me or Windows 2000, you could use the built-in driver for OZ6933 CardBus contoller without any upgrade.

Installing PCMCIA Driver for Windows 98

1. Boot Windows from your hard disk and insert the disc containing the chip driver for Windows.
2. Click the **Start** button and then click **Run**. In the **Run** dialog box, click **Browse** button and navigate to the directory as **"\Drivers\Win98\PCMCIA\O2setup.exe"** where the chip driver is located.
3. Execute the setup program and then the dialog box appears. Click **OK** to copy necessary files to the system.
4. Finally click **Yes** to restart the computer to finish the installation.

2.2.7 Installing Twister Driver

VIA Video Accelerator 3D Adapter (English version) provides better video performance to your computer. For installing the chip driver, please follow the procedures indicated below:

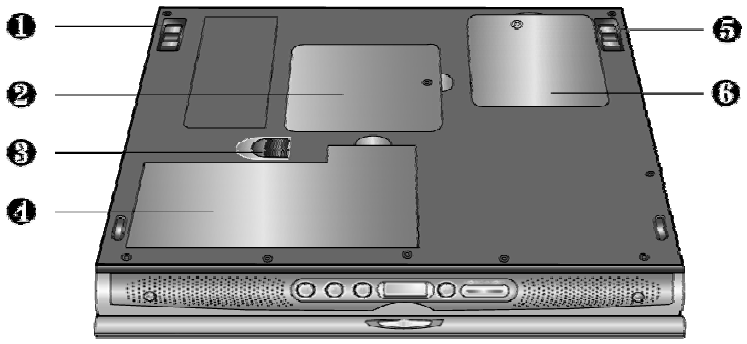
Installing Twister Driver for Windows 98 / Me / 2000

1. Boot Windows from your hard disk and insert the disc containing the chip driver for Windows.
2. Click the **Start** button and then click **Run**. In the **Run** dialog box, click **Browse** button and navigate to the directory as **"\Drivers\Twis-chip\setup.exe"** where the chip driver is located.
3. The system may prompt you the message to restart the computer to finish the installation.

2.2.8 Installing Internal Modem Device Driver

Your notebook computer may come with an optional internal modem. The internal modem is a 56Kps V.90 Askey Data Fax modem.

Installing Internal Modem for Windows 98 / Me / 2000



❶/❺	Tilt Foot	❷	Memory Compartment
❸	Battery Release Latch	❹	Battery Bay
❻	**Mini-PCI Socket Compartment**		

Figure 2-1 Mini-PCI Socket Compartment Door

1. Locate the modem module socket. Align the notch with the notch in the socket connector and insert the module as follows:
   - Insert the cable into the modem module.
   - Hold the modem module at an angle and align the modem module connector with the socket in the system. Push the connector into the socket.
   - Press down on the edge of the modem module until the locking tabs on the sides snap into place, securing the module.

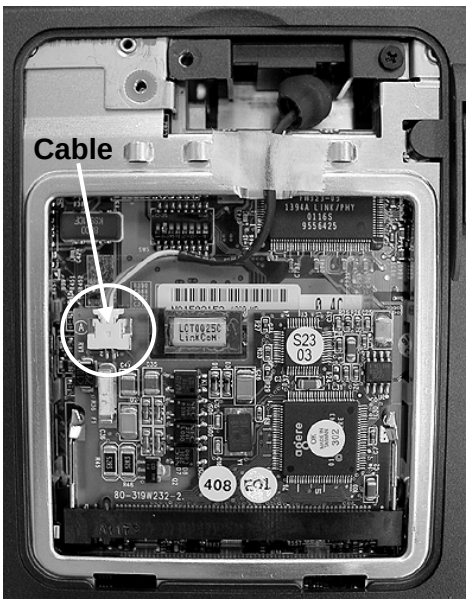


Figure 2-2 Mini-PCI Socket Compartment

2. To remove the modem module, press the locking tabs away from the sides of the module until the module pops up. Then, remove the modem module.

3. Reassemble the notebook components as follows:
   - Put the Mini-PCI Socket Compartment door back.
   - Replace the screw.
   - Turn the system over.

4. Boot Windows from your hard disk and insert the disc containing the Modem driver for Windows.

5. Click the **Start** button and then click **Run**. In the Run dialog box, click **Browse** button and navigate to the directory as **"\driver\Win98\MODEM\setup.exe"** where the modem driver is located. . Please change "**Win98**" to other path named as **WinMe**, **Win2K**… to fit the operating system you are using.

6. Click **OK** to process the installation of modem driver. Follow the instruction to finish the installation.

7. With **"Yes, I want to restart my computer now"** selected, click **Finish** to complete the modem installation.

2.2.9 Installing Internal LAN Device Driver

Your notebook computer may come with an optional internal LAN, which uses the Intel 82559 chip. Please follow the procedures below for installing the LAN driver:

Installing Internal LAN for Windows 98

1. Boot Windows 98 from your hard disk and insert the disc containing the LAN driver for Windows 98.
2. Click the **Start** button, then click **Settings**, and **Control Panel**. Double click **System** and click **Device Manager** tab. Under **Other Devices,** you'll see **PCI Ethernet Controller**.
3. Click **Refresh** button. The **Add New Hardware Wizard** will detect PCI Ethernet Controller. Click **Next** to search for the driver.
4. Click **Next** to continue.
5. Tick **Specify a location** and click **Browse** button. Then, navigate to "**\Drivers\Win98\LAN**" and click **Next**.
6. Click **Next** to accept the updated driver for Intel 82559 Fast Ethernet LAN driver.
7. Click **Next** to continue with LAN driver installation.
8. Insert the disk labeled "**Windows 98 Second Edition CD-ROM**", and then click **OK**.
9. Type **"\Win98",** then click **"OK"**.
10. Click **Finish** to complete installation.
11. Restart Computer to finish setting up LAN.

Installing Internal LAN for Windows Me

1. Boot WinMe from your hard disk and insert the disc containing the LAN driver for WinMe. The **New Hardware Found** Message box appears.
2. You will find the message stated **searching PCI Ethernet Controller Device driver** showed in the **Add New Hardware Wizard** message box.
3. Select **"Specify the location of the driver"**, and click **Next**.
4. Tick on **"Specify a location box"**. Then, click **Browse** button and navigate to the LAN

driver location as **"\Drivers\WinMe\LAN"**. Click **Next** to begin searching the driver.
5. The Add New Hardware will found **Intel PRO PCI Adapter...** Click **Next** to continue the driver installation.
6. Click **Finish** button to finish installing LAN driver.
7. Click **Yes** to restart the computer

Installing Internal LAN for Windows 2000

1. Click the **Start** button, then point to **Settings,** and click **Control Panel.**
2. Double-click on the **System** icon, **Hardware** and then click on the **Device Manager** folder tab.
3. Under the **Other Devices** line, you will find the **Ethernet Controller**, then **Scan for hardware changes** buttons to appear the **New Hardware Found** Message Box.
4. In the Found New Hardware Wizard message box which shows searching **Ethernet Controller** driver. Click **Next** to proceed to the next step.
5. Select **"Search for a suitable driver for my device"**, and click **Next**.
6. Tick on **"Specify a location box"**. Then, click **Next** and **Browse** buttons and navigate to the LAN driver location as **"\Drivers\Win2K\LAN"**. Click **OK** and **Next** to begin searching the driver.
7. The Add New Hardware will found **Intel (R) PRO 100B PCI Adapter**. Click **Yes** to continue installing the driver.
8. Click **Finish** button to finish installing LAN driver.

2.2.10 Installing Internal Modem and LAN Combo Device Driver

If your notebook has installed two-in-one combo card for enabling both Modem and LAN function, please install Modem and LAN drivers, respectively.

For Modem driver, please follow the procedures below for installing the Lucent Data Fax Modem driver:

Installing Modem Driver of Combo Device for Windows 98 / Me / 2000

1. Boot Windows from your hard disk and insert the disc containing the Modem driver for Windows.
2. Click the **Start** button and then click **Run**. In the Run dialog box, click **Browse** button and navigate to the directory as **"\driver\Win98\MODEM\setup.exe"** where the modem driver is located. . Please change "**Win98**" to other path named as **WinMe**, **Win2K**… to fit the operating system you are using.

3. Click **OK** to process the installation of modem driver. Follow the instruction to finish the installation.

4. With **"Yes, I want to restart my computer now"** selected, click **Finish** to complete the modem installation.

For LAN, please follow the procedures below for installing the Askey 10/100 Mini PCI Ethernet LAN of Combo card:

Installing LAN Driver of Combo Device for Windows 98

1. Boot Windows 98 from your hard disk and insert the disc containing the LAN driver for Windows 98.
2. Click the **Start** button, then click **Settings**, and **Control Panel**. Double click **System** and click **Device Manager** tab. Under **Other devices,** you'll see **PCI Ethernet Controller**.
3. Click **Refresh** button. The **Add New Hardware Wizard** will detect PCI Ethernet Controller. Click **Next** to search for the driver.
4. Click **Next** to continue.
5. Tick **Specify a location** and click **Browse** button. Then, navigate to "**\Drivers\Win98\Combo\LAN**" and click **Next**.
6. Click **Next** to accept the updated driver for **Accton EN2242 Series Mini PCI Fast Ethernet Adapter.** Ethernet LAN driver.
7. Click **Next** to continue with LAN driver installation.
8. Insert the disk labeled " **Accton EN2242 Series Mini PCI Fast Ethernet Adapter**", and then click **OK**.
9. Type **"\Win98",** then click **"OK"**.
10. Click **Finish** to complete installation and restart Computer to finish setting up LAN.

Installing LAN Driver of Combo Device for Windows Me

1. Boot WinMe from your hard disk and insert the disc containing the LAN driver for WinMe. The **New Hardware Found** Message box appears.
2. You will find the message stated **searching PCI Ethernet Controller Device driver** showed in the **Add New Hardware Wizard** message box.
3. Select **"Specify the location of the driver"**, and click **Next**.
4. Tick on **"Specify a location box"**. Then, click **Browse** button and navigate to the LAN driver location as **"\Drivers\WinMe\Combo\LAN"**. Click **Next** to begin searching the driver.
5. The Add New Hardware will found **Accton EN2242 Series Mini PCI Fast Ethernet Adapter.** Click **Next** to continue the driver installation.
6. Click **Finish** button to finish installing LAN driver and click **Yes** to restart the computer.

Installing LAN Driver of Combo Device for Windows 2000

1. Click the **Start** button, then point to **Settings,** and click **Control Panel.**
2. Double-click on the **System** icon, **Hardware** and then click on the **Device Manager** folder tab.
3. Under the **Other Devices** line, you will find **Ethernet Controller.** Click **Scan for hardware changes** buttons to appear **New Hardware Found** Message Box.
4. In the Found New Hardware Wizard message box which shows searching **Ethernet Controller** driver. Click **Next** to proceed to the next step.
5. Select **"Search for a suitable driver for my device"**, and click **Next**.
6. Tick on **"Specify a location box"**. Then, click **Next** and **Browse** buttons and navigate to the LAN driver location as **"\Drivers\Win2K\Combo\LAN"**. Click **OK** and **Next** to begin searching the driver.
7. The Add New Hardware will found **Accton EN2242 Series Mini PCI Fast Ethernet Adapter**. Click **Yes** to continue installing the driver.
8. Click **Finish** button to finish installing LAN driver.

2.2.11 Installing Easy Button Driver

Following is the procedure for installing Easy Button driver.

Installing Easy Button driver for Windows 98 / Me / 2000

1. Boot Windows from your hard disk and insert the disc containing the Easy Button driver.
2. Click the **Start** button, then click **Run**. In the Run dialog box, click **Browse** button and navigate to the directory as **"\Drivers\Win98\Easy Button\Ez Button V1.01.exe"**, **"\Drivers\WinMe\Easy Button\Ez Button V1.01.exe ", or "\Drivers\Win2K\Easy Button\Ez Button V1.01.exe".**
3. Run the execution file for installing the Easy Button driver, and then click **Finish** after complete the installing procedure.

2.2.12 Installing EzMail Driver

Following is the procedure for installing EzMail driver.

Installing EzMail driver for Windows 98 / Me / 2000

1. Boot Windows from your hard disk and insert the disc containing the Easy Button driver.
2. Click the **Start** button, then click **Run**. In the Run dialog box, click **Browse** button and navigate to the directory as **"\Drivers\Win98\EzMail\Ez Mail V1.01.exe"**, **"\Drivers\WinMe\ EzMail\Ez Mail V1.01.exe", or "\Drivers\Win2K\ EzMail\Ez Mail V1.01.exe".**
3. Run the execution file for installing the Easy Button driver, and then click **Finish** after complete the installing procedure.

2.2.13 Enabling DMA Channel for Best Performance

This Notebook supports DMA function for fastest data bus transmission. The Windows system does not enable this function after you had installed the Windows system. You must enable this function manually to make this notebook running smoothly, especially in music listening and DVD, VCD playback.

Enabling DMA channel for Windows 98 / Me

1. Please click the following buttons with the procedure **Start → Setting → Control Panel→ System → Device Manager.**
2. Select and click **CD-ROM,** then point to the **name of CD-ROM/DVD-ROM/CD-RW.**
3. Click **Setting** tab and tick the **DMA** function
4. Return to previous level (**Device Manager**), select and click **Disk Drives,** under the **Disk Drives** level, click the name of Hard Disk (For example "**Generic IED Disk Tupe 01**").
5. Please change the setting of **Disk Drives** as above.
6. Restart your notebook to let the setting take effect.

Enabling DMA channel for Windows 2000

1. Please click the following buttons with the procedure **Start → Setting→ Control Panel → System → Hardware → Device Manager.**
2. Select and click **IDE ATA/ATAPI Controller**, you will find **Primary IDE Channel** and **Secondary IDE channel**. Please click **Primary IDE Channel** first.
3. Click **Advanced setting** Tab. Please change the selection of **Transfer Mode** to **DMA if available** on both **Device 0** and **Device 1**.
4. Return to previous level, please change the setting of **Secondary IDE Channel** as above.
5. Restart your notebook to let the setting take effect.

2.3 System Upgrades

This section provides an easy step in doing system upgrades for your notebook computer.

2.3.1 Jumper Settings

This section provides a jumper setting lists of configuring the notebook.

Keyboard Type Select

K/B Type	Pos #1	POS #2
US KEYBOARD	OFF	OFF
RESERVE	OFF	ON
JP KEYBOARD	ON	OFF
UK KEYBOARD	ON	ON

Logo Select

Logo	Pos #3
RESERVE	OFF
RESERVE	ON

Password Override (CMOS / RTC Data) Jumper Setting

Password Override	Pos#4
RTC Battery Normal	OFF
Clear (RTC) DATA	ON

ⓘ Before doing password override, take off AC adapter and battery first.

Main Board ID Select

Main Board ID	Pos #5	POS #6
RESERVE	OFF	OFF
RESERVE	OFF	ON
RESERVE	ON	OFF
RESERVE	ON	ON

CD-ROM Master / Slave Select

CD-ROM	Pos #7
Master	ON
Slave	OFF

ⓘ Pos # 8 is N/A Pin for reserve

2.3.2 CPU Upgrade Procedure

The A360 features Intel Pentium III and Celeron FC-PGA Processors. It is located on the upper-left side of the system motherboard.

How to Access the CPU Socket

To install or replace the CPU, follow the steps below:

1. Turn off the system and remove both AC adapter and the battery pack from the notebook unit.

2. Remove keyboard cover by gently bending it and sliding it towards in front of you.

Figure 2-3 Remove keyboard cover

3. Lift the keyboard and tilt it towards the LCD panel.

4. Release keyboard cable by sliding the ZIF connector towards up direction.

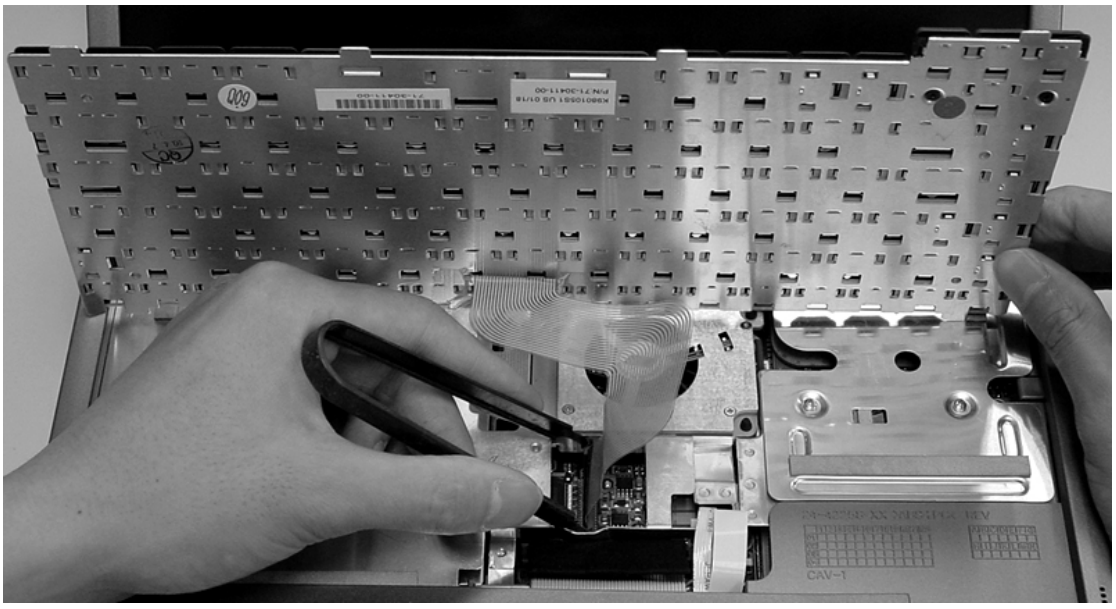


Figure 2-4 Remove keyboard

5. Release seven screws as shown in the picture below, and then remove heat sink plate by slightly lifting it up.

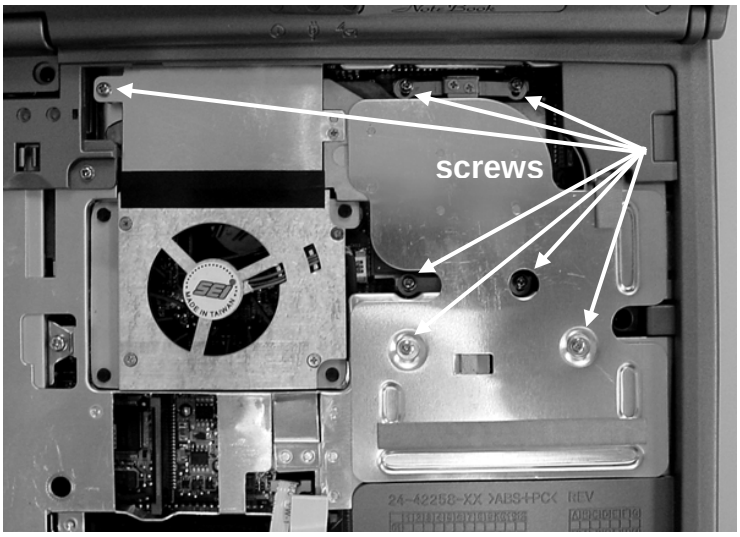


Figure 2-5 Remove heat sink plate

6. Use a flat screw driver and insert it into the CPU socket and tilt it towards in front of you to unlock CPU from the socket. It's recommended to use the protective tooling securing CPU against damage.

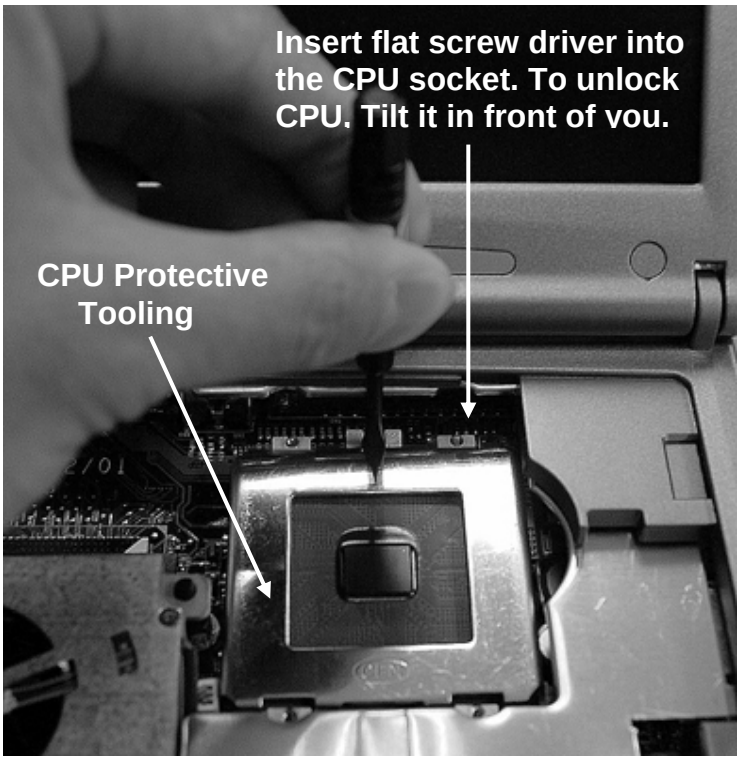


Figure 2-6 Remove CPU

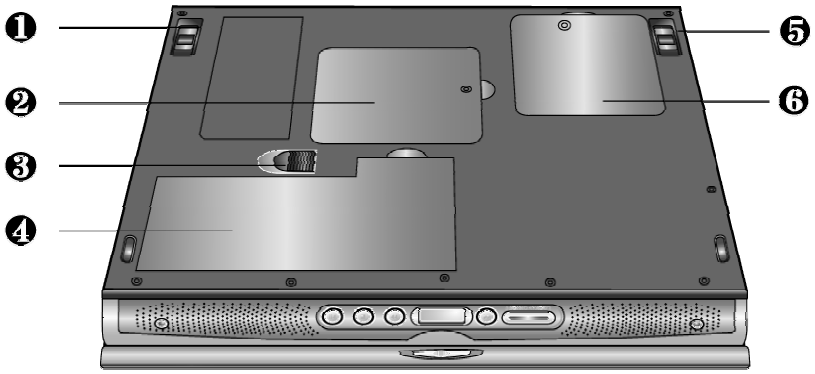
7. Remove CPU and insert the preferred CPU.

8. Use a flat screw driver and insert it into the other side of CPU socket and tilt it towards LCD panel to unlock CPU from the socket. It's recommended to use the protective tooling securing CPU against damage.

9. Place back the heat plate and keyboard cover. Boot on the computer, and then BIOS will automatically detect the type of the CPU which just be installed.

2.3.3 Memory Upgrade Procedure

The notebook computer offers two 64-bit memory slot using 144-pin SODIMM (Small Outline Dual Inline Memory Module) at 64MB, 128MB, and 256MB SDRAM. Two memory slots are found inside the memory compartment. 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 SODIMM module inserted. With two memory slots, you can have several combinations up to 512MB.



❶/❺	Tilt Foot	❷	**Memory Compartment**
❸	Battery Release Latch	❹	Battery Bay
❻	Mini-PCI Socket Compartment		

Figure 2-7 Memory Compartment Door

Using the Memory Slot inside the Memory Compartment

Follow the steps below on how to upgrade the memory modules:

1. Make sure the system is powered off and that no peripheral devices are attached.

2. Turn the system over and locate the screw on the memory compartment.

3. Remove the screw and open the memory compartment. Locate the alignment notch on the module.

4. Locate the memory module socket. Align the notch with the notch in the socket connector and insert the module as follows:
   - Hold the SODIMM at a 60-degree angle and align the SODIMM connector with the socket in the system. Push the connector into the socket.
   - Press down on the edge of the SODIMM until the locking tabs on the sides snap into place, securing the module.

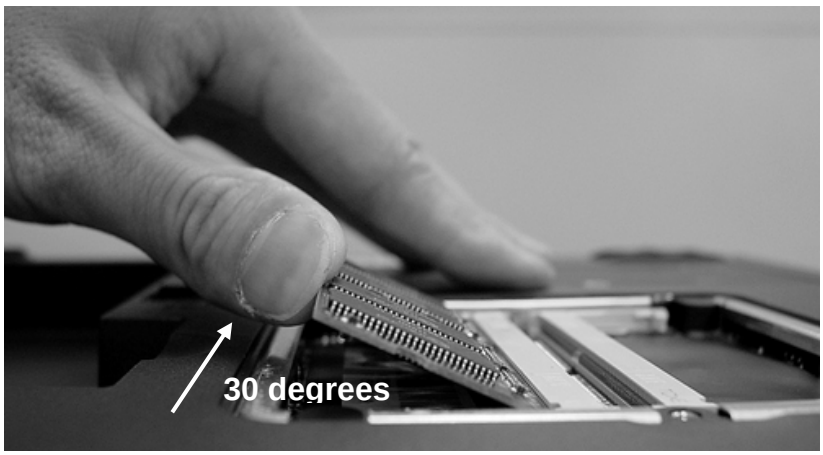


Figure 2-8 Insert Memory Module

5. To remove a SODIMM, press the locking tabs away from the sides of the module until the module pops up. Then, remove the SODIMM.

6. Reassemble the notebook components as follows.
   - Put the DIMM door back.
   - Replace the screw and turn the system over.

2.3.4 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.

1. Make sure the system is powered off and that no peripheral devices are attached.

2. Remove the five screws securing the palm-rest cover underneath the system base unit.

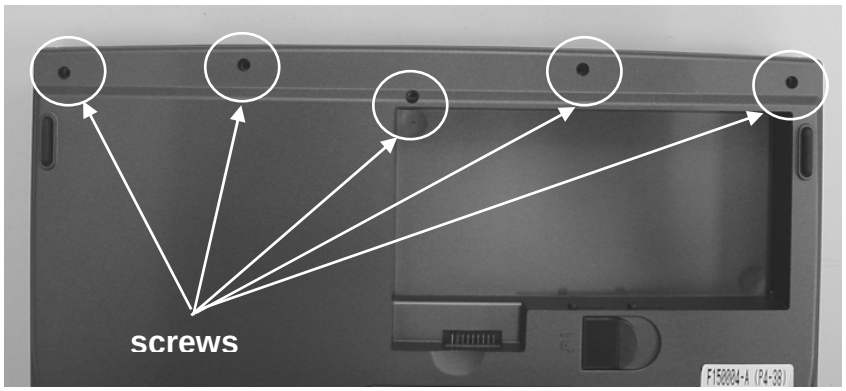


Figure 2-9 Remove Palm Reset

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

4. When you have remove the entire palm-rest cover, simply flip over the touchpad panel to the keyboard. You will find the built-in hard disk secured with one screw at the upper

right corner of the hard disk. Remove this screw and carefully pull the hard disk module from the connector.

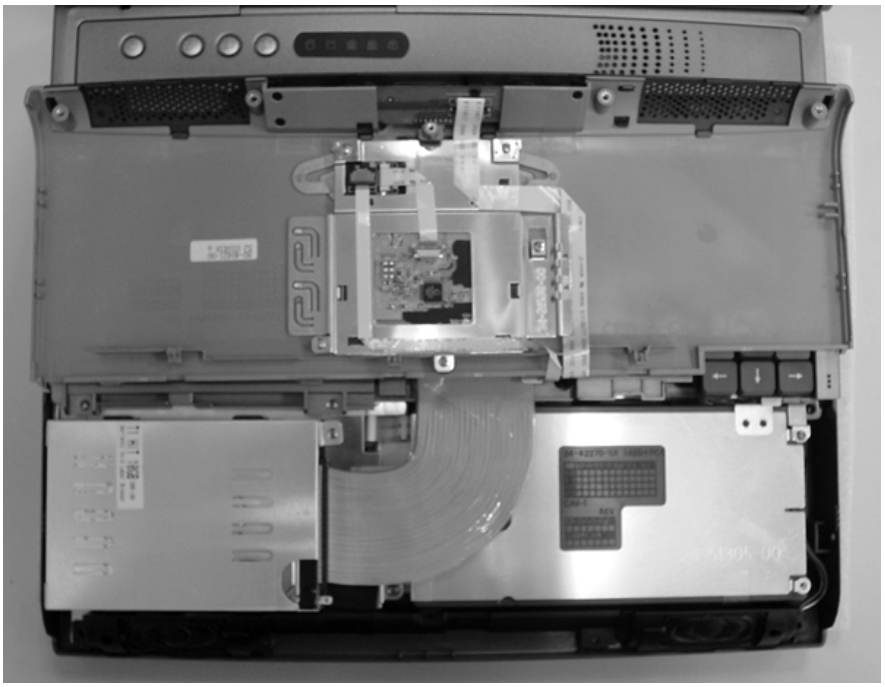


Figure 2-10 The disassembly of Hard Disk Drive

5. Remove four screws of frame HDD bracket plate. Two ones of them are at the same side, and others are at the other sides.

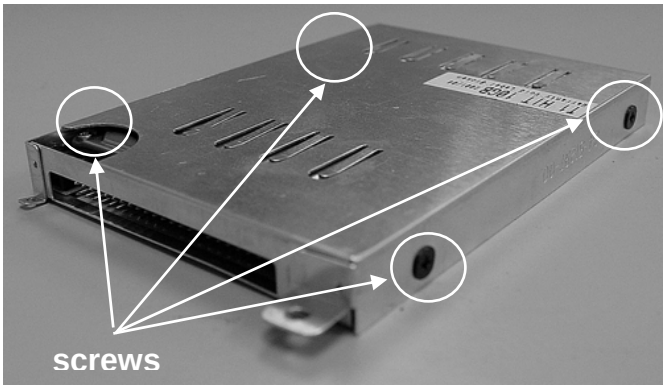


Figure 2-11 Screws Locations of the frame HDD bracket plate

6. Plug in the hard disk module to the connector and secure the screw on the upper right corner of the hard disk.

7. Place back the palm rest and secure those screws

2.3.5 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 MS-DOS and requires the system not to load high memory like **HIMEM.SYS**. It also needs the "**PLATFORM.BIN**" file in order to activate.

Follow the steps below on how 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, type the command "**PHLASH <*BIOSfile*.ROM>**" to activate Flash BIOS programming utility. The computer will then start to update the system BIOS inside the notebook.

3. After programming is complete, the system will prompt you to press any key to shutdown the computer. The BIOS version is displayed inside the BIOS Setup Main menu. Press <F2> after power on to run CMOS Setup program.

   BIOS Version : 1.0A-0004-3430

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

ⓘ Always plug in the AC adapter when updating the BIOS.

Chapter 3

Software Functional Overview

3.1 Overview

The A360 is an IBM PC/AT compatible Notebook PC which support the Intel's FC-PGA processors family. The following are the major features that A360 supports:

- Microsoft PC99 logo and WinME Logo approval.
- Offer 800x600 SVGA display with 12.1" LCD panel
- Offer 1024x768 XGA display with 13.3" LCD panel
- Offer 1024x768 XGA display with 14.1" LCD panel
- Support ACPI 1.0B (or above)
- Support PCI 2.1 (or above)
- Support AGP 2.0.
- Support SMBIOS 2.3
- Support PC-100/133 SDRAM
- Support 100/133 MHz CPU front side bus.
- Support a proprietary Port Replicator

3.2 Summary of the BIOS Specification

Below is the summary of the BIOS software specification:

Controller Chip	Description
BIOS Feature	▪ Microsoft PC99 logo and WinME Logo approval. ▪ Support Boot Block / Crisis Rescue ▪ Support ACPI 1.0B (or above) ▪ Support PCI 2.1 (or above) Spec ▪ Support SMBIOS 2.3 ▪ Support AGP 2.0. ▪ Support Windows 98 SE, Windows 2000 and Windows ME. ▪ Support flash function including both DOS and Windows interface for new BIOS update. ▪ Support 3 Mode FDD. ▪ Support 4 different keyboards on same BIOS ▪ Support boot from FDD, HDD,CDROM and LAN Drive ▪ Support Quick Boot (10 Seconds)
CPU	Auto detect the CPU type and speed for Intel Pentium III based system
DRAM	Auto sizing and detection. Support PC-100/133 SDRAM.
Cache	▪ Level 2 SRAM auto sizing and detection ▪ Always enable CPU L1 and L2 cache
Shadow	Always enable VGA and System BIOS shadow
Display	▪ System auto detects LCD or CRT presence on boot and lid closed

	▪ Support Panning while LCD in a display resolution greater than supported ▪ Support Microsoft Direct 3D ▪ Support AGP4X Bus

Controller Chip	Description
Hard Disk	▪ Enhanced IDE spec ▪ Support auto IDE detection ▪ Support LBA mode for larger capacity HDD ▪ Support Ultra DMA 33 ▪ Support Fast PIO mode 1-4 transfer ▪ Support 32-bit PIO transfer ▪ Support Multi-Sector transfer ▪ Support SMART monitoring.
Multi Boot	Allow the user to select boot from FDD, HDD and CD-ROM and LAN devices.
Plug and Play	Support PnP Run Time Service and conflict-free allocation of resource during POST
Smart Battery	Support BIOS interface to pass battery information to the application via SMBus
Keyboard Controller	Support Fn hot keys, two Win98 hot keys, built-in Glide Pad and external PS/2 mouse/keyboard
PCMCIA	Compliant with PCMCIA 2.1 specification
Audio DJ	With DVD resume system
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 (ACPI Mode)	The power management is compliant with ACPI 1.0B specification and supports the following power state: ▪ S0 (Full-On) Mode ▪ S1 (Doze) Mode ▪ S4 (STD) Mode ▪ S5 (Soft-Off) Mode

3.3 Subsystem Software Functions

This section provides introduction on the software functions of the notebook subsystems and BIOS related function.

3.3.1 Key Chipset Summary

Following are the main chipsets used in the notebook:

Controller Chip	Vendor	Description
Processor	Intel	FC-PGA 370 Socket Pentium III 933 / 1G / 1.13G MHz Celeron 766/ 800 MHz
Core Logic	VIA	Twister VT8603 (North Bridge) VT82C686B (South Bridge)
Video Controller	S3	Savage4 with AGP 4X SMA
PCMCIA Controller	O2Micro	OZ6933
Super I/O Controller	VIA	VT82C686B embed super I/O
Audio Chip	VIA	South Bridge Integrated
Audio Codec	ADI	AD1886
Keyboard Controller	Mitsubishi	M38869
PMU Controller	Mitsubishi	PMU07
Gas Gauge IC	Include PMU07	
ROM BIOS	Winbond	W29C040P, Boot Block Structure
Clock Generator	IMI	C9896B
Temperature Sensor	NS	MAX1617A
LAN	INTEL	82559
Modem	Lucent	MARS III
IEEE 1394	Lucent	FW323

3.3.2 System Memory

The system memory consists of SDRAM memory on 64-bit bus and the module size options are 64/128/256MB upward. 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 must be done in a way that requires no user interaction.

Base SO-DIMM DRAM slot (Bank 0 & 1)	Expansion SO-DIMM DRAM slot (Bank 2 & 3)	Total Size
64MB	NIL	64MB
64MB	64MB	128MB
64MB	128MB	192MB
64MB	256MB	320MB
128MB	NIL	128MB
128MB	64MB	192MB
128MB	128MB	256MB
128MB	256MB	384MB

256MB	NIL	256MB
256MB	64MB	320MB
256MB	128MB	384MB
256MB	256MB	512MB
NIL	64MB	64MB
NIL	128MB	128MB
NIL	256MB	256MB

3.3.3 Video

The Video subsystem used share memory of Video memory. The system will support the true ZV port, the Microsoft Direct 3D assist, simultaneous display, monitor sense for auto display on boot and VESA Super VGA function call.

Supported Video Mode

The following is the display modes supported by the S3 Savega4 in LCD only, CRT only, and simultaneous 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.

Panel Type Initialization

The VGA BIOS will issue 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 should get the panel type from GPI pins before the VGA chip initialized, and pass this information to VGA BIOS through INT 15 Function 5F01h.

Supported standard VGA modes:

The VGA BIOS supports the IBM VGA Standard 7-bit VGA modes numbers.

Mode	Pixel Resolution	Colors	Memory
00h/01h	40*25	16	Text
02h/03h	80*25	16	Text
04h/05h	320*200	4	2-bit Planar
06h	640*200	2	1-bit Planar
07h	80*25	Mono	Text
0Dh	320*200	16	4-bit Planar
0Eh	640*200	16	4-bit Planar
0Fh	640*350	Mono	1-bit Planar
10h	640*350	16	4-bit Planar
11h	640*480	2	2-bit Planar
12h	640*480	16	4-bit Planar
13h	320*200	256	8-bit Planar

Note: All Standard VGA Modes are limited to the standard VGA refresh rates.

Supported extended video modes:

CRT device will support all listed VESA mode; and other devices such as PANEL & TV may be limited to the mode support due to their characteristics.

VESA Mode	Pixel Resolution	Memory Model	Refresh Rates In (Hz)	Minimum Memory
100h	640 x 400	8-bit Packed	70	2MB
101h	640 x 480	8-bit Packed	60, 72, 75, 85	2MB
102h	800 x 600	4-bit Planar	60, 72, 75, 85, 100	2MB
103h	800 x 600	8-bit Packed	60, 72, 75, 85, 100	2MB
104h	1024 x 768	4-bit Planar	43(I), 60, 70, 75, 85, 100	2MB
105h	1024 x 768	8-bit Packed	43(I), 60, 70, 75, 85, 100	2MB
106h	1280 x 1024	4-bit Planar	43(I), 60, 75, 85	2MB
107h	1280 x 1024	8-bit Packed	43(I), 60, 75, 85	2MB
10Eh	320 x 200	16-bit Packed	70	2MB
10Fh	320 x 200	32-bit Unpacked	70	2MB
111h	640 x 480	16-bit Packed	60, 72, 75, 85	2MB
112h	640 x 480	32-bit Unpacked	60, 72, 75, 85	2MB
114h	800 x 600	16-bit Packed	60, 72, 75, 85, 100	2MB
115h	800 x 600	32-bit Unpacked	60, 72, 75, 85, 100	2MB
117h	1024 x 768	16-bit Packed	43(I), 60, 70, 75, 85, 100	2MB
118h	1028 x 768	32-bit Unpacked	43(I), 60, 70, 75, 85, 100	4MB
11Ah	1280 x 1024	16-bit Packed	43(I), 60, 75, 85	4MB
11Bh	1280 x 1024	32-bit Unpacked	43(I), 60, 75, 85	8MB
11Dh	640 x 400	16-bit Packed	70	2MB
11Eh	640 x 400	32-bit Packed	70	2MB
120h	1600 x 1200	8-bit Packed	48(I), 60, 75, 85	2MB
122h	1600 x 1200	16-bit Packed	48(I), 60, 75, 85	4MB
124h	1600 x 1200	32-bit Unpacked	48(I), 60, 75, 85	8MB
12Ah	640 x 480	24-bit Packed	60, 72, 75, 85	2MB
12Bh	800 x 600	24-bit Packed	60, 72, 75, 85, 100	2MB
12Ch	1024 x 768	24-bit Packed	43(I), 60, 70, 75, 85, 100	4MB
12Dh	1280 x 1024	24-bit Packed	43(I), 60, 75, 85	4MB
12Eh	320 x 200	8-bit Packed	70	2MB
131h	320 x 200	8-bit Packed	72	2MB
133h	320 x 200	16-bit Packed	72	2MB
134h	320 x 200	32-bit Packed	72	2MB
13Bh*	1400 x 1050	8-bit Packed	60, 75	2MB
13Ch*	1400 x 1050	16-bit Packed	60, 75	4MB
13Eh*	1400 x 1050	32-bitUnpacked	60, 75	8MB

141h	400 x 300	8-bit Packed	72	2MB
143h	400 x 300	16-bit Packed	72	2MB
144h	400 x 300	32-bitUnpacked	72	2MB
151h	512 x 384	8-bit Packed	70	2MB
153h	512 x 384	16-bit Packed	70	2MB
154h	512 x 384	32-bitUnpacked	70	2MB
171h	720 x 480	8-bit Packed	75	2MB
173h	720 x 480	16-bit Packed	75	2MB
174h	720 x 480	24-bit Packed	75	2MB
175h	720 x 480	32-bitUnpacked	75	2MB
176h	720 x 576	8-bit Packed	75	2MB
178h	720 x 576	16-bit Packed	75	2MB
179h	720 x 576	24-bit Packed	75	2MB
17Ah	720 x 576	32-bitUnpacked	75	2MB

Note: "*" The modes may not be available. Their availability should be determined by VESA function calls.

Panel Type Initialization

The VGA BIOS will issue 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 should get the panel type from GPIO pins before the VGA chip initialized, and pass this information to VGA BIOS through INT 15 Function 5F01h.

LCD Panel ID pin Definition:

VT82C686B GPI Pins				Panel Type
GPI [23]	**GPI [17]**	**GPI [11]**	**GPI [10]**	
0	0	0	0	ADI 12.1" SVGA TFT AA121SJ23
0	0	0	1	Hannstar HSD121PS11
0	0	1	0	
0	0	1	1	
0	1	0	0	ADT L133X3-1
0	1	0	1	Unipac UB133X3-1
0	1	1	0	
0	1	1	1	
1	0	0	0	CPT CLAA141XC01
1	0	0	1	Hyundai HT14X13-101
1	0	1	0	
1	0	1	1	
1	1	0	0	
1	1	0	1	

1	1	1	0	
1	1	1	1	

3.3.4 Enhanced IDE

The system BIOS must be ready to support 4 IDE devices on two controllers. The BIOS support Ultra DMA 33 and also supports automatic configuration of drives using both the LBA and CHS large drive remapping method. In addition to supporting standard drives through an auto-configuration process that does NOT require user involvement or confirmation. The system should automatically do this at POST time in a way that is transparent to the user. If a drive is connected to the bus, the drive should be automatically recognized, configured and available for use under MS-DOS 6.2x.

Ultra DMA

Ultra DMA 33 is a 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.

3.3.5 Audio

The audio subsystem will support the requirements identified by the AC’97 specification. Both software and hardware will control the volume level for the internal audio subsystem. In addition to the volume control, the user will be able to mute the sound to completely cut off the volume using both software and hardware.

3.3.6 Super I/O

This controller contains 16550A or FIFO Enabled UART, ECP/EPP/Uni-directional Parallel Port meeting the 1284 specification, and an Infrared port.

3.3.7 PCMCIA

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

- Individually accessed, dual-buffer implementation
- Support for 2 separate CardBus slots (one type III or two type II stacked)
- Support for 3.3v, 5v and 12v (flash programming) cards

3.3.8 LED Indicator

The table below lists down the functions of the Status LED indicator:

Indicator	Function Description
IDE accessing LED❶	This LED will turn on while accessing the IDE Device.
FDD accessing LED❶	This LED will turn on while accessing the FDD Device.
Battery Charging LED	Turn on (Amber) – Battery is under charging mode Turn off – Battery full charged or no battery
Caps Lock LED❶	This LED will turn on when the function of Caps Lock is active.
Scroll Lock LED❶	This LED will turn on when the function of Scroll Lock is active.
Num Lock LED❶	This LED will turn on when the function of Num Lock is active.
Power Status LED	Green – System is powered on. Green Blinking- System is entered suspend mode. Amber – Battery Low.
Mail LED❶	This LED will turn on while Mail was arrived.

❶ - There LEDs will be turned off during Suspend mode.

3.3.9 Hot Keys Definition

All Hot keys must be active at all times under all operation systems.

Hot Key	Function	Handler
Fn + F3	Toggle Display (LCD/CRT/TV/LCD&CRT)	BIOS Handler
Fn + F5	Display Stretch	BIOS Handler
Fn + F6	System Speakers On/Off	BIOS Handler
Fn + F8	Brightness Increase	Controlled by PMU07
Fn + F9	Brightness Decrease	Controlled by PMU07
Internet Button	Internet Function Key	Controlled by Driver
Mail Button	Internet Function Key	Controlled by Driver

The system will issue a beep to inform user while the following hot keys are pressed.

1) Fn + F3 (Toggle Display) -- LCD => CRT=> LCD+CRT
2) Fn + F5 (Display Stretching)
3) Fn + F6 (System Speakers On/Off)
4) Fn + F8 (Brightness Up)
5) Fn + F9 (Brightness Down)

3.3.9-1 Port Replicator

The Port Bar duplicates the following ports from the Notebook:

- CRT Port
- Serial Port
- Printer Port
- PS/2 Port For Keyboard
- PS/2 Port For Mouse
- One USB Ports
- DC in Jack

The Port replicator can just support the cold insertion but not hot insertion. While hot insertion, the system is not guaranteed that functionality.

3.3.10 Plug & Play

The BIOS supports the Plug and Play Specification 1.0A. (Include ESCD)
This section describes the device management. The system board devices and its resources are as follows:

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	IRQ 8	-	-
ISA Bus	Static	-	-	-	-
System Speaker	Static	61	-	-	-
System Board	Static	-	-	-	E0000~FFFFF
PnP Mother Board	Static	80	-	-	-
Keyboard Controller	Static	60, 64	IRQ 1	-	-
PMU07	Static	68, 6C			
Math Coprocessor	Static	F0~FF	IRQ 13	-	-
PS/2 Mouse	Enable / Disable	-	IRQ 12	-	-
Video Controller	Static	3B0~3BB, 3C0~3DF	IRQ 5	-	A0000~BFFFF, C0000~CFFFF
Serial Port	Static	3F8~3FF	IRQ 4	-	-
ECP, Parallel port	Static	378~37F, 778~77F	IRQ 7	DMA 1	-
FDC	Static	3F0~3F5, 3F7	IRQ 6	DMA 2	-
Dual IDE Controller	Static	170~177, 1F0~1F7, 3F6	IRQ 14, 15	-	-
CardBus Controller	Dynamic	3E0~3E1	IRQ 10	-	
Audio chip	Dynamic	220~22F, 300~301, 388~38B	IRQ 5	DMA 3	
Modem	Dynamic	3E8~3EF	IRQ 10	-	
LAN	Dynamic	1080~10FF	IRQ 10		
IR	Enable/ Disable	158~15F, 2F8-2EF	IRQ 3		-
USB Host Controller	Dynamic	EF80~EF9F	IRQ 9	-	-

3.3.11 PCI Device

The table below summarizes the PCI IDSEL Pin Allocation:

IDSEL Pin	PCI Device		
	Device Number	Function Number	Device Name
AD11	Device 00	Function 0	VT8603 – Host to PCI bridge.
AD12	Device 01	Function 0	VT8603 – PCI to AGP bridge.
AD15	Device 04	Function 0	ESS 1988 Audio Accelerator
AD16	Device 05	Function 0	ASKEY Combo card
AD17	Device 06	Function 0	LAN / MODEM
AD18	Device 07	Function 0	VT82C686B – PCI to ISA bridge
		Function 1	VT82C686B – IDE interface
		Function 2	VT82C686B – USB Port 0-1interface
		Function 3	VT82C686B – USB Port 2-3interface
		Function 4	VT82C686B – PMU and SMBus interface
		Function 5	VT82C686B – AC97 Audio Interface
AD23	Device 0C	Function 0	OZ6933 – Card Bus Socket A
		Function 1	OZ6933 – Card Bus Socket B
AD24	Device 0D	Function 0	IEEE 1394

The table below summarizes the INT Pin Allocation:

INT Pin	PCI Device
INTA	CardBus / LAN / Modem / IEEE1394
INTB	CardBus / LAN / Modem
INTC	VGA / Audio
INTD	USB

The table below summarizes the PCI bus master Allocation:

REQ# Pin	PCI Device
REQ 0	VGA / Audio
REQ 1	CardBus
REQ 2	LAN / Modem
REQ 3	IEEE1394

3.3.12 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.

3.3.12 VT82C686B SMBus Connection Devices

SMBus Device	Master/Slave	Address	BIOS Need to Initialization
VT82C686B – Core Logic	Both Host and Slave	02h	Enable SMBus interface and SMBus interrupt
SO-DIMM	Slave	A0h	Not Need
PMU07	Master	10h	Enable PS01 decode interface
MAXIM1617 – Temperature Sensor	Slave	9Ch	Program the desired temperature range.
OZ168	Slave	34h	Audio DJ
Battery	Slave	A8h	No Need
Clock Synthesizer	Slave	D2h	Program the desired clock frequency (Pin23 output 24MHz, Pin22 output 48MHz)

3.3.13 Resource Allocation

This section summarizes the resource allocation of the notebook computer.

I/O Map

Hex Address	Device
000 - 01F	8237-1
020 - 021	8259-1
022	VIA VT82C686B
040 - 05F	8254
060 - 064	Keyboard Controller
068 – 06C	PMU07 Controller
070 - 07F	RTC & NMI Mask
080 - 08F	DMA Page Registers
092	System Control Port
0A0 - 0A1	8259-2
0B2	Advanced Power Management Control Port
0B3	Advanced Power Management Status Port
0C0 – 0DF	8237-2
0F0 – 0FF	Math Coprocessor
170 - 177	IDE Secondary Command Block
1F0 - 1F7	IDE Primary Command Block
200 - 20F	Game Port
220 - 22F	Sound Blaster
279	ISA PnP Address

330 - 333	MIDI
376	IDE Secondary Control Block
378 – 37F	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 - 3F5, 3F7	Floppy Disk Controller
3F6	IDE Primary Control Block
3F8 - 3FF	Serial Port 1
778 – 77F	ECP port
A79	ISA PnP Address
CF8 – CFF	PCI BUS configuration Register

ISA DMA Map

DMA Channel	Device
DMA 0	Unused
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	638 KB	Base Memory
9F800 - 9FFFFh	2 KB	Extended BIOS Data Area
A0000 – BFFFFh	128 KB	Video Memory
C0000 – CBFFFh	48 KB	Video ROM
CC000 – CFFFFh	16 KB	Unused
D0000 – DFFFFh	64 KB	Unused
E0000 – E0FFFh	4 KB	DMI information
E1000 – FFFFFh	124 KB	System ROM BIOS

IRQ Map

IRQ#	Description
IRQ 0	System Timer
IRQ 1	Keyboard
IRQ 2	[Cascade]
IRQ 3	Serial Infrared Port

IRQ 4	Serial Port
IRQ 5	Audio / USB
IRQ 6	Floppy Disk Drive
IRQ 7	Parallel Port
IRQ 8	RTC Alarm
IRQ 9	ACPI
IRQ10	LAN / Modem / CardBus/ VGA
IRQ11	Reserved for PCMCIA Card
IRQ12	PS/2 Mouse
IRQ13	FPU
IRQ14	Hard Disk Drive
IRQ15	CD-ROM or DVD-ROM

3.3.14 GPIO Pin Assignment

The GPI and GPO pins connected to system devices. The BIOS can get device's status and control the device via the GPI and GPO pins.

VT82C686B GPI pin assignment

Pin Name	Function Name	Connected Device	Description
GPI[0]	Pull High		
GPI[1]	ECSCI#	PMU07	Low = SCI request from PMU07
GPI[2]	BATLOW#	PMU07	Low = Battery Low Activated
GPI[3]	MEDIA_DET	OZ168	Wake Up system for Audio DJ. (Program to LID function)
GPI[4]	IRQ6		Assign to IRQ6
GPI[5]	PME#	CardBus, LAN, Modem, IEEE1394	Low = PME Request
GPI[6]	SENSE#	PHS connector	Low = PHS Connected
GPI[7]	WAKECOM#	PMU07	Low = Ring signal from PMU07
GPI[8]	GPO[8]		Refer GPO[8].
GPI[9]	GPO[9]		Refer GPO[9]
GPI[10]	PANELID0	LCD FPC	LCD Panel Type Select
GPI[11]	PANELID1	LCD FPC	LCD Panel Type Select
GPI[16]	N.C.		
GPI[17]	PANELID2	LCD FPC	LCD Panel Type Select
GPI[18]	MB_ID0	DIP Switch	Mother board revision ID data 0
GPI[19]	MB_ID1	DIP Switch	Mother board revision ID data 1
GPI[20]	INTE_LATCH	M38869	Internet key status
GPI[21]	MAIL_LATCH	M38869	Mail key status
GPI[22]	AGP_BUSY#	VT8603	
GPI[23]	PANELID3	LCD FPC	LCD Panel Type Select

3.3.15 VT82C686B GPO pin assignment

Pin Name	Function Name	Connected Device	Description
GPO[0]	N.C.		
GPO[1]	SUSA#	VT8603, PMU07, Clock Generator	This pin will output Low to power down devices during Standby, STR, STD and SOFF
GPO[2]	SUSB#		Low = Suspend to RAM
GPO[3]	SUS_STA1#	VT8603	Low = Suspend Status 1.
GPO[4]	CPU_STP#	Clock Generator, SpeedStep Controller	Low = CPU clock Stop.
GPO[5]	PCI_STP#	Colck Generator	Low = PCI clock Stop.
GPO[7]	SLP#	VT8603	This pin will output Low to power down devices during Standby, STR, STD and SOFF
GPO[8]	GCLSMENA#	PCA9559	Low = Disable PCA 9559 Write Protect feature
GPO[9]	BIOSWEN#	BIOS ROM	Low = Enable Write BIOS ROM
GPO[10]	GPI[10]		Refer GPI[10]
GPO[11]	GPI[11]		Refer GPI[11]
GPO[12]	PMUCS1# (PCS0#)	PMU07	Low = Select PMU07 Chip
GPO[13]	PMUCS0# (MCCS#)	PMU07	Low = Select PMU07 Chip
GPO[14]	IRTX#	SIR	Infrared Transmit.
GPO[15]	IRRX#	SIR	Infrared Receive.
GPO[16]	FAN_HI/LO	FAN	High = FAN work on high speed Low = FAN work on low speed
GPO[17]	FANON#	FAN	Low = Turn on FAN
GPO[18]	PCMUTE#	Speaker	Low = PC sound off
GPO[19]	PCI_SERIRQ	CardBus Controller	Serial Interrupt Request
GPO[20]	FETON	PHS Connector	Enable PHS power
GPO[21]	BLEN	LCD Panel	Low = Turn off LCD Backlight
GPO[22]	DRAMENA		Select SMBus Device 00:DRAM Slot1 01:DRAM Slot2 10:NC 11:Clock Generator
GPO[23]	DRAMENB		
GPO[24]	USBOC1#	USB Connector 1	Low = USB Port 1 Over Current Detect
GPO[25]	USBOC0#	USB Connector 0	Low = USB Port 0 Over Current Detect

3.3.16 PMU07 GPIO pin assignment

PIN Name	Function Name	I/O	Connected Device	Description
GPIOA0	LID#	I	LID Switch	Low = LCD Close.
GPIOA1	N.C.	X		
GPIOA2	MailLED#	O	Mail LED	Low = Mail Arrival
GPIOA3	QGSMI#	I	M38869	Low = Keyboard SMI
GPIOA4	N.C.	X		
GPIOA5	PSTMSK#	O		Low = PCI Reset Mask
GPIOA6	PCMRI#	I	OZ6933	Low = Ring Signal from PCMCIA
GPIOA7	RI1#	I	Serial Port	Low = Ring Signal from Serial Port
GPIOB0	N.C.	X		
GPIOB1	N.C.	X		
GPIOB2	LEDSEL	O	Mail LED	Low = Disable Mail LED during POST. High = Enable Mail LED after POST.
GPIOB3	SHDN#	O	MAX3243	Low = Power down RS232
GPIOB4	N.C.	X		
GPIOB5	N.C.	X		
GPIOB6	SUSA#	I	VT82C686B	Low = Suspend Status 1
GPIOB7	WakeCOM#	O	VT82C686B	Low = Wake Up Event
GPIOC0	PMU5V	I	Pull High	
GPIOC1	N.C.	X		
GPIOC2	CHGLED	O	Charge LED	High = Turn ON Charge LED
GPIOC3	STSCLR	O		High = Clear Internet/Mail keys Status

3.3.17 M38867 GPIO pin assignment

Pin Name	Function Name	Connected Device	Description
P40	GSMI#	VT82C686B	Keyboard SMI#
P41	.		
P46	ECSCI_686B	VT82C686B	SCI
P54	ECSCI_PMU07	VT82C686B	ECSCI in
P55	N.C.		
P56	N.C.		
P57	N.C.		
P60	KBSEL1	DIP Switch	
P61	KBSEL2	DIP Switch	
P62	PASS#	DIP Switch	Low = Need to Clear

			Password during POST
P63	LOGOSEL	DIP Switch	
P64	N.C.		
P65	Pull High		
P66	N.C.		
P67	Pull High		
P76 (SDA)	Pull High		
P77 (SCL)	Pull High		

3.4 Power Management

This section provides the Power Management software function of the notebook.

3.4.1 General Requirements

The BIOS meet the following general Power Management requirements:

- Compliant with ACPI 1.0B Specification
- Support for Suspend-to-RAM (S1 state) and Suspend-to-Disk mode
- Support for Resume on Modem Ring while in S1 / S4 Mode.
- Power Management must not substantially affect or degrade system performance.
- Power Management must be OS independent
- Support resume on Time/Date

3.4.2 System Power Plane

The system components are grouped as the following parties to let the system to control the On/Off of power under different power management modes.
The power plane is divided as following:

Power Group	Power Control Pin	Controlled Devices
+B	Nil	IMM, (9V~20V)
+3VA	Nil	PIC16C62A, VT82C686B (RTC I/F), Internal Modem, PMU07
+12V	PWRON	PCMCIA Card, AC97 Codec
+5V	PWRON	PCMCIA Slot 5V
+3V	PWRON	VGA, PCMCIA, PCMCIA Slot 3V, DRAM, Twister(DRAM I/F), M38867, MAX3243
+5VS	SUSB#	FLASH ROM, HDD, CD-ROM, USB, Internal K/B, Glide Pad, External P/S2 Mouse, FDD, Audio AMP, Fan
+3VS	SUSB#	VT82C686B (ISA I/F Power), Clock Generator & Buffer (W137)
+RTCVCCS	Nil	VT82C686B (RTC)

3.5 ACPI

This section provides the ACPI software function of the notebook.

3.5.1 General Requirements

The BIOS must meet the following general Power Management requirements:

- Refers to the portion of the firmware that is compatible with the ACPI 1.0 specifications.
- Support for Suspend-to-RAM (S1 state) and Suspend-to-Disk mode (S4 state).
- Support the Wake up event from Modem Ring in S1~S4 state.
- Support the Wake up event from RTC Time/Date alarm in S1 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. Following is a list of the system states:

G0/S0 - Working:

A computer state where the system dispatches user mode (application) threads and they execute. In this state, devices (peripherals) are dynamically having their power state changed. The user will be able to select (through some user interface) various performance/power characteristics of the system to have the software optimize for performance or battery life. The system responds to external events in real time. It is not safe to disassemble the machine in this state.

G1 - Sleeping:

A computer state where the computer consumes a small amount of power, user mode threads are not being executed, and the system “appears” to be off (from an end user’s perspective, the display is off, etc.). Latency for returning to the Working state varies on the wakeup environment selected prior to entry of this state (for example, should the system answer phone calls, etc.). Work can be resumed without rebooting the OS because large elements of system context are saved by the hardware and the rest by system software. It is not safe to disassemble the machine in this state.

G2/S5 - Soft Off:

A computer state where the computer consumes a minimal amount of power. No user mode or system mode code is run. This state requires a large latency in order to return to the Working state. The system’s context will not be preserved by the hardware. The system must be restarted to return to the Working state. It is not safe to disassemble the machine.

G3 – Mechanical Off:

A computer state that is entered and left by a mechanical means. It is implied by the entry of this off state through a mechanical means that the no electrical current is running through the circuitry and it can be worked on without damaging the hardware or endangering the service personnel. The OS must be restarted to return to the Working state. No hardware context is retained. Except for the real time clock, power consumption is zero.

Sleeping State Definitions

Sleeping states (Sx states) are types of sleeping states within the global sleeping state, G1. The Sx states are briefly defined below. For a detailed definition of the system behavior within each Sx state, refer to ACPI specification section 7.5.2. For a detailed definition of the transitions between each of the Sx states, refer to ACPI specification section 9.1.

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) and 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 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 is the lowest power, longest wake-up latency sleeping state supported by ACPI. In order to reduce power to a minimum, it is assumed that the hardware platform has powered off all devices. Platform context is saved in 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. Software uses a different state value to distinguish between the S5 state and the S4 state to allow for initial boot operations within the BIOS to distinguish whether or not the boot is going to wake from a saved memory image.

3.5.2 System Power Plane

The system components are grouped as the following parties to let the system to control the On/Off of power under different power management modes.

The power plane is divided as following:

Power Group	Power Control Pin	Controlled Devices
B+	Nil	IMM, (9V~12V)
+3VA	Nil	PIC16C62A, VT82C686B(RTC I/F), Internal Modem, PMU07
+12V	PWRON	PCMCIA card , AC97 codec
+5V	PWRON	PCMCIA Slot 5V
+3V	PWRON	VGA, PCMCIA, PCMCIA Slot 3V, DRAM, Twister(DRAM I/F), M38867, MAX3243
+5VS	SUSB#	Flash ROM, HDD, CD-ROM, USB, Internal K/B, Glide Pad, External PS/2 Mouse, Audio AMP,

		Fan
+3VS	SUSB#	VT82C686B (ISA I/F Power), Clock Generator & Buffer (W137)
+RTCVCCS	Nil	VT82C686B (RTC)

3.5.3 Global System State Definitions

Global system states (Gx states) apply to the entire system and are visible to the user.

Following is a list of the system states:

G0/S0 – Working

A computer state where the system dispatches user mode (application) threads and they execute. In this state, devices (peripherals) are dynamically having their power state changed. The user will be able to select (through some user interface) various performance/power characteristics of the system to have the software optimize for performance or battery life. The system responds to external events in real time. It is not safe to disassemble the machine in this state.

G1 - Sleeping

A computer state where the computer consumes a small amount of power, user mode threads are not being executed, and the system “appears” to be off(from an end user’s perspective, the display is off, etc). Latency for returning to the Working state varies on the wakeup environment selected prior to entry of this state (for example, should the system context are saved by the hardware and the rest by system software. It is not safe to disassemble the machine in this state.

G2/S5 – Soft Off

A computer state where the computer consumes a minimal amount of power. No user mode or system mode code is running. This state requires a large latency in order to return to the Working state. The system’s context will not be preserved by the hardware. The system must be restarted to return to the Working state. It is not safe to disassemble the machine.

G3 – Mechanical Off

A computer state that is entered and left by a mechanical means. It is implied by the entry of this off state through a mechanical means that the no electrical current is running through the circuitry and it can be worked on without damaging the hardware or endangering the service personnel. The OS must be restarted to return to the Working state. No hardware context is retained. Except for the real time clock, power consumption is zero.

3.5.4 Device Power State Definitions

Device # CPU K+

C0 Power State	-CPU executes instruction
C1 Power State	-CPU is in Auto Halt State
C2 Power State	-CPU is in Stop Clock mode
C3 Power State	-CPU is in Stop Clock mode

Device # HDD

D0 Power State	-HDD is accessing or idle
D1 Power State	-HDD is in standby mode -D1 is resumed by any access
D2 Power State	-HDD is in sleep mode -D2 is resumed by reset
D3 Power State	-Same with D2

Device # CD-ROM

D0 Power State	-CD-ROM is accessing or idle (motor on)
D1 Power State	-CD-ROM is in standby mode -D1 is resumed by any access
D2 Power State	-CD-ROM is in sleep mode -D2 is resumed by reset
D3 Power State	-Same with D2

Device # VGA

D0 Power State	-VGA is accessing or idle
D1 Power State	-VGA is in standby mode -D1 is resumed by any access
D2 Power State	-VGA is in suspend mode -D2 is resumed by access
D3 Power State	-Same with D2

Device # Modem

D0 Power State	-Modem is accessing or idle
D1 Power State	-Modem is in standby mode -D1 is resumed by any access
D2 Power State	-Same with D1
D3 Power State	-Same with D1

Device # PCMCIA

D0 Power State	-PCMCIA is accessing or idle
D1 Power State	-PCMCIA is in RUN# mode
D2 Power State	-PCMCIA is in suspend mode
D3 Power State	-Same with D2

Device # NIC

D0 Power State	-NIC is accessing or idle
D1 Power State	-Snooze is in CLKRUN is asserted
D2 Power State	-Sleep mode, PCI chip in suspend mode
D3 Power State	-Power down mode, both PCI and phyter in sleep mode.

3.5.5 Sleeping State Definitions

Sleeping states (Sx states) are types of sleeping states within the global sleeping state, G1. The Sx states are briefly defined below. For a detailed definition of the system behavior within each Sx state and transition, refer to the ACPI specification.

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) and 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 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 (STR mode)

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 (STD mode)

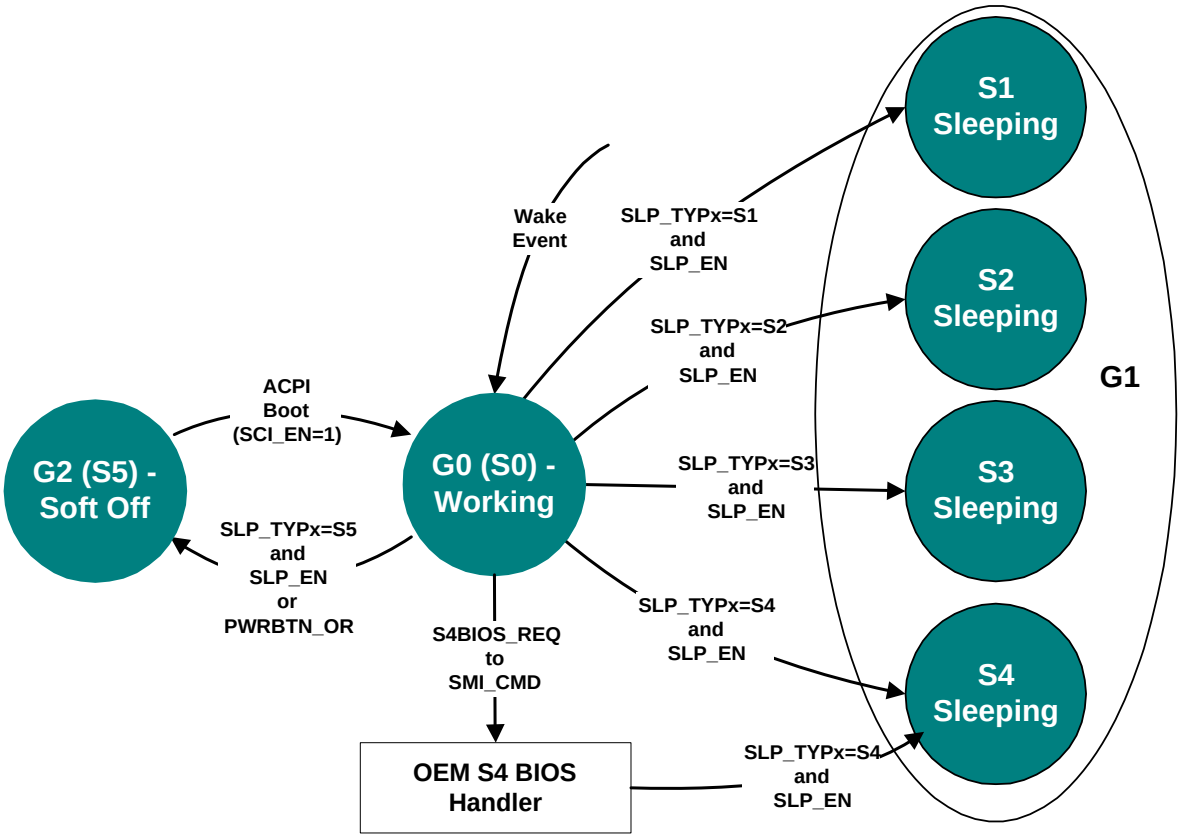
The S4 sleeping state is the lowest power, longest wake-up latency sleeping state supported by ACPI. In order to reduce power to a minimum, it is assumed that the hardware platform has powered off all devices. Platform context is saved in disk.

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 "SOFF" off state and requires a complete boot when awakened. Software uses a different state value to distinguish between the S5 state and the S4 state. This is to allow for initial boot operations within the BIOS to distinguish whether or not the boot is going to wake from a saved memory image.

3.5.6 Power Management Mode Transition Flow Chart

From a user-visible level, the system can be thought of as being one of the states in the following diagram:



3.5.7 Power States transition event

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

Power State	Entry Event	Wake up Event
S1	OSPM control, Sleep Button, Lid Close	Sleep button Ring Indicator PME Event LAN Wake Up Lid Open Schedule Alarm
S4	OSPM control, Power Button Lid Close Battery Low - Low	Power Button Schedule Alarm
S5	Power Button Execute Windows shutdown command	Power Button

OSPM: OS-directed Power Management

3.5.8 Lid Switch

Display mode	Power States	Lid Close	Lid Open
LCD	G0	S3	G0
	S3~S5	No active	No active
CRT	G0	No active	No active
	S3~S5	No active	No active
SIMUL	G0	CRT	No active
	S3~S5	No active	No active

If dual view enable lid close always suspend.

3.5.9 Power Button and Internet / Mail Button

Button	State			
	G0	S1	S4	S5
Power	Power off	Power off	No active	G0

*Press power and suspend button reset PIC

3.5.10 Device Power Control Methodology

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

PowerState Component	Doze	STR	STD/SOff
CPU	Stop Grant	Stop Clock	Power Off
L2 CACHE	ON	Power Down	Power Off
VT8603	ON	Stop Clock	Power Off
VT82C686B	ON	ON	Power Off (except SUSVcc, RTCVcc)
DRAM	ON	Self Refresh	Power Off
Clock Synthesizer	ON	Low Power	Power Off
CDROM	ON	Power Down	Power Off
HDD	ON	Power Down	Power Off
FDD	ON	Power Down	Power Off
KBC	ON	ON	Power Off
PIC16C62A	ON	ON	Power Down
PMU07	ON	ON	Power Down
VGA/VRAM	ON	Power Down	Power Off
PCMCIA	ON	Power Down	Power Off
Super I/O	ON	Power Down	Power Off

AUDIO	ON	Power Down	Power Off
Audio AMP	ON	Power Down	Power Off
LCD Backlight	ON	Power Off	Power Off
Serial Port	ON	Power Down	Power Off
IR Module	ON	Power Down	Power Off
LAN	ON	Power Down	Power Down
Internal Modem	ON	Power Down	Power Down

Device Power control Methodology During S2 Mode

This section illustrates the control methodology of each device/component and its details under Stand by mode.

Device	Power Down Controlled by	Description
CPU	Hardware	Controlled by SUS_STAT1# pin
L2 CACHE	Hardware	Controlled by BIOS
VT8603	Hardware	Controlled by SUS_STAT1# pin
VT82C686B	Working	
DRAM	Hardware	Self Refresh
Clock Synthesizer	Hardware	Controlled by SUSA# pin
CDROM	Software	CDROM support power down command
HDD	Software	HDD support power down command
FDD	Software	FDD support power down command
KBC	Working	
PIC16C62A	Working	
VGA/VRAM	Software	Controlled by VT8603
PCMCIA	Software	Controlled by Driver enter Dx status
Super I/O	Software	Controlled by VT82C686B
AUDIO	Software	Controlled by VT82C686B
Audio AMP	Software	Controlled by BIOS
LCD Backlight	Hardware	Controlled by VGA chip
Serial Port	Software	Controlled by PMU07 GPIO[B3] pin
IR Module	Software	IR module support power down command
LAN	Software	LAN support power down

		command
Internal Modem	Software	Modem support power down command

Device Power Control Methodology During S1 Mode

This section illustrates the control methodology of each device/component and its details under Suspend to RAM mode.

Device	Power Down Controlled by	Description
CPU	Hardware	Controlled by SUSB# pin
L2 CACHE	Hardware	Power off
VT8603	Hardware	Controlled by SUSB# pin
VT82C686B	Hardware	Controlled by SUSB# pin
DRAM	Software	Self Refresh
Clock Synthesizer	Hardware	Controlled by SUSB# pin
CDROM	Hardware	Power off
HDD	Hardware	Power off
FDD	Hardware	Power off
KBC	Software	Controlled by M38867 power down command
PIC16C62A	Software	Controlled by PIC16C62A power down command
PMU07	Sofeware	Controlled by PMU07 power down command
VGA/VRAM	Software	Controlled by VT8603
PCMCIA	Software	Controlled by SUSB# pin
Super I/O	Hardware	Controlled by VT82C686B
AUDIO	Hardware	Controlled by VT82C686B
Audio AMP	Hardware	Controlled by BIOS
LCD Backlight	Hardware	Power off
Serial Port	Software	Controlled by PMU07 GPIO[B3] pin
IR Module	Hardware	Controlled by SUSB# pin
LAN	Hardware	Controlled by Driver enter Dx status
Internal Modem	Hardware	Controlled by Driver enter Dx ststus

3.5.11 Expanding Event Through the Embedded Controller

The following figure shows the relationships between the devices that are wired to the embedded controller, the embedded controller queries, and ACPI general

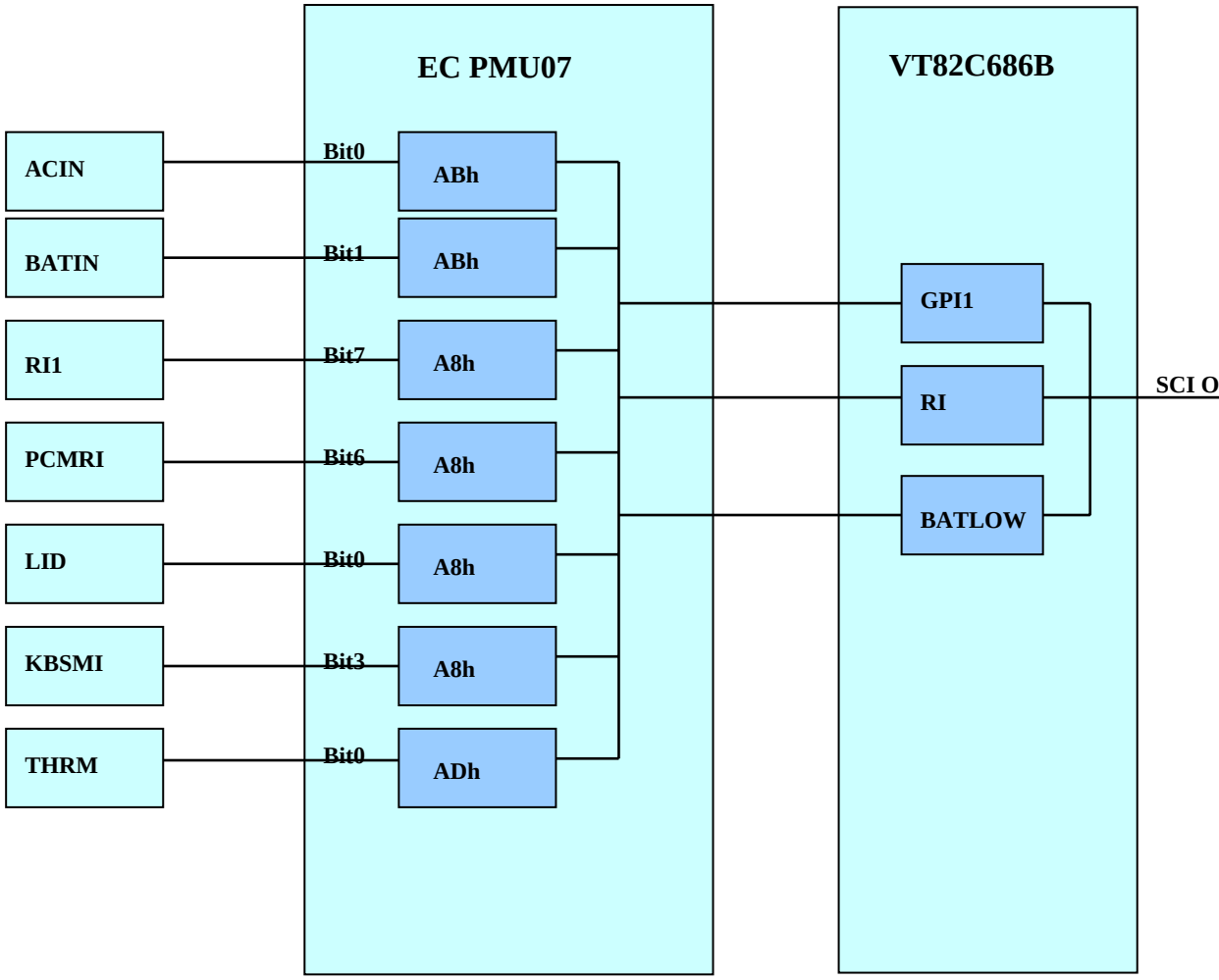


Figure 3-2 The Relationships between ACPI, Controller, and Device

SCI Source and GPE Event from PMU07

PMU07	Input Event	GPE Event	Handler
ADPIN0	AC Plug In / Out	GPI1	AML Handler
BAT00	Battery Plug In / Out	GPI1	AML Handler
GPIOA0	LID Event	RI	AML Handler

GPIOA3	KB SMI event	RI	AML Handler
GPIOA6	PCMCIA Ring In	RI	AML Handler
GPIOA7	COM Port Ring In	RI	AML Handler
THRM	Thermal Event	GPI1	AML Handler

The system will issue a beep to inform user while the following SCI alerted:

- AC (AC status change) update battery information.
- Battery A (Power status change) update battery information.
- Lid (Lid close /open event) update Lid position status.
- RI10 COM Port Ring Event
- PCMRI10 PCMCIA Ring Event
- PME (Modem SCI) update system power status.

Control Method Battery Subsystem

EC should support all the battery information to ACPI-OS

- Designed Battery capacity
- Designed Voltage
- Designed Low battery capacity
- Designed Low – Low battery capacity
- Latest Full charged capacity
- Present Remaining capacity
- Present drain rate
- Present voltage
- Present Battery Status

ACPI BIOS should support an independent device object in the name space, and implement the following methods.

3.5.12 Thermal Control

ACPI allows the OS to be proactive in its system cooling policies. With the OS in control of the operating environment, cooling decisions can be made based on application load on the CPU and the thermal heuristics of the system. Graceful shutdown of the OS at critical heat levels becomes possible as well. The following sections describe the thermal objects available to the OS to control platform temperature. ACPI expects all temperatures to be given in tenths of Kelvin.

The ACPI thermal design is based around regions called *thermal zones*. Generally, the entire PC is one large thermal zone, but an OEM can partition the system into several thermal zones if necessary.

Active, Passive, and Critical Policies

There are three primary cooling policies that the OS uses to control the thermal state of the hardware. The policies are *Active, Passive* and *Critical:*

- **Passive cooling:** The OS reduces the power consumption of the system to reduce the thermal output of the machine by slowing the processor clock. The _PSV control method is used to declare the temperature to start passive cooling.
- **Active cooling:** The OS takes a direct action such as turning on a fan. The _AC*x* control methods declare the temperatures to start different active cooling levels.
- **Critical trip point:** This is the threshold temperature at which the OS performs an orderly, but critical, shut down of the system. The _CRT object declares the critical temperature at which the OS must perform a critical shutdown.

When a thermal zone appears, the OS runs control methods to retrieve the three temperature points at which it executes the cooling policy. When the OS receives a thermal SCI it will run the _TMP control method, which returns the current temperature of the thermal zone. The OS checks the current temperature against the thermal event temperatures. If _TMP is greater than or equal to _AC*x* then the OS will turn on the associated active cooling device(s). If _TMP is greater than or equal to _PSV then the OS will perform CPU throttling. Finally if _TMP is greater than or equal to _CRT then the OS will shutdown the system.

An optimally designed system that uses several SCI events can notify the OS of thermal increase or decrease by raising an interrupt every several degrees. This enables the OS to anticipate _AC*x*, PSV, or _CRT events and incorporate heuristics to better manage the systems temperature.The operating system can request that the hardware change the priority of active cooling vs passive cooling.

Dynamically Changing Cooling Temperatures

An OEM can reset _ACx and _PSV and notify the OS to reevaluate the control methods to retrieve the new temperature settings. The following three causes are the primary uses for this thermal notification:

- When a user changes from one cooling mode to the other.
- When a swappable bay device is inserted or removed. A swappable bay is a slot that can accommodate several different devices that have identical form factors, such as a CD-ROM drive, disk drive, and so on. Many mobile PCs have this concept already in place.
- When the temperature reaches an _AC*x* or the _PSV policy settings

In each situation, the OEM-provided AML code must execute a **Notify** (*thermal_zone*, 0x80) statement to request the OS to re-evaluate each policy temperature by running the _PSV and _AC*x* control methods.

- **Resetting Cooling Temperatures from the User Interface**

  When the user employs the UI to change from one cooling mode to the other, the following occurs:

1. The OS notifies the hardware of the new cooling mode by running the Set Cooling Policy (_SCP) control method.
2. When the hardware receives the notification, it can set a new temperature for both cooling policies and notify the OS that the thermal zone policy temperatures have changed.
3. The OS re-evaluates _PSV and _ACx.

- **Resetting Cooling Temperatures to Adjust to Bay Device Insertion or Removal**

The hardware can adjust the thermal zone temperature to accommodate the maximum operating temperature of a bay device as necessary. For example,

1. Hardware detects that a device was inserted into or removed from the bay and resets the _PSV and/or _AC*x* and then notifies the OS of the thermal and device insertion events.
2. The OS reenumerates the devices and reevaluates _PSV and _ACx.

- **Resetting Cooling Temperatures to Implement Hysteresis**

An OEM can build hysteresis into platform thermal design by dynamically resetting cooling temperatures. For example,

1. When the heat increases to the temperature designated by _AC*x*, the OS will turn on the associated active cooling device and the hardware will reset the AC*x* value to a lower temperature.
2. The hardware will then run the Notify command and the OS will reevaluate the new temperatures. Because of the lower _AC*x* value now, the fan will be turned off at a lower temperature than when turned on.
3. When the temperature hits the lower _AC*x* value, the OS will turn off the fan and reevaluate the control methods when notified.

3.5.13 Hardware Thermal Events

An ACPI-compatible OS expects the hardware to generate a thermal event notification through the use of the SCI. When the OS receives the SCI event, it will run the _TMP control method to evaluate the current temperature. Then the OS will compare the value to the cooling policy temperatures. If the temperature has crossed over one of the three policy thresholds, then the OS will actively or passively cool (or stop cooling) the system, or shutdown the system entirely.

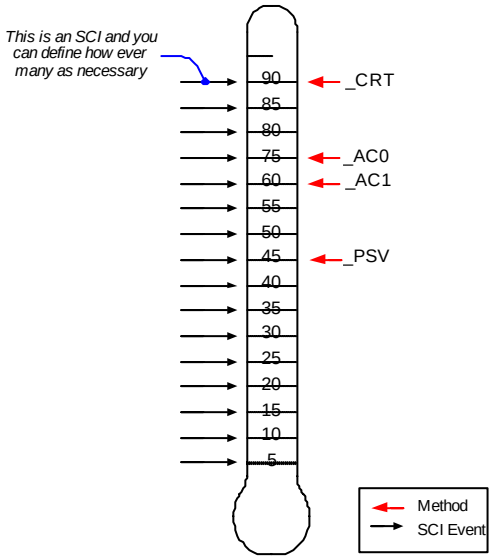


Figure 3-3 SCI Events

Both the number of SCI events to be implemented and the granularity of the temperature separation between each SCI event is OEM-specific. However, it is important to note that since the OS can use heuristic knowledge to help cool the system, the more events the OS receives the better understanding it will have of the system thermal characteristic.

3.5.14 Active Cooling Strength

The Active cooling methods (_Ac*x*) in conjunction with active cooling lists (_AL*x*), allows an OEM to use a device that offers varying degrees of cooling capability or multiple cooling devices. The _AC*x* method designates the temperature at which the Active cooling is enabled or disabled (depending upon the direction in which the temperature is changing). The _AL*x* method evaluates to a list of devices that actively cool the zone. For example:

- If a standard single-speed fan is the Active cooling device, then the policy is represented by the temperature to which _AC0 evaluates, and the fan is listed in _AL0.
- If the zone uses two independently-controlled single-speed fans to regulate the temperature, then _AC0 will evaluate to the maximum cooling temperature using two fans, and _AC1 will evaluate to the standard cooling temperature using one fan.
- If a zone has a single fan with a low speed and a high speed, the _AC0 will evaluate to the temperature associated with running the fan at high-speed, and _AC1 will evaluate to the temperature associated with running the fan at low speed. _AL0 and _AL1 will both point to different device objects associated with the same physical fan, but control the fan at different speeds.

3.5.15 Passive Cooling Equation

Unlike the case for _AC*x*, during passive cooling the OS takes the initiative to actively monitor the temperature in order to cool the platform. On an ACPI-compatible platform that properly implements CPU throttling, the temperature transitions will be similar to the following figure.

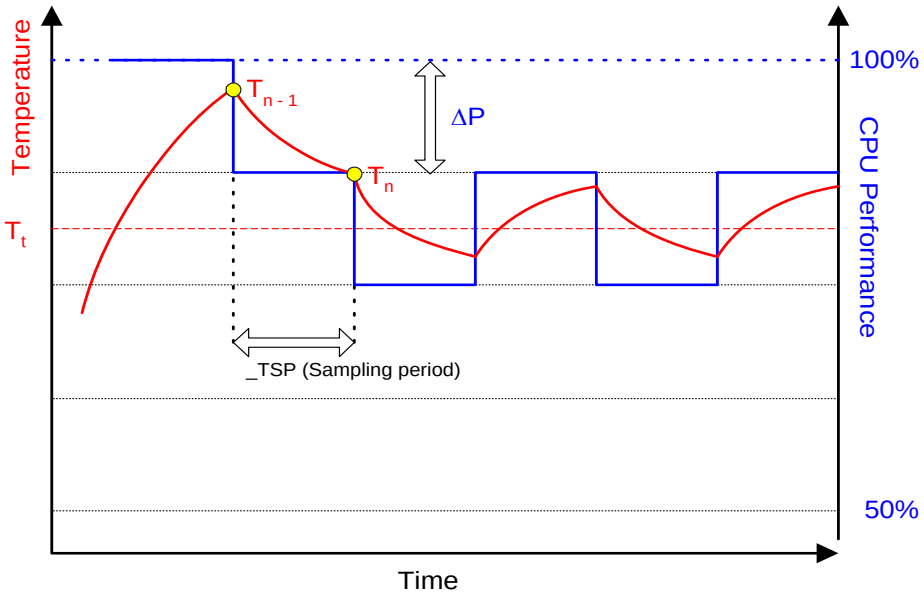


Figure 3-4 Temperature and CPU Performance Versus Time

For the OS to assess the optimum CPU performance change required to bring the temperature down, the following equation must be incorporated into the OS.

$$\Delta P\ [\%] = _TC1 * (Tn - Tn\text{-}1) + _TC2 * (Tn - Tt)$$

where

Tn = current temperature
Tt = target temperature (_PSV)

The two coefficients _TC1 and _TC2 and the sampling period _TSP are hardware-dependent constants the OEM must supply to the OS (for more information, see section 12.3). The object _TSP contains a time interval that the OS uses to poll the hardware to sample the temperature. Whenever _TSP time has elapsed, the OS will run _TMP to sample the current temperature (shown as Tn in the above equation). Then the OS will use the sampled temperature and _PSV (which is the target temperature Tt) to evaluate the equation for ΔP. The granularity of ΔP is determined by the CPU duty width of the system. A detailed explanation of this thermal feedback equation is beyond the scope of this specification.

3.5.16 Critical Shutdown

When the heat reaches the temperature indicated by _CRT, the OS must immediately shutdown the system. The system must disable the power either after the temperature reaches some hardware-determined level above _CRT or after a predetermined time has passed.

Before disabling power, platform designers should incorporate some time that allows the OS to run its critical shutdown operation. There is no requirement for a minimum shutdown operation window that commences immediately after the temperature reaches _CRT. This is because

- Heat might rise rapidly in some systems and slower on others, depending on casing design and environmental factors.
- Shutdown can take several minutes on a server and only a few short seconds on a hand-held device.

Because of this indistinct discrepancy and the fact that a critical heat situation is a remarkably rare occurrence, ACPI does not specify a target window for a safe shutdown. It is entirely up to the OEM to build in a safe buffer that it sees fit for the target platform.

3.5.17 Other Implementation Of Thermal Controllable Devices

The ACPI thermal event model is flexible enough to accommodate control of almost any system device capable of controlling heat. For example, if a mobile PC requires the battery charger to reduce the charging rate in order to reduce heat it can be seamlessly implemented as an ACPI cooling device. Associating the charger as an active cooling device and reporting to the OS target temperatures that will enable or disable the power resource to the device do this. Figure as following illustrates the implementation. Because the example does not create noise, this will be an implementation of *silence* mode.

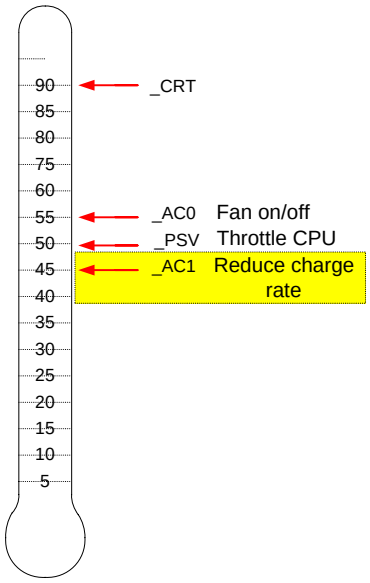


Figure 3-5 Other Thermal Control

3.5.18 Thermal Control Methods

Control methods and objects related to thermal management are listed in the table below.

Object	Description
_AC*x*	Returns Active trip point in tenths Kelvin
_AL*x*	List of pointers to active cooling device objects
_CRT	Returns critical trip point in tenths Kelvin
_PSL	List of pointers to passive cooling device objects
_PSV	Returns Passive trip point in tenths Kelvin
_SCP	Sets user cooling policy (Active or Passive)
_TC1	Thermal constant for Passive cooling
_TC2	Thermal constant for Passive cooling
_TMP	Returns current temperature in tenths Kelvin
_TSP	Thermal sampling period for Passive cooling in tenths of seconds

_AC*x*

This control method returns the temperature at which the OS must start or stop Active cooling, where *x* is a value between 0 and 9 that designates multiple active cooling levels of the thermal zone. If the Active cooling device has one cooling level (that is, n") then that cooling level is named _AC0. If the cooling device has two levels of capability, such as a high fan speed and a low fan speed, then they are named _AC0 and _AC1 respectively. The smaller the value of *x*, the greater the cooling strength _AC*x* represents. In the above example, _AC0 represents the greater level of cooling (the faster fan speed) and _AC1 represents the lesser level of cooling (the slower fan speed). For every AC*x* method, there must be a matching AL*x* method.

Arguments: None.

Result Code: Temperature in tenths Kelvin

The result code is an integer value that describes up to 0.1 precisions in Kelvin. For example, 300.0K are represented by the integer 3000.

_AL*x*

This object evaluates to a list of Active cooling devices to be turned on when the associated _ACx trip point is exceeded. For example, these devices could be fans.

_CRT

This control method returns the critical temperature at which the OS must shutdown the system.

Arguments: None.

Result Code: Temperature in tenths Kelvin

The result is an integer value that describes up to 0.1 precisions in Kelvin. For example, 300.0K are represented by the integer 3000.

_PSL

This object evaluates to a list of processor objects to be used for Passive cooling.

_PSV

This control method returns the temperature at which the OS must activate CPU throttling.

Arguments: None.

Result Code: Temperature in tenths Kelvin.

The result code is an integer value that describes up to 0.1 precision in Kelvin. For example, 300.0 Kelvin is represented by 3000.

_SCP

This control method notifies the hardware of the current user cooling mode setting. The hardware can use this as a trigger to reassign _AC*x* and _PSV temperatures. The operating system will automatically evaluate _ACx and _PSV objects after executing _SCP.

Arguments: 0 - Active; 1 - Passive

Result Code: None.

_TC1

This is a thermal object that evaluates to the constant _ TC1 for use in the Passive cooling formula:

ΔPerformance [%]= _TC2 * (Tn - Tn-1) + _TC1 * (Tn. - Tt)

_TC2

This is a thermal object that evaluates to the constant _TC2 for use in the Passive cooling formula:

ΔPerformance [%]= _TC2 * (Tn - Tn-1) + _TC1 *.(Tn. - Tt)

_TMP

This control method returns the thermal zone □ current operating temperature in Kelvin.

Argument: None.

Result Code: Temperature in tenths Kelvin.

The result is an integer value that describes up to 0.1 precision in Kelvin. For example, 300.0K is represented by the integer 3000.

_TSP

This is an object that evaluates to a thermal sampling period used by the OS to implement the Passive cooling equation. This value, along with _TC1 and _TC2, will enable the OS to provide the proper hysteresis required by the system to accomplish an effective passive cooling policy. The granularity of the sampling period is 0.1second. For example, if the sampling period is 30.0 seconds, then _TSP needs to report 300; if the sampling period is 0.5 seconds, then it will report 5. The OS can normalize the sampling over a longer period if necessary.

3.5.19 AC Adapters and Power Source Objects

The Power Source objects describe the power source used to run the system.

Object	Description
_PSR	Returns present power source device
_PCL	List of pointers to powered devices.

_PSR

Returns the current power source devices. Used for the AC adapter and is located under the AC adapter object in name space. Used to determine if system is running off the AC adapter.
Arguments: None
Results code: **0x00000000** = Off-line; **0x00000001** = On-line

_PCL

This object evaluates to a list of pointers, each pointing to a device or a bus powered by the power source device. Pointing a bus means that all devices under the bus is powered by it power source device.

3.6 Battery Management

The A360 supports both Li-Ion and Ni-MH Battery Pack. There is only one battery pack activating at one time. The special designed Bridge Battery module can backup the system under Suspend To RAM mode for a short period of time.

3.6.1 Battery Sub-system

- The charger will stop charge the battery when the following condition is detected.
  - The temperature of the system is too high
  - The remaining capacity is 95% and more.
- Battery Life → 2.5 to 3 Hours.
- Battery reading methodology is through PMU07 SMBus.

Note that the battery life is dependent on different configuration running. E.g. with CD-ROM battery life is shorter, document keyin only battery life is longer, PMU disable battery life is short, PMU enable battery life is longer.

3.6.2 Battery Low Warning

When the battery capacity remains 8%, the PMU07 will generate a battery warning SMI. The system will do the following action.

- The Power LED Indicator will continually blinking with 1 Hz.
- The system issues a warning beep (3 beeps at once).

3.6.3 Battery Low

When the battery capacity remains 3%, the system will generate a battery low SMI. The system will do the following action.

- The system will enter Suspend To Disk mode even the power management is

disabled.
- The function of power-on or Resume will be inhibited until the battery low condition is removed.

3.6.4 AC Adapter

When plug in the AC adapter, the system will do the following action:

- The charger will charge the Main Battery, if it is possible.
- The Battery Charging Indicator will turn on if the battery is in changing mode.
- The power management function will be disabled, if the Setup item of "Power Management" is set to "Battery Only".

3.7 PMU07

The Embedded controller PMU07 acts as a supplement for power management control. It supports a lot of functions via SMBus interface.

3.7.1 The System EC RAM with PMU07

Embedded Controller Command Set
The EC I/F command set allows the OS to communicate with the PMU07.
For detail information refer to ACPI 1.0B specification.

EC I/F Command	Command Byte Encoding	Byte	Register	R / W	Description	Interrupt
Read Embedded Controller (RD_EC)	0x80	#1	EC_SC	W	Command byte Header	Interrupt on IBF=0
		#2	EC_DATA	W	Address byte to read	No Interrupt
		#3	EC_DATA	R	Read data to host	Interrupt on OBF=1
Write Embedded Controller (WR_EC)	0x81	#1	EC_SC	W	Command byte Header	Interrupt on IBF=0
		#2	EC_DATA	W	Address byte to write	Interrupt on IBF=0
		#3	EC_DATA	W	Data to write	Interrupt on IBF=0
Burst Enable Embedded Controller (BE_EC)	0x82	#1	EC_SC	W	Command byte Header	No Interrupt
		#2	EC_DATA	R	Burst acknowledge byte	Interrupt on OBF=1
Burst Disable Embedded Controller (BD_EC)	0x83	#1	EC_SC	W	Command byte Header	Interrupt on IBF=0
Query Embedded Controller (QR_EC)	0x84	#1	EC_SC	W	Command byte Header	No Interrupt
		#2	EC_DATA	R	Query value to host	Interrupt on OBF=1

3.7.2 PMU07 EC RAM List

The micro controller PMU07 acts as a supplement for power management control. It supports the following functions via SMBus Command **(0x80 , 0xC0)**

Function	Address	Register Name	R/W	Bit Number 7 6 5 4 3 2 1 0	Logic	Default	Description
1st Battery [_BIF]	00h *3	Power unit	R(/W)	DATA[15:0] *1	-	0xffff	0x0000: mWh [Fixed value] 0xffff: Unknown
	02h *3	Design capacity	R(/W)	DATA[15:0] *1	-	0xffff	0x0000-0xfffe(mWh) 0xffff: Unknown
	04h *3	Last Full Charge Capacity	R(/W)	DATA[15:0] *1	-	0xffff	0x0000-0xfffe(mWh) 0xffff: Unknown
	06h *3	Battery Technology	R(/W)	DATA[15:0] *1	-	0xffff	0x0000 : Primary 0x0001: Secondary [Fixed value] 0xffff: Unknown.
	08h *3	Design Voltage	R(/W)	DATA[15:0] *1	-	0xffff	0x0000-0xfffe(mV) 0xffff: Unknown
	0Ah *3	Design capacity of Warning	R(/W)	DATA[15:0] *1	-	0xffff	0x0000-0xfffe(mWh) 0xffff: Unknown
	0Ch *3	Design capacity of Low	R(/W)	DATA[15:0] *1	-	0xffff	0x0000-0xfffe(mWh) 0xffff: Unknown
	0Eh *3	Battery capacity Granularity 1	R(/W)	DATA[15:0] *1	-	0xffff	0x0000-0xfffe(mWh) 0xffff: Unknown
	10h *3	Battery capacity Granularity 2	R(/W)	DATA[15:0] *1	-	0xffff	0x0000-0xfffe(mWh) 0xffff: Unknown
	12h *3	Model number	R(/W)	DATA[15:0] *1	-	0xffff	0x0000 [Not support]
	14h *3	Serial Number	R(/W)	DATA[15:0] *1	-	0xffff	0x0000 [Not support]
	16h *3	Battery type	R(/W)	DATA[15:8] *1 All bits are 0 / CELL_TYPE [7:0]	-	0xffff	CELL_TYPE [3:0] This code depends on battery data format. In the future, this code may be added. 0x00: NiMH 0x01: Li-ion 0x10: Non-rechargeable battery (Reserved)
	18h *3	OEM Information	R(/W)	DATA [15:8] *1 All bits are 0 / Vender[7:0]	-	0xffff	Vender [7:0] This code depends on battery data format. And the following name should be described in the ASL with the same character code. In the future, these codes will be added. 0: “MoliEnergy” 1: “Panasonic” 2: “”(SANYO does not agree) 3: “TBCL” (Toshiba) 4: “Sony”

*1: The register type is word.
*3: This register is not cleared if the system is in S4-S5 state.
R(/W): This is the read only register, but the written data will be able to read back till PMU updates the data periodically, or PMU detects the status change.

Function	Address	Register Name	R/W	Bit Number 7	6	5	4	3	2	1	0	Logic	Default	Description
1st Battery [_BST]	1Ah *3	Battery State	R(/W)	DATA[15:3] *1 All bits are 0					CRIT	CHG	DCHG	-	-	DCHG=1: The battery is discharged CHG =1 : The battery is charged CRIT =1 : The battery is critical (Empty)
	1Ch *3	Battery Present rate	R(/W)	DATA[15:0] *1								-	0xffff	0x0000-0xfffe(mW) 0xffff: Unknown
	1Eh *3	Battery Remaining Capacity	R(/W)	DATA[15:0] *1								-	0xffff	0x0000-0xfffe(mWh) 0xffff: Unknown
	20h *3	Battery present Voltage	R(/W)	DATA[15:0] *1								-	0xffff	0x0000-0xfffe(mV) 0xffff: Unknown
1st Battery [_BTP]	22h	Battery Trip Point	R/W	DATA[15:0] *1								-	0x0000	0x0000 :Clear the trip point 0x0001-0xffff(mWh)
2nd Battery [_BIF]	24h to 3Ch *3	*2	*2	*2								*2	*2	*2
2nd Battery [_BST]	3Eh to 44h *3	*2	*2	*2								*2	*2	*2
2nd Battery [_BTP]	46h	*2	*2	*2								*2	*2	*2
-	48h	Battery data Size	R(/W)	DATA[7:0]								-	-	0x01 : DATA size is 3byte.(PMU06A) 0x00 :DATA size is 2 byte. (PMU06) *8
1st Battery [_BIF]	49h	Design capacity	R(/W)	DATA[23:16] *1 *7								-	0xff	PMU06A use this data with 02/03h. *7 *8
	4Ah	Last Full Charge Capacity	R(/W)	DATA[23:16] *1 *7								-	0xff	PMU06A use this data with 04/05h. *7 *8
1st Battery [_BST]	4Bh	Battery Remaining Capacity	R(/W)	DATA[23:16] *1 *7								-	0xff	PMU06A use this data with 1E/1Fh. *7 *8
1st Battery [_BTP]	4Ch	Battery Trip Point	R(/W)	DATA[23:16] *1 *7								-	0x00	PMU06A use this data with 22/23h. *7 *8
2nd Battery [_BIF]	4Dh	Design capacity	R(/W)	DATA[23:16] *1 *7								-	0xff	PMU06A use this data with 26/27h. *7 *8
	4Eh	Last Full Charge Capacity	R/(/W)	DATA[23:16] *1 *7								-	0xff	PMU06A use this data with 28/29h. *7 *8
2nd Battery [_BST]	4Fh	Battery Remaing Capacity	R(/W)	DATA[23:16] *1 *7								-	0xff	PMU06A use this data with 42/43h. *7 *8
2nd Battery [_BTP]	50h	Battery Trip Point	R(/W)	DATA[23:16] *1 *7									0x00	PMU06A use this data with 46/47h. *7 *8
	51h to 6Bh *3	Reserved	R/W	Don't care								-	-	

*1: The register type is word.
*2: Same as 1st Battery CMBatt Data.
*3: This register is not cleared if the system is in S4-S5 state.
R(/W): This is the read only register, but the written data will be able to read back till PMU updates the data periodically, or PMU detects the status change.

Function	Address	Register Name	R/W	Bit Number 7	6	5	4	3	2	1	0	Logic	Default	Description
PMU Access	6Ch	PMU_LOW_ ADR	R/W	DATA [7:0]								-	-	These registers are available when PMU slave mode or charger mode is selected. For detail information, refer to PMU slave communication section in this document
	6Dh	PMU_HIG_ ADR	R/W	DATA [15:8]								-	-	
	6Eh	CHECK_ SUM	R/W	DATA [7:0]								-	-	
	6Fh	PMU_DATA	R/W	DATA [7:0]								-	-	
SMBus	70h *7	SMB_PTCL	R/W	PROTOCOL[7:0]								-	-	For detail information, refer to ACPI 1.0 specification [13.9 SMBus Host controller Interface via Embedded controller] These registers are not available when PMU slave mode or charger mode is selected. The PMU06 has access protect function for the EEPROM in the battery, to cancel the protection, set the access protect cancel bit. For detail, refer to SMBus section
	71h *7	SMB_STS	R/W	DONE	ALRM	RES	STATUS [4:0]					-	-	
	72h	SMB_ADDR	R/W	ADDRESS [6:0]							RES	-	-	
	73h	SMB_CMD	R/W	COMMAND								-	-	
	74h to 93h	SMB_DATA [0-31]	R/W	DATA								-	-	
	94h	SMB_BCNT	R/W	RES[7:5]			BCNT[4:0]					-	-	
	95h	SMB_ ALARM_ ADDR	R(/W)	ADDRESS[6:0]							RES	-	-	
	96h to 97h	AMB_ ALARM_ DATA[0-1]	R(/W)	DATA								-	-	
	98h	SMB_CNRL	R/W	RES[7:1]							PRT		0x00	PRT =1 : The SMBus address (A8-AE) protection is cancelled.
Reserve	99h to 9Fh	Reserved	R/W	Don't care								-	-	

*7: When polling checks this register, the interval time is necessary more than 500usec.

R(/W): This is the read only register, but the written data will be able to read back till PMU updates the data periodically, or PMU detects the status change.

Function	Address	Register Name	R/W	Bit Number 7	6	5	4	3	2	1	0	Logic	Default	Description
Status	A0h *3	ADP_STS	R(/W)	RES[7:1]							CON	-	-	CON = 1 : AC adapter is connected
	A1h *3	BAT1_STS (1st Battery)	R(/W)	BTP	EMP	LOW	WAR	ERR	DCHG	CHG	CON	-	-	BTP =1: Battery trip point is detected. EMP =1: Battery is empty. LOW =1: Battery is Low battery state. WAR=1: Battery is Warning state. ERR =1: Battery is Error state. DCHG=1: Battery is discharged. CHG=1: Battery is charged. CON=1: Battery is connected.
	A2h *3	BAT2_STS (2nd Battery)	R(/W)									-	-	
	A3h *3	Reserved	R/W	Don't care								-	-	
	A4h *3	BAT1_CAP	R(/W)	BCAP								-	-	0x00-0x64 = 0-100(%) 0x7F = Unknown 0x80 = Not installed
	A5h *3	BAT2_CAP	R(/W)	BCAP								-	-	
	A6h *3	Reserved	R/W	Don't care								-	-	
	A7h	SMB_Alert_ ADDR	R/W	ADDRESS[6:0]							RES	-	0x00	SMBAlert output device address The alert response function is available when this register is cleared (0x00) only. When the several devices assert the alert signal at the same time, the least address is stored to this register. And when this register is cleared , next alert address is stored to this register.
	A8h *5	GPIO-A_ EVT_STS	R/W	STS_A [7:0]								Read 0:No event 1:EVT detection Write 0:Clear event 1:Ignore	0x00	To clear the notified event flag without unexpected event loss, clear the corresponding bit flag only. For this operation, this register has special writing manner as follows. **STS_X ← (STS_X) AND (Written data)**
	A9h *5	GPIO-B_ EVT_STS	R/W	0	STS_B [6:0]								0x00	
	AAh *5	GPIO-C_ EVT_STS	R/W	0	0	0	0	0	0	STS_C [1:0]			0x00	
	ABh *5	RUN_ EVT_STS	R/W	BTP2	SMB	ALRT	GPIO	RES	BAT2	BAT1	ADP		0x00	BTP2 =1: BTP2 event is detected SMB =1 : SMBus event is detected. ALRT=1 : SMBAlert is detected. GPIO =1 : GPIO event is detected. BATn=1 : Battery event is detected. ADP =1 : Thermal event is detected TH =1 : High alarm point is detected. HIGH=1 : Low alarm point is detected. LOW =1 : Low alarm point is detected. ERR =1 : Polling communication failure with retry. To clear the notified event flag without unexpected event loss, clear the corresponding bit flag only. For this operation, this register has special writing manner as follows. **STS_X ← (STS_X) AND (Written data)**
	ACh *5	WAKE_ EVT_STS	R/W										0x00	
	ADh *5	RUN_ EVT_STS_2	R/W	Reserved [7:1]							TH		0x00	
	AEh *5	WAKE EVT_STS_2	R/W	Reserved [7:1]							TH		0x00	
	AFh *5	THERMAL_ EVT_STS	R/W	Reserved [7:3]					ERR	LOW	HIGH		0x00	

*3: This register is not cleared if the system is in S4-S5 state.
*5: After writing to this register, Set the "00h" to the BURST_FLG_CLR register.
R(/W): This is the read only register, but the written data will be able to read back till PMU updates the data periodically, or PMU detects the status change.

Function	Address	Register Name	R/W	Bit Number 7	6	5	4	3	2	1	0	Logic	Default	Description
Event/ GPIO Control	B0h	EC_RUN_ ENB	R/W	BTP2	SMB	ALRT	RES[4:1]				ADP	0: Disable 1: Enable	0x00	BTP2: BTP2 event SMB : SMBus event. ALRT: SMBAlert event. ADP: Adapter event.
	B1h	EC_WAKE_ ENB	R/W									0: Disable 1: Enable	0x00	
	B2h	BATT_RUN _ ENB	R/W	BTP	EMP	LOW	WAR	ERR	CAP	C/D	CON	0: Disable 1: Enable	0x00	BTP: Battery trip point EMP: Empty. LOW: Low battery WAR: Warning ERR: Error CAP: Capacity learning C/D: Charge/Discharge CON: Battery presence
	B3h	BATT_WAK E _ENB	R/W									0: Disable 1: Enable	0x00	
	B4h	GPIO-A_ IO_CONF	R/W	CONF_A [7:0]								0: Input 1: Output	0x00	For detail information, refer to GPIO section in this document.
	B5h	GPIO-A_ DATA	R/W	DATA_A [7:0]									-	
	B6h	GPIO-A_ RUN_ENB	R/W	RUN_ENB_A [7:0]								0: Disable 1: Enable	0x00	
	B7h	GPIO-A_ EVT_POL	R/W	POL_A [7:0]								0: Falling edge 1: Rising edge	0x00	
	B8h	GPIO-A_ WAKE_ENB	R/W	WAKE_ENB_A [7:0]								0: Disable 1: Enable	0x00	
	B9h	GPIO-B_ IO_CONF	R/W	1	CONF_B [6:0]							0: Input 1: Output	0x80	
	BAh	GPIO-B_ DATA	R/W	0	DATA_B [6:0]								-	
	BBh	GPIO-B_ RUN_ENB	R/W	0	RUN_ENB_B [6:0]							0: Disable 1: Enable	0x00	
	BCh	GPIO-B_ EVT_POL	R/W	0	POL_B [6:0]							0: Falling edge 1: Rising edge	0x00	
	BDh	GPIO-B_ WAKE_ENB	R/W	0	WAKE_ENB_B [6:0]							0: Disable 1: Enable	0x00	
	Beh	GPIO-C_ DATA	R/W	RES [7 :4] *4				DATA_C [3:0]					-	
	BFh	GPIO-C_ RUN_ENB	R/W	0	0	0	0	0	0	RUN _ENB _C [1:0]		0: Disable 1: Enable	0x00	

*4: Should be 0.
*6: This register's response time is 150usec max.

Function	Address	Register Name	R/W	Bit Number 7	6	5	4	3	2	1	0	Logic	Default	Description	
Event/ GPIO Control	C0h	GPIO-C_ EVT_POL	R/W	0	0	0	0	0	0	POL _C [1:0]		0: Falling edge 1: Rising edge	0x00		
	C1h	GPIO-C_ WAKE_ENB	R/W	0	0	0	0	0	0	WAK E_ ENB _C [1:0]		0: Disable 1: Enable	0x00		
	C2h	EVT_CONT	R/W	RES [7:6]		WAKE	SCI	RES *4	Q_RUN	WAKE_OUT	SUS_X		0x00	WAKE SCI Q_Run WAKE_OUT Sus_X	=0: Wake# output is “Level”. =1: Wake# output is “Pulse”. =0: SCI is always output by event detection and SCI_EVT shows the query data is stored. And next SCI is not output until SCI_EVT is cleared. =1: SCI is output when the command set is not executed and OBF=0. SCI_EVT shows the output SCI is for event notification. =0: Runtime event status is reflected to RUN_EVT_STS register. =1: Runtime event status is reflected to Query data. =0: Wake event output is always enable.(in S0-S3) =1: Wake event output is enable when SUS_X=L. =0: Runtime and Wakeup is selected by SUS_B. (GPIO B6 is enable) =1: Runtime and Wakeup is selected by SUS_A. (GPIO B6 is used as SUS_A input.)
	C3h	EC_RUN_ ENB_2	R/W	Reserved [7:1]							TH	0: Disable 1: Enable	0x00	TH: Thermal event	
	C4h	EC_WAKE_ ENB_2	R/W									0: Disable 1: Enable	0x00		
	C5h To C7h	Reserved	R/W	Don’t care								-	-		
	C8h *6	GPI_AD0	R	AD0_DATA [7:0]								-	-	For detail information, refer to GPIO section in this document.	
	C9h *6	GPI_AD1	R	AD1_DATA [7:0]								-	-		
	Cah *6	Reserved	R/W	Don’t care								-	-		
	CBh	D/A_CONT	R/W	DATA [7:0]								-	0xff	0x00-0xfe: D/A converter output data 0xff : Battery capacity(%) output	
	CCh	WAKE_DIS	R/W	DATA [7:0]								-	0x00	0x00 : WAKE# output enable 0x01 : WAKE# output disable	

*4: Should be 0.
*6: This register’s response time is 150usec max.

Function	Address	Register Name	R/W	Bit Number 7	6	5	4	3	2	1	0	Logic	Default	Description
Battery control	D0h	BAT_CHG_CONT	R/W	RES[7:5]			CHG_RDY#	RES [3:2]		CHG2	CHG1	-	-	CHG_RDY# =0 : Charge ready CHGn =1 : The nth battery is charged
	D1h	BAT_DCH_PRI	R/W	RES[7:3]					PAT [2:0]			-	0x00	Battery discharge priority 0 : 2 1 1 : 1 2 2 : 2 1 3 : 2 1 4 : 1 2 5 : 1 2 6 : Same as 0 7 : Simultaneously discharge (Read only :This data can be set using PMU register)
	D2h	BAT_DCH_CONT	R/W	RES[7:2]						DCHG2	DCHG1	0: Not discharge 1: Discharge	-	The discharge battery can be selected one of the batteries can be discharged.
	D3h	BAT_WAR_ABS	R/W	DATA[15:0] *1								-	0x0000	Absolute capacity battery Warning detection point 0x0000-0xffff (mWh)
	D5h	BAT_LOW_ABS	R/W	DATA[15:0] *1								-	0x0000	Absolute capacity battery Low detection point 0x0000-0xffff (mWh)
	D7h	BAT_WAR_REL	R/W	DATA [7:0]								-	0x10	Relative capacity battery Warning detection point 00-C8h (0-100% step 0.5%)
	D8h	BAT_LOW_REL	R/W	DATA [7:0]								-	0x06	Relative capacity battery Low detection point 00-C8h (0-100% step 0.5%)
	D9h *3	FULL_DATA	R/W	DATA [7:0]								-	0xbe	Full charge cancel point 00-C8h (0-100% step 0.5%)
	Dah	CC_CUR_DATA	R	DATA [7:0]								-	0x00	Battery charging current setting 0x01-0xff (0.02-5.10A step 0.02A) 0x00 Depends on the battery This register is “read only”, to change the value, use the register in PMU registers area.
	DBh To DCh	BTP2	R/W	DATA [15:0]								-	0x0000	0x0000: Clear the trip point 0x0001-0xffff : (mWh) When all of the battery’s capacities lesser than this setting value, the BTP2 is detected if event is enabled.
	DDh To DFh	Reserved	R/W	Don't care								-	-	

*3: This register is not cleared if the system is in S4-S5 state.

R(/W): This is the read only register, but the written data will be able to read back till PMU updates the data periodically, or PMU detects the status change.

Function	Address	Register Name	R/W	Bit Number 7	6	5	4	3	2	1	0	Logic	Default	Description
PMU control	E0h	PMU_CONT	R/W	RES[7:3]					EC_REG	BAY_LED	POW_LED	-	0x00	PMU does not initialize EC registe EC_REG =1: when system powe is off. BAY_LED =1: PMU indicates the Battery discharge status to the LED_BAY#n, POW_LED =1: when the battery is installed. The Power LED blink
	E1h	ACPI_ACC_ENB	R/W	RES [7:1]							OS_STS	-	0x00	OS_STS = 1: ACPI mode = 0: Legacy mode
	E2h	OFF_TIME	R/W	DATA [7:0]								-	0x64	Power switch over ride function timer 01h-FFh (0.1-25.5esc step 0.1sec) 00h : Reserved
Thermal Sensor Polling	E3h	POLLING_ADDRESS	R/W	Slave Address [6:0]							RES		0x00	Address: 0x00-0x7F The polling slave address setting If this address is 00, the Polling is disabled.
	E4h	HIGH_ALARM	R/W	DATA [7:0]								Signed value	0x00	If the received data GE this value, the event will be detected.
	E5h	LOW_ALARM	R/W	DATA [7:0]								Signed value	0x00	If the received data LE this value, the event will be detected.
	E6h	POLLING_INTERVAL	R/W	DATA [7:0]									0x00	0x00 :Polling disable 0x01 – 0xFF [x 250ms] (250ms to 63.75sec)
	E7h	POLLING_DATA	R(/W)	DATA [7:0]								Signed value	0x00	This register shows data at latest polling.
	E8h	HARDWARE_SHUT_DOWN	R/W	DATA [7:0]								Signed value	0x7D	If the thermal sensor read value GE this value, the PMU automatically off the power.
	E9h	POLLING_COMMAND	R/W	DATA [7:0]									0x00	Polling command (data register) address.
	EAh	RETRY_COUNT	R/W	DATA [7:0]									0x10	0x00 - 0xFF: Retry count value (0-255)
	Ebh To EFh	Reserved	R/W	Don't care										
PMU control	F0h	BURST_FLG_CLR	R/W	DATA [7:0]								-	-	After writing to the register addressed A8h-AFh, Set the 00h to this register.
	F1h To FFh	Reserved	R/W	Don't care										

R(/W): This is the read only register, but the written data will be able to read back till PMU updates the data periodically, or PMU detects the status change.

3.8 Miscellaneous

3.8.1 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 resource, while the User Password may not access the floppy disk when it is protected by Supervisor Password. Also, the User Password may not access the floppy disk when the Supervisor Password protects it.

When the security function is enabled, the system will request the user to enter password during the following situation:

- Power On → The system will prompt the user to enter the password before booting the OS. If the user key in the wrong password for 3 times, then the system will halt.

- Resume → The system will prompt the user to enter password while resuming from STR or STD mode. If the user keys in the wrong password for 3 times, the system will not resume and should return to Suspend mode.

- Entering CMOS Setup → The system will prompt the user to enter the password before entering the CMOS Setup. If the user keys in the wrong password for 3 times, then the system will halt.

3.9 CMOS Setup Utility

The Setup utility is used to configure the system. The Setup contains the information regarding the hardware for boot purpose. The changed settings will take effect after the system rebooted. Refer to Chapter 1 on running BIOS Setup Program for more detailed information.

Chapter 4

Hardware Functional Overview

4.1 Overview

The FIC A360 consist of several major functions and subsystems including:

- System Processor – implemented on the motherboard using the Intel Pentium-III or Celeron with FC-PGA packaging at 100/133MHz system bus speed.
- System North Bridge Core Logic – implemented on the motherboard using the VIA Twister chipset.
  - SMA (Share Memory Architecture)
  - Savage IX AGP 3D Graphics Accelerator
- System South Bridge Core Logic – implemented on the motherboard using the VIA VT82C686B PCI-to-ISA chipset.
  - Enhanced IDE Interface for HDD, CD-ROM, and IDE Device Bay
  - SoundBlaster/DirectSound AC97 Digital Audio Controller
  - USB Interface for the external USB port
  - Super I/O
- Clock Frequency Generator – implemented on the motherboard using the IMI 9806I clock generator chip.
- Cache Memory Subsystem – implemented on-die on the Intel CPU.
- Video Subsystem – integrated on the motherboard using S3 Savage IX VGA chip and on the LCD Panel for supporting the LCD and CRT.
- PCMCIA Subsystem – implemented on the motherboard using the O2Micro OZ6933 PCI-CARDBUS BRIDGE controller chip.
- Audio Subsystem – implement included on the VT82C686B.
- Keyboard and Pointing Device Subsystem – implemented on the AIO board, the Keyboard assembly, and the Glidepad assembly.
- I/O Subsystem – implement included on the VT82C686B.
- Modem Feature Card – implemented on the motherboard via the mini-PCI bus module socket.
- Power Subsystem – implemented on the battery board, LCD Inverter Board, Battery Pack, and AC adapter.
- Micro-P Subsystem – implemented on the motherboard using Mitsubishi PMU07.

4.2 System Hardware Block Diagram

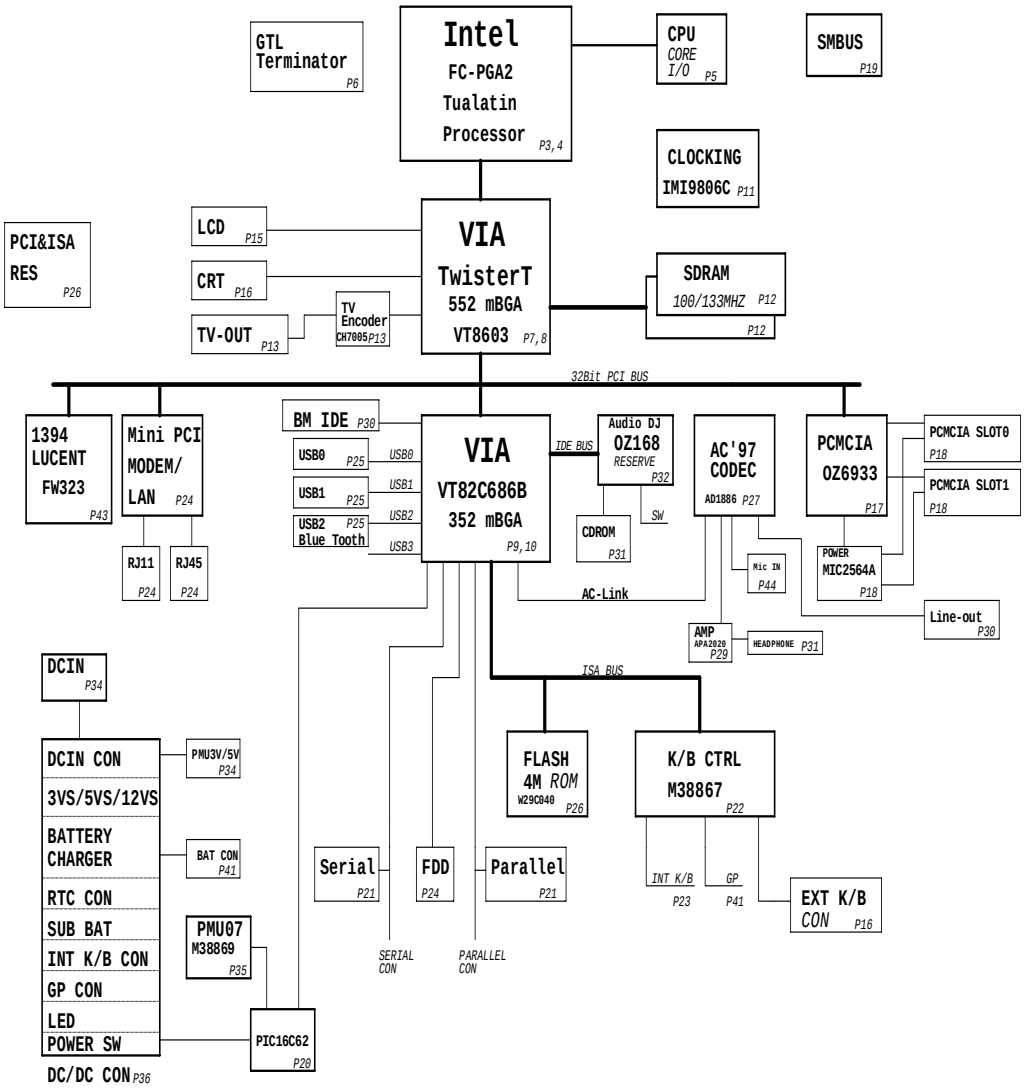


Figure 1-1 A360 Block Diagram

4.3 Chipset Summary

The notebook consists of following major chipsets:

Controller Chip	Vendor	Description
Processor	Intel	FC-PGA Pentium III 933 / 1G / 1.3GMHz FC-PGA Celeron 766 / 800MHz
Core Logic	VIA	Twister + VT82C686B
Video Controller	S3	Savage IX
PCMCIA Controller	O2Micro	OZ6933
Supper I/O Controller	VIA	Integrated in South Bridge (VIA VT82C686B).
Audio Chip	VIA	Integrated in South Bridge (VIA VT82C686B)
Audio Amplifier	APEC	APA2020
Keyboard Controller	Mitsubishi	M38867
PMU Controller	Mitsubishi	PMU07, Mitsubishi M38867M(E)SA-xxxHP
Gas Gauge IC		Included in PMU07
ROM BIOS	SST	28SF040-12
Clock Generator	IMI	IMI 9806I
Temperature Sensor	NS	MAXIM-1617
USB Hub		Integrated in South Bridge (VIA VT82C686B)
Modem (Type 3B)	ASKEY	1456VQL19R-4 Mini-PCI Solution (Type-3B)
IEEE1394	Agere	FW-323

4.4 System Processor (CPU)

The FIC A360 runs on Intel Pentium-III based on FC-PGA packaging. It supports CPU with up to 1GHz clock speed rating. The processor operates in conjunction with the RAM and ROM memory and the system control logic (e.g. VIA Twister) to process software instructions (BIOS, Windows, and Applications).

4.4.1 Intel Pentium-III Features

Using Intel's advanced 0.18 micron process technology, the Intel mobile Pentium III processor is offered at speeds of 700MHz to 1GHz while still offering lower power for long battery life. Other performance advancements include the addition of new Internet Streaming SIMD instructions, the advanced transfer cache architecture, and a processor system bus speed of 100MHz.

Intel Mobile Pentium III processor featuring Intel SpeedStep technology is the next dramatic step towards achieving near desktop performance. This exciting new processor has two performance modes and allows real-time dynamic switching of the voltage and frequency between the modes. This occurs by switching the bus ratios, core operating voltage, and core processor speeds without resetting the system.

There are two performance modes offered, Maximum Performance and Conserved Performance. Maximum Performance mode provides near desktop performance and runs at 700, 750, 800 and 850 MHz. Conserved Performance mode provides the best balance between performance and battery life and operates at a lower frequency of 550, 600, 650, 700 MHz. You can check the table of two performance modes as following.

The integrated L2 cache is designed to help improve performance, and it complements the system bus by providing critical data faster and reducing total system power consumption. The Pentium III processor's 64-bit wide Gunning Transceiver Logic (GTL+) system bus provides a glue-less, point-to-point interface for an I/O bridge/memory controller.
Features summary of the Pentium-III CPU:

- Processor core/bus speeds
  - Featuring Intel SpeedStep technology: Maximum Performance Mode at 1.60V and Conserved Performance Mode at 1.35V
- Supports the Intel Architecture with Dynamic Execution
- On-die primary (L1) 16-Kbyte instruction cache and 16-Kbyte write-back data cache
- On-die second level L2 cache (256-Kbyte)
- Integrated GTL+ termination
  64-bit data bus, 100-MHz operation
- Integrated math co-processor
- Intel Processor Serial Number
- Fully compatible with previous Intel microprocessors
  - Binary compatible with all applications
  - Support for MMX technology
  - Support for Streaming SIMD Extensions enhances floating point, video, sound, and 3-D application performance
- Power Management Features
  - Quick Start for low power, low exit latency clock "throttling"
  - Deep Sleep mode provide low power dissipation
- On-die thermal diode

4.4.2 Intel Celeron Features

The Intel Celeron processor is designed for uni-processor based Value PC and is binary compatible with previous generation Intel architecture processors. The Intel Celeron processor provides good performance for applications running on advanced operating systems such as Windows 98 / Me, Windows NT / 2000, and UNIX. This is achieved by integrating the best attributes of Intel processors – the dynamic execution performance of the P6 micro-architecture plus the capabilities of MMX technology – bringing a balanced level of performance to the Value PC market segment.

Features summary of the Celeron CPU:

- Available up to 700 MHz core frequencies
- Integrated primary (L1) 16-Kbyte instruction cache and 16-Kbyte write back data cache
- Integrated second level (L2) cache 128-Kbyte ECC protected cache data array
- Intel's latest Celeron processors in the FC-PGA package are manufactured using the advanced 0.18 micron technology.
- Binary compatible with applications running on previous members of the Intel microprocessor line.
- Supports the Intel Architecture with Dynamic Execution
- Specifically designed for uni-processor based Value PC systems, with the capabilities of MMX technology.
- Power Management Features. Quick Start for low power, low exit latency clock "throttling" and Deep Sleep mode for extremely low power dissipation.
- Optimized for 32-bit applications running on advanced 32-bit operating systems.

- UPGA-2 packaging technology for thin form factor notebook designs. Exposed die enables more efficient heat dissipation.
- Low-Power GTL+ processor system bus interface. 64-bit data bus, 100-MHz operation.
- Integrated Intel Floating-Point Unit compatible with the IEEE Std 754
- Integrated thermal diode measuring processor temperature.

4.5 System Core Logic

The system core logic function of the notebook is implemented on the CPU module and motherboard using the VIA S3 Savage IX AGPset. The VIA S3 Savage IX AGPset is intended for the Pentium III processor platform and emerging 3D graphics/multimedia applications. The VIA S3 Savage IX AGPset brings 100/133-MHz FSB (front-side bus), ATA/33/66/100 HDD support in UDMA mode 2 & 4 and PC100/133 SDRAM performance to entry-level Performance PCs.

4.5.1 VIA TWISTER Features

The VIA TWISTER 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 VIA TWISTER functions and capabilities include:

Define Integrated Solutions for Value PC Mobile Designs

- Integrated VIA Apollo Pro133 and S3® Savaged IX in a single chip
- 64-bit Advanced Memory controller supporting PC100/PC133 SDRAM and VCM
- Combines with VIA VT82C686B PCI-LPC South Bridge for state-of-the-art power management

High Performance CPU Interface

- Socket 370 support for Intel Pentium III, Celeron™ processors
- 66/100/133 MHz CPU Front Side Bus (FSB)
- Built-in Phase Lock Loop circuitry for optimal skew control within and between clocking regions
- Five outstanding transactions (four In-Order Queue IOQ) plus one output latch)
- Dynamic deferred transaction support

Advanced High Performance DRAM Controller

- DRAM interface runs synchronous (66/66, 100/100, 133/133) mode or pseudo-synchronous (66/100, 100/66, 100/133, 133/100) mode with FSB
- Concurrent CPU, AGP, and PCI access
- Supports SDRAM and VCM SDRAM memory types
- Support 3 DIMMs or 6 banks for up to 1.5 GB of DRAM (256Mb DRAM technology)
- 64-bit data width
- Supports maximum 8-bank interleave (8 pages open simultaneously); banks are allocated based on LRU
- SDRAM X-1-1-1-1-1-1-1 back-to-back accesses

Integrated Savage4 2D/3D/Video Accelerator

- Optimized Shared Memory Architecture (SMA)
- 8 to 32 MB frame buffer using system memory
- Floating point triangle setup engine
- Single cycle 128-bit 3D architecture
- 8M triangles/second setup engine
- 140M pixels/second trilinear fill rate
- Full internal AGP4X performance
- S3 DX7 texture compression (S3TC™)
- Next generation, 128-bit 2D graphics engine
- High quality DVD video playback
- Flat panel monitor support
- 2D/3D resolutions up to 1920x1440

3D Rendering Features

- Single pass multiple textures
- 8-bit stencil buffer
- 32-bit true color rendering
- Specular lighting and diffuse shading
- Alpha blending modes
- Massive 2K x 2K textures
- MPEG-2 video textures
- Vertex and table fog
- 16 or 24-bit Z-buffering
- Sprite anti-aliasing, reflection mapping, texture morphing, shadows, procedural textures and atmospheric effects

Motion Video Architecture

- High quality up/down scalar
- Planar to packed format conversion
- Motion compensation for full speed DVD playback
- Hardware subpicture blending and highlights
- Multiple video windows for video conferencing
- Contrast, hue, saturation, brightness and gamma controls
- Digital port for NTSC/PAL TV encoders

Advanced System Power Management Support

- Dynamic power down of SDRAM
- Independent clock stop controls for CPU/SDRAM, AGP and PCI bus
- Low-leakage I/O pads

Full Software Support

- Drivers for major operating systems and APIs
- North Bridge/Chipset and Video BIOS support

4.5.2 VT82C686B Features

The VT82C686B PSIPC (PCI Super-I/O Integrated Peripheral Controller) is a high-integration, high performance, power-efficient, and high compatibility device that supports Intel and non-Intel based processor to PCI bus bridge functionality to make a complete Microsoft PC99-compliant PCI/ISA system.

The VT82C686B functions and capabilities include:

Inter-operable with VIA and other Host-to-PCI Bridges

- Combine with TWISTER for a complete 66 / 100 / 133 MHz Socket 370 or Slot-1 system with integrated 2D / 3D graphics (S3 Savage 4)
- Inter-operable with Intel or other Host-to-PCI bridges for a complete PC99 compliant PCI / AGP / ISA system

PCI to ISA Bridge

- Integrated ISA Bus Controller with integrated DMA, timer, and interrupt controller
- Integrated Keyboard Controller with PS2 mouse support
- Integrated DS12885-style Real Time Clock with extended 256 byte CMOS RAM and Day/Month Alarm for ACPI
- Integrated USB Controller with root hub and four function ports
- Integrated UltraDMA-33/66 master mode EIDE controller with enhanced PCI bus commands
- PCI-2.2 compliant with delay transaction and remote power management
- Distributed DMA support for ISA legacy DMA across the PCI bus
- Fast reset and Gate A20 operation
- Flash EPROM, 4Mb EPROM and combined BIOS support
- Supports positive and subtractive decoding

UltraDMA-33 / 66 / 100 Master Mode PCI EIDE Controller

- Dual channel master mode PCI supporting four Enhanced IDE devices
- Transfer rate up to 33MB/sec to cover PIO mode 4, multi-word DMA mode 2 drives, and UltraDMA-33 interface
- Support ATAPI compliant devices including DVD devices
- Support PC native and ATA compatibility modes
- Complete software driver support

Integrated Super IO Controller

- Supports 2 serial ports, IR port, parallel port, and floppy disk controller functions
- Two UARTs for Complete Serial Ports
- Infrared-IrDA (HPSIR) and ASK (Amplitude Shift Keyed) IR port multiplexed on COM2
- Multi-mode parallel port
- Floppy Disk Controller

SoundBlaster Pro Hardware and Direct Sound Ready AC97 Digital Audio Controller

- Dual full-duplex Direct Sound channels between system memory and AC97 link

- PCI master interface with scatter / gather and bursting capability
- 32 byte FIFO of each direct sound channel
- Standard v1.0 or v2.0 AC97 Codec interface for single or cascaded AC97 Codec's from multiple vendors
- Loopback capability for re-directing mixed audio streams into USB and 1394 speakers
- Hardware SoundBlaster Pro for Windows DOS box and real-mode DOS legacy compatibility
- Hardware assisted FM synthesis for legacy compatibility
- Direct two game ports and one MIDI port interface
- Complete software driver support for Windows-95/98/2000 and Windows NT
- Voltage, Temperature, Fan Speed Monitor and Controller
- Five positive voltage (one internal), three temperature (one internal) and two fan-speed monitoring
- Programmable control, status, monitor and alarm for flexible desktop management
- Automatic clock throttling with integrated temperature sensing
- Internal core VCC voltage sensing
- Flexible external voltage sensing arrangement (any positive supply and battery)

Universal Serial Bus Controller

- USB v1.1 and Intel Universal HCI v1.1 compatible
- Eighteen level (doublewords) data FIFO with full scatter and gather capability
- Root hub and four function ports
- Integrated physical layer transceivers with optional over-current detection status on USB inputs
- Legacy keyboard and PS/2 mouse support

System Management Bus Interface

- Host interface for processor communications
- Slave interface for external SMBus masters

Sophisticated PC99-Compatible Mobile Power Management

- Supports both ACPI and legacy APM power management
- ACPI v1.0 Compliant
- APM v1.2 Compliant
- CPU clock throttling and clock stop control for complete ACPI C0 to C3 state support
- PCI bus clock run, Power Management Enabled (PME) control, and PCI/CPU clock generator stop control
- Supports multiple system suspend types
- Multiple suspend power plane controls and suspend status indicators
- Normal, doze, sleep, suspend and conserve modes
- Global and local device power control
- System event monitoring with two event classes
- Dedicated input pins for power and sleep buttons, external modem ring indicator, and notebook lid open/close for system wake-up
- Up to 12 general purpose input ports and 23 output ports
- One programmable chip select and one microcontroller chip select

- Enhanced integrated real time clock (RTC) with date alarm, month alarm, and century field
- Thermal alarm on either external or any combination of three internal temperature sensing circuits
- Hot docking support
- I/O pad leakage control

Plug and Play Controller

- PCI interrupts steerable to any interrupt channel
- Steerable interrupts for integrated peripheral controllers: USB, floppy, serial, parallel, audio, soundblaster, MIDI
- Steerable DMA channels for integrated floppy, parallel, and soundblaster pro controllers
- One additional steerable interrupt channel for on-board plug and play devices
- Microsoft Windows 98, Windows NT, Windows 95 and plug and play BIOS compliant
- Integrated I/O APIC (Advanced Peripheral Interrupt Controller) (CG Silicon)
- Built-in NAND-tree pin scan test capability 35um, 3.3V, low power CMOS process
- Single chip 27x27 mm, 352 pin BGA

4.6 Clock Frequency Generator

The notebook utilizes the IMI 9896I chip to supply the system clock needed to run the computer. The following are the available clock frequencies:

System clock:

Clock generator IMI 9806I support:

- 66/100 MHz for Pentium III Mobile CPU
- 30/33 MHz for PCI device bus clock use
- 48 MHz for PIIX4M
- 14.318 MHz for PIIX4M refresh use

- 14.318 MHz XTAL for Clock Generator use
- 32.768 KHz XTAL for RTC real time clock
- 8.0 MHz XTAL for K/B controller use
- 14.318 MHz OSC for sound blaster use

4.7 Cache Memory

The primary (L1) and secondary (L2) level cache are integrated on the CPU. By incorporating the cache on-die (meaning it is combined with the CPU into one component), Intel eliminates the need for separate components. The 256KB on-die L2 cache provides three (3X) times faster processor access, resulting in significant improvements in performance. Likewise, an integrated cache means a reduction of connections resulting in increased reliability.

4.8 System Memory

The memory subsystem, implemented on the motherboard, includes System and Video memory. The VIA Twister System Controller chip provides primary control for the system memory.

4.8.1 System Memory

The notebook offers two 64-bit SODIMM (Small Outline Dual Inline Memory Module) sockets for main memory configuration. The memory sockets accept any standard 144-pin SODIMM modules at 16MB, 32MB, 64MB, 128MB and 256MB sizes. Memory modules are 3.3V SDRAM type.

4.8.2 Video Memory

The video memory of the notebook is embedded inside the VGA controller chip (S3 Savage 4) with 8,16 and 32MB SMA video memory that can support display resolutions of up to 1024 x 768 at 32-bit 16M color (TFT LCD).

4.9 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 that allows instant erasing and programming without replacing the EPROM chip.

The BIOS is stored in a 32-pin PLCC package FLASH ROM SST 28SF040A-90/120 or Winbond W29C040P-90 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.

4.10 Video Subsystem

The video subsystem, integrated inside the North Bridge chip and the LCD panel, controls the display output to both the LCD Panel screen and to the external VGA port.

4.10.1 Video Chip Controller

S3 Savage 4 also includes 8, 16 and 32MB of shared architecture memory (SMA) with all of the above in a single BGA package.

Feature Summary of the S3 Savage 4:

- S3 Savage 4 Chip set
- 32/64-Bit 8/16/32MB SMA video buffer
- Designed for AGP 4X/2X with side-band addressing and execute modes
- 128 bit engine with dual rendering pipelines
- Floating point triangle setup engine Single cycle 3D architecture and trilinear filtering
- True color rendering
- 140MHz pixels/sectrilinear fill rate
- 8M triangle/sec setup engine Full speed DVD video play back
- VESA-DPMS 2.0 and DDC2
- Support Industry standard S3 Texture Compression

- Support major 3D standards: DierctX, OpenGL
- Support Pentium III SEE Command and AMD K6-2 / 3 , K7 3Dnow! Technology.Resolution up to 1920x1440

	Frame Buffer Size	
Resolutions Supported	8MB	16/32MB
640x480x8/16/32 bit	Yes	Yes
800x600x8/16/32 bit	Yes	Yes
1024x768x8/16/32 bit	Yes	Yes
1280x1024x8/16 bit	Yes	Yes
1280x1024x32 bit	Yes	Yes
1600x1200x8/16 bit	Yes	Yes
1600x1200x32 bit	Yes	Yes
1920x1440x8 bit	Yes	Yes
1920x1440x16 bit	Yes	Yes
1920x1440x32 bit		Yes

4.10.2 Video Clock

VIA VT82C686B provides input to generate VGA internal slate machine, MCLK, and DCLK. Also provides 32.768 KHz O/P for video RAM refresh.

4.11 PCMCIA Controller

The PCMCIA controller of the notebook is implemented on the motherboard using the O2Micro OZ6933 CardBus Controller. The notebook supports two PCMCIA slots for insertion of two Type I/II cards at the same time.

CARDBUS CONTROLLERS

The OZ6933 is an ACPI and PC98/99 logo certified high performance, dual slot PC Card controller with a synchronous 32-bit bus master/target PCI interface. This PC Card to PCI bridge host controller is compliant with the 2000 PC Card Standard. This standard incorporates the new 32-bit CardBus while retaining the 16-bit PC Card specification as defined by PCMCIA release 2.1. CardBus is intended to support "temporal" add-in functions on PC Cards, such as Memory cards, Network interfaces, FAX/Modems and other wireless communication cards, etc. The high performance and capability of the CardBus interface will enable the new development of many new functions and applications.

The OZ6933 CardBus controller is compliant with the latest ACPI-PCI Bus Power Management interface Specification. It supports all four power states and the PME# function for maximum power savings and ACPI compliance. Additional compliance to On Now Power Management includes D3 cold state support, paving the way for low sleep state power consumption and minimized resume times. To allow host software to reduce power consumption further, the OZ6933 provides a power-down mode in which internal clock distribution and the PC Card socket clocks are stopped. An advanced CMOS process is also used to minimize system power consumption.

The OZ6933 dual PCMCIA socket supports two 3.3V/5V 8/16-bit PC Card R2 cards or 32-bit CardBus R3 cards. The R2 card support is compatible with the Intel 82365SL PCIC controller,

and the R3 card support is fully compliant with the 2000 PC Card Standard CardBus specification. The OZ6933 is an additional buffer chip for the PC Card socket interface. In Addition, the OZ6933 supports dynamic PC Card hot insertion and removal, with auto configuration capabilities.

The OZ6933 is fully complains with the 33Mhz PCI Bus specification, v2.2. It supports a master device with internal CardBus direct data transfer. The OZ6933 implements FIFO data buffer architecture between the PCI bus and CardBus socket interface to enhance data transfers to CardBus Devices. The bi-directional FIFO buffer permits the OZ6933 to accept data from a target bus (PCI or CardBus interface) while simultaneously transferring data. This architecture not only speeds up data transfers but also prevents system deadlocks.

The OZ6933 is a PCMCIA R2/CardBus controller, providing the most advanced design flexibility for PC Cards that interface with advanced notebook designs.

FEATURES - Dual Slot Solution OZ6933

- Supports 2 PCMCIA 2.1 and JEIDA 4.2 R2 cards or 2 CardBus cards
- ACPI-PCI Bus Power Management Interface Specification Rev 1.1 Compliant
- Supports OnNow LAN wakeup, OnNow Ring Indicate, PCI CLKRUN#, PME#, and CardBus CCLKRUN#
- Compliant with the 33Mhz PCI Specification V2.2, 2000 PC Card Standard 7.1 for OZ6933
- Yenta™ PCI to PCMCIA CardBus Bridge register compatible
- ExCA (Exchangeable Card Architecture) compatible registers map-able in memory and I/O space
- Intel™ 82365SL PCIC Register Compatible
- Supports PCMCIA_ATA Specification
- Supports 5V/3.3V PC and 3.3V Cardbus cards
- Supports two PC Card or CardBus slots with hot insertion and removal
- Supports multiple FIFOs for PCI/CardBus data transfer
- Supports Direct Memory Access for PC/PCI and PCI/Way on PC Card socket
- Programmable interrupt protocol: PCI, PCI+ISA, PCI/Way, or PC/PCI interrupt signaling modes
- Win'98 IRQ and PC-98/99 compliant
- Parallel or Serial interface for socket power control devices including Micrel and TI
- Integrated PC 98/99 -Subsystem Vendor ID support, with auto lock bit
- LED Activity Pins

- OZ6933 supports D3cold state PME# wakeup; 3.3Vaux Power; and Zoomed video buffer enable pins
- OZ6860: "Built-in" live video, high throughput, multimedia ZV ports support without additional buffers; 3V card protection during host system suspend with Auto Card VS# resensing; dedicated ZV output port to LCD controller

SmartCardBus™ (OZ711E1/OZ711E2) combines a Smart Card reader and CardBus controller in a single IC. In addition to meeting PC Card standards, SmartCardBus is compliant to Microsoft PC/SC, ISO 7816-1, -2, -3 electrical specifications, standard protocols including T = 0, T = 1, and synchronous and asynchronous formats. SmartCardBus lowers the cost of ownership of e-commerce and corporate security Smart Card applications.

4.12 Audio Subsystem

The audio subsystem is integrated inside the South Bridge chip on the motherboard. Refer to the System Core Logic section of this chapter.

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.

4.13 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 A360 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 Synaptics touch pad pointing device module on the system top cover assembly and a pre-programmed Mitsubishi 38867M8 micro-controller that interfaces the mouse device to the Motherboard. The touch pad module is connected to battery board through a 6-pin FPC cable. An external PS/2 port also supports the use of an external PS/2 compatible mouse where the system automatically detects on system power up and runs both internal and external mouse simultaneously.

The Synatics touch pad, 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 - the finger is detected 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; electronic components are mounted on the other side. The sensitive area is protected by a layer of smooth and durable mylar.

The Synatics touch pad 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 Synatics touch pad 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.

4.14 Disk Drives Subsystem

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

The notebook is equipped with high capacity hard disk drive using Enhanced IDE controller with LBA (Logical Block Addressing) and Ultra DMA mode support.

The VT82C686B 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 (3 Mode) mini-diskettes for Japanese market.

The notebook uses the 24X-speed IDE CD-ROM Drive that reads digital data stored on CD-ROM at 24 times faster rotational speed. 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. The notebook also could use the 8X+ speed IDE DVD-ROM Drive that reads DVD digital data stored on DVD-ROM at 8 times faster rotational speed.

4.15 Power Subsystem

The Power Subsystem consists of the following major sections:

4.15.1 AC Power Adapter

The computer is equipped with a 60W universal AC power adapter that converts AC voltage (100 to 240VAC, 50 to 60Hz) into DC voltage used to operate the notebook and charge the batteries.

4.15.2 Internal Battery Pack

The computer utilizes Nickel Metal Hydride (NiMH) or Lithium-Ion (Li-Ion) that provides DC power for the notebook and real time clock battery on the motherboard when the AC Adapter is not connected to the computer.

The normal charging time for the battery is around 2.5 hours when computer is turn off while it should take around 8 hours when the computer is running. Running time of battery is around 2 to 2.5 hours.

4.15.3 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.

4.15.4 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 used to light the CCFT (Cold-Cathode Fluorescent Tube).

4.16 Micro-P Subsystem (PMU-07)

The micro controller Mitsubishi PMU07 acts as a supplement for the power management control. It supports many functions via the SMBus interface.

The system communicates with the PMU07 via the SMBus interface. The SMBus host (M38867) should be first initialized before starting the transaction. The following is the procedure for system communication with PMU07:

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 PMU07 slave address to SmbHstAdd register.
   - Send command to PMU07 -- Slave address is 04h.
   - Read data from PMU07 -- 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 PMU07.
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 PMU07.

Features Summary of the Micro-P:

- 5 channels 8-bit analog 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 I^2C
- 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

Chapter 5

Maintenance & Disassembly

5.1 Introduction

This section contains preventive and corrective maintenance procedures for the A360 notebook. The first part of the section describes the computer cleaning procedures and preferred handling procedures for sensitive components (e.g. disk drives, LCD, CPU, batteries).

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

5.2 Preventive Maintenance

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

5.2.1 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.

> 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 has become 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 matte.

5.2.2 Protecting the Disk Drives

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

5.2.3 Maintaining the LCD Quality

When it comes to screen problems, heat plays a big part. After a good working session, the typical routine is to shut the machine and close the cover. But the display surface - no matter what type it is - and the components inside the computer radiates 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. Make this a habit.

5.2.4 Maintaining the Hard Disk Drive

The hard disk drive is one of the most common parts that always gets problem. Here is some preventive maintenance that you can do when handling the hard disk.

- Always back up the data files from the hard disk.
- Run a virus detecting program for possible virus infected area on the hard disk.
- Use **SCANDISK** to correct any errors found in the directory and File Allocation Table (FAT). This will also free up space from any unused sectors.
- Never turn the computer off when the hard disk is being accessed.
- Never move or raise the computer while the hard disk is being accessed, most especially don't jar the hard disk as this may cause a hard disk crash.
- Use hard disk system tools like **Disk Defragmenter** under Windows. This reorganizes your hard disk by eliminating fragmentation and improves the hard disk access time.

5.2.5 Handling the Computer Battery Packs

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

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

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

5.3 Required Tools and Equipment

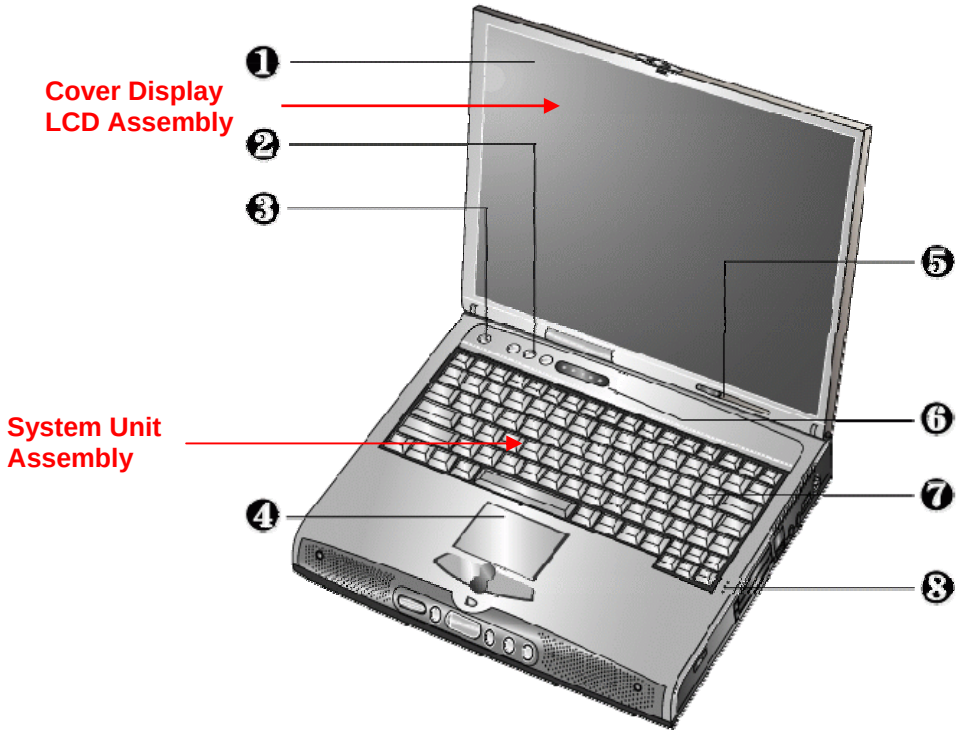
To troubleshoot and repair PC systems properly, you need a few basic tools:

- Tweezers
- Small flat-blade screwdriver
- Small Cross screwdriver
- Regular size Cross screwdriver
- Small Hex-bolt screwdriver

> 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.

5.4 Notebook Field-Replaceable Parts and Assemblies

The notebook contains two major assemblies: The Cover Display LCD Assembly and the System Unit Assembly.



❶	Color LCD Panel	❷	Keyboard	❸	Integrated Microphone
❹	Power Status LED Indicator	❺	Status LED Indicator	❻	Easy Buttons
❼	Power Button	❽	Glidepad Pointing Device		

Figure 5-1 Cover Display and System Unit Assembly

5.4.1 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 are used to cover the whole LCD Panel assembly, which includes the LCD Display Module, the LCD FPC cables, and inverter board.

- **LCD Display Module**
  12.1”/13.3”/14.1” LCD (Liquid Crystal Display) screen is used for output display. This part is assembled together with LCD Power Inverter Board, and LCD cables contained inside the whole LCD Panel. Handle this part with care against static electricity and accidents that can break the LCD.

- **LCD Power Inverter Board**
  This part or PCB (Printed Circuit Board) is used to provide high voltage to the CCFT (Cold Cathode Fluorescent Tube) of the notebook’s LCD backlighting. It is connected to the right side of the LCD display screen and attached to the back panel by a screw. Exercise safety electrical precautions in handling and servicing this part. The circuit board also includes the function for displaying the power status and battery charge LED indicators.

- **LCD FPC Cable**
  The LCD FPC cable is used to convert output signals from the motherboard in driving the LCD display screen. The cable is connected to the back of the LCD Panel.

5.4.2 System Unit Assembly

The System Unit Assembly comprise of several assemblies of which can be 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):

- **Glidepad Touch Pad Module Assembly**
  The touch pad (glide pad) pointing device module is assembled at the underside of the top cover with the sensor pad exposed on the top. The assembly comprises of the glide pad board, the glide pad converter board, the select buttons bracket casing, the insulator sheet, the glide pad FPC cable, and the glidepad wire cable. The glide pad board is assembled just underneath the select button assembly. It provides a FPC cable connector for the mother board.

- **Keyboard Panel Assembly**
  The keyboard is assembled on top of the system unit and connected to the main 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 upper-right side of the system unit. It comprises of a heat plate and one fan. There are seven screws securing the heat plate to the CPU module inserted on the motherboard. The exhaust fan is secured beside the heat plate.

- **Keyboard Cover Assembly**
  The keyboard cover is a thin bracket for holding the keyboard as well as covering the base unit. It is also includes the power button, easy buttons, and status LED cover moldings.

The following System Base Unit Assembly includes the following major Field Replaceable Units/parts (FRUs):

- **Battery Pack**
  This is one of more easily replaceable parts. The battery pack is found on the right side on the base unit and can be easily removed by pressing the latch underneath the unit and pulling the battery on 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 is attached on the lower-left side of the system base unit located just below the keyboard. The HDD is secured by only one screw. The HDD module is a 2.5-inch hard disk drive with a maximum height of 9.5mm. The hard drive module assembly is attached to the motherboard through the HDD connector.

- **CD-ROM / DVD-ROM / CD-RW Drive Assembly**
  The CD-ROM / DVD-ROM / CD-RW Drive Assembly is attached on the left side of the base unit and is secured with one screws.\
- **Floppy Disk Drive Assembly**
  The Floppy Drive assembly is located at the front left side of the base unit just underneath the HDD assembly. It is assembled to the unit with one screw secured on the left side.

- **CPU**
  The Pentium-III/Celeron FC-PGA socket is found on the top right part of the motherboard. You will need a flat screwdriver and CPU tooling for removing or installing the CPU. Refer to Chapter 2 on how to install and upgrade the CPU.

- **Speaker Assembly**
  The internal speakers of the notebook are assembled into front side of the system. They are secured into a slot and speaker cable connector is attached into the main board.

- **Motherboard Assembly**
  The Motherboard assembly is the most important part of the notebook. It contains the entire major chipsets including the core logic, PCMCIA, memory, and BIOS to operate the whole computer. It also includes the sockets, connectors and ports completing the functionality.

- **Internal Modem / LAN / Combo Module Assembly**
  If the computer includes an internal modem, LAN, or combo module, it is located underneath the motherboard using a mini-PCI slot.

- **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.

5.5 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.

5.5.1 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.
2. To release the battery pack, locate the battery latch found underneath the unit.
3. Push the latch to release the lock and at the same time pull the battery pack out.

5.5.2 Removing the Keyboard

The internal keyboard is located above the system top unit and is fitted in without screws on the top unit case. Follow the steps below on how to remove the keyboard:

1. Remove keyboard cover by gently bending it and sliding it towards in front of you.

Figure 5-2 Remove keyboard cover

2. Lift the keyboard and tilt it towards the LCD panel.

3. Release keyboard cable by sliding the ZIF connector towards up direction.

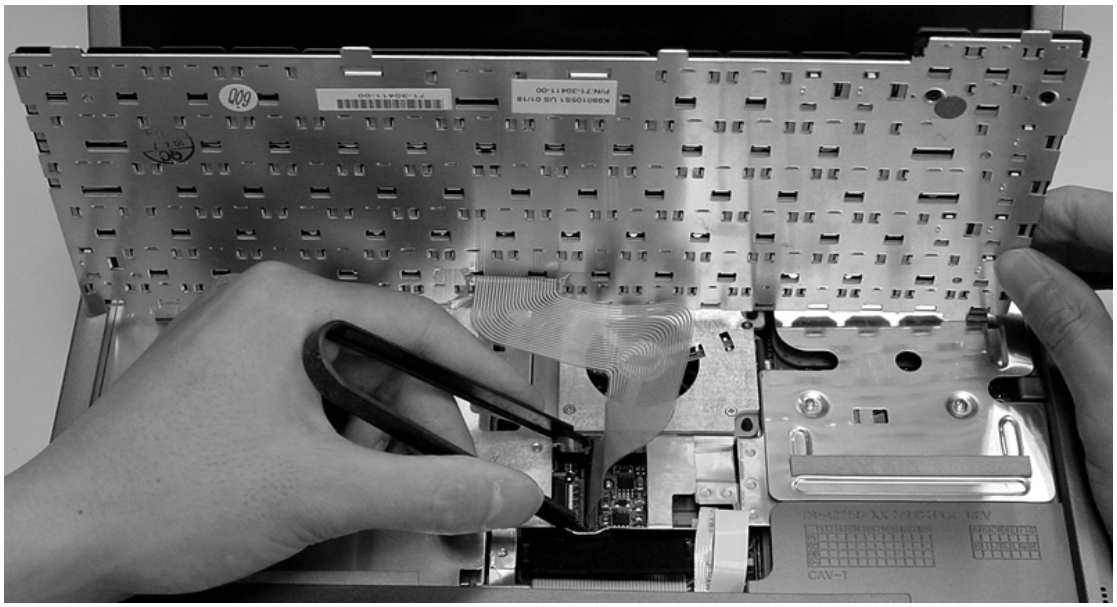


Figure 5-3 Remove keyboard

5.5.3 Removing the Palm Rest and Glide Pad

Follow the procedure below on how to remove them:

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

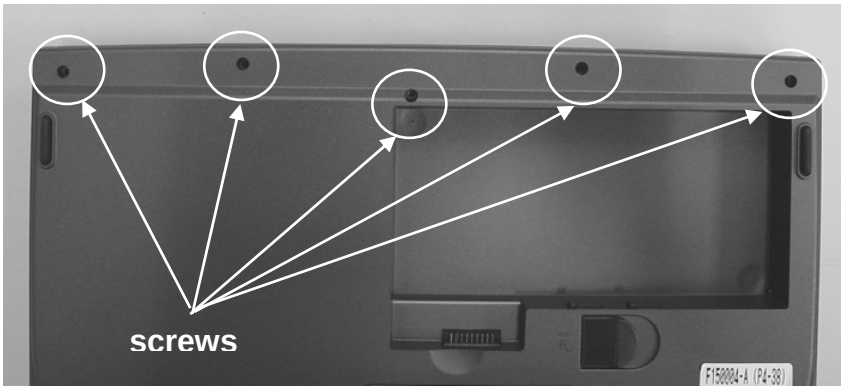


Figure 5-4 Remove Palm Reset

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

3. Slowly lift the cover case, and you will find two cables connected to the main board. One is from glidepad, and another one is from Audio DJ panel. Pull the glidepad cable and Audio DJ panel from the main board to separate the palm-rest cover from the system unit.

4. Underneath the palm-rest cover, you will see the glidepad module assembly. Remove the five screws on the glidepad converter board where the glidepad wire cable is connected.

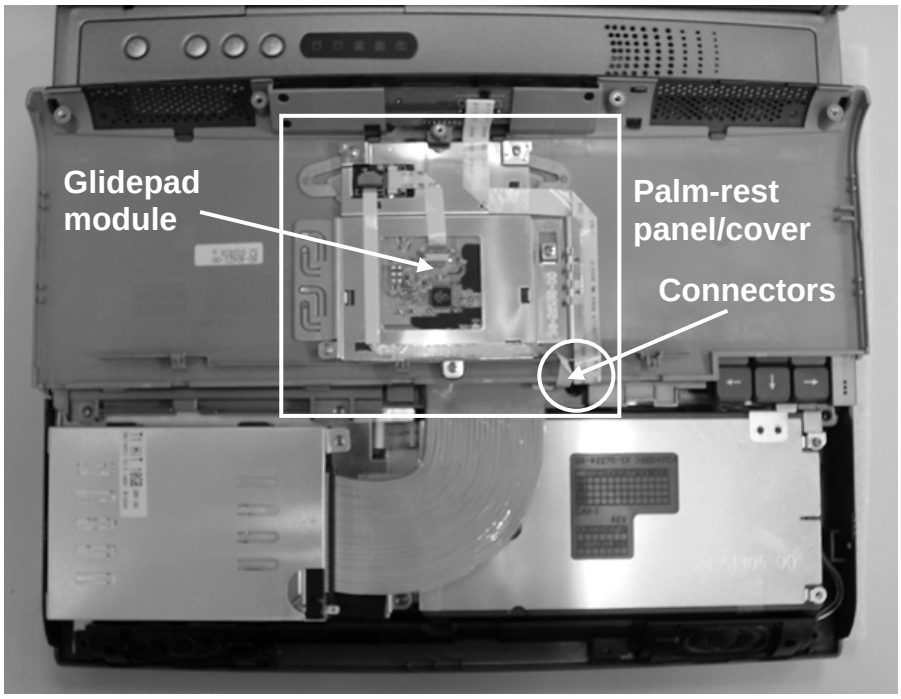


Figure 5-5 Removing Palm Rest / Glide Pad

5. When the converted board is removed, you can remove the select-button bracket casing covering the glidepad board.

6. Replace a new glidepad module and reverse the procedure to reassemble.

5.5.4 Removing the Internal Hard Disk Drive

The notebook provides a built-in hard disk for the primary IDE controller. The HDD is an industry standard 2.5” IDE disk drive with a maximum height of 9.5mm.

1. Find out the built-in hard disk secured with one screw at the upper right corner of the hard disk. Remove this screw and carefully pull the hard disk module from the connector.

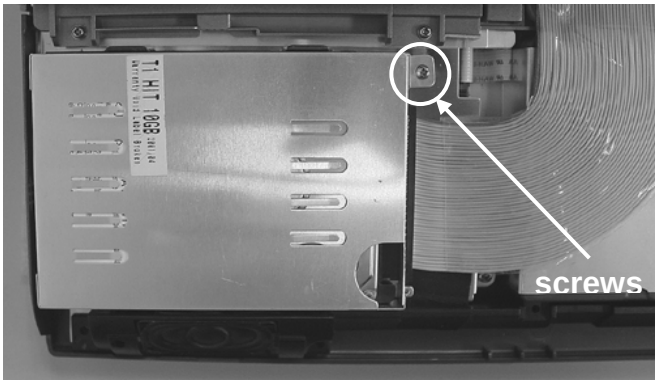


Figure 5-6 The disassembly of Hard Disk Drive

2. Remove four screws of frame HDD bracket plate. Two ones of them are at the same side, and others are at the other sides.

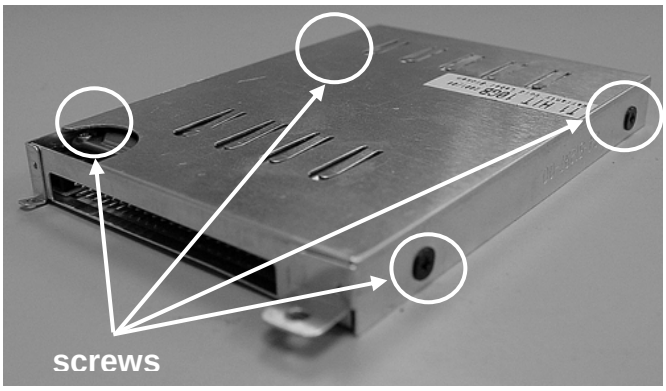


Figure 5-7 Screws Locations of the frame HDD bracket plate

5.5.5 Removing the LCD Panel

The procedure for removing the LCD Panel is as follows:

1. Follow the steps above in removing the keyboard cover.

2. You will find the LCD panel connector with a cover attached to the system unit using two screws. Remove the screws of the cover and pull out the FPC connector.

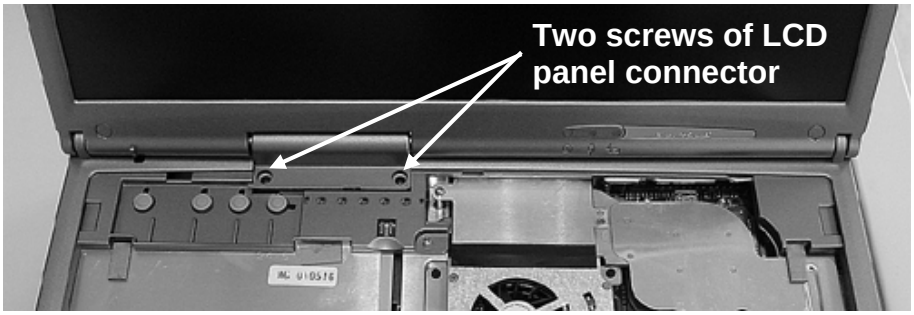


Figure 5-8 Two Screws of LCD Panel Connector

3. There are four screws securing both LCD hinges to the system unit. Two screws are at the rear side of notebook, and the other two screws are at the under side. Remove the screws to separate the LCD panel from the system unit.

Figure 5-9 Four Screws Securing the LCD Hinges

4. Slowly pullout the LCD panel from the system unit.

5. To remove the LCD panel, you need to disassemble the LCD bezel and LCD cover back. Remove six screws on the front bezel as shown in the figure below. Then, carefully separate the front bezel cover from the LCD assembly.

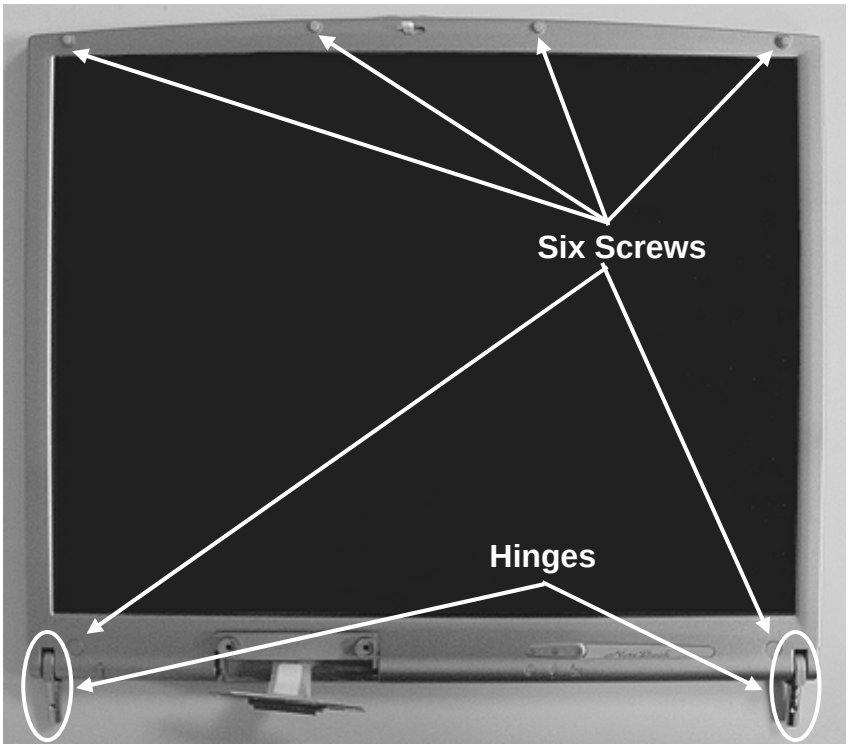


Figure 5-10 LCD Bezel Screw Locations

5.5.6 Removing the Heat Sink Plate

1. Release seven screws as shown in the picture below.

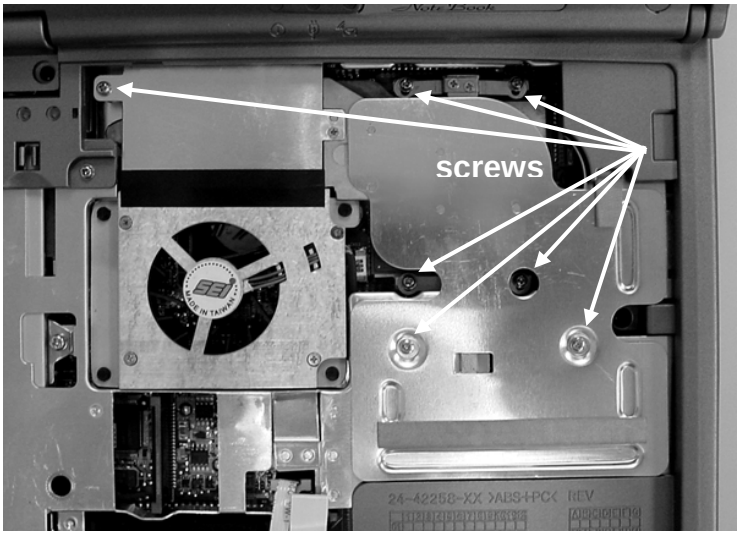


Figure 5-11 Remove heat sink plate

2. Remove heat sink plate by slightly lifting it up.

5.5.7 Removing the CPU

1. For doing this disassembly, you need first to do the disassembly for the keyboard cover, keyboard, and heat sink plate.

2. Use a flat screw driver and insert it into the CPU socket and tilt it towards in front of you to unlock CPU from the socket. It's recommended to use the protective tooling securing CPU against damage.

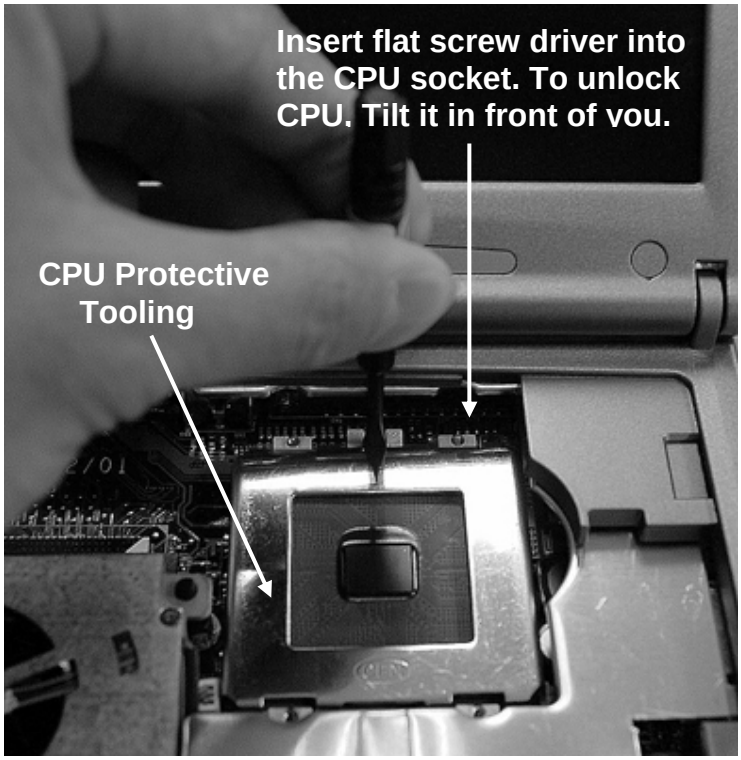


Figure 5-12 Remove CPU

5.5.8 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 need to disassemble keyboard first.
2. To remove the CD-ROM module, remove one screw securing the CD-ROM bracket and push out the drive from the connector.

3. Slowly slide the CD-ROM module out of the base unit.

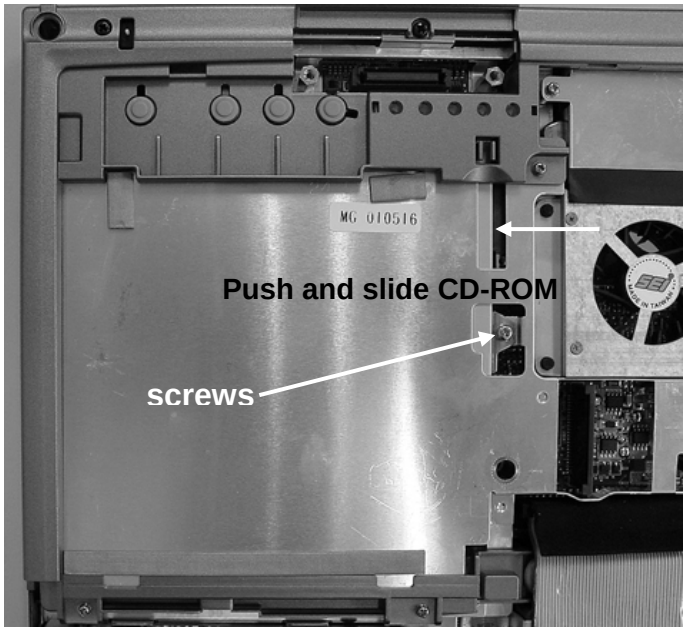


Figure 5-13 Remove CD-ROM Drive

4. To replace the CD-ROM, remove the metal bracket around it.

5.5.9 Removing the Top Cover and System Cover

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

1. Before removing the top case, you need first to disassemble keyboard cover, keyboard, palm rest, LCD panel, and HDD.

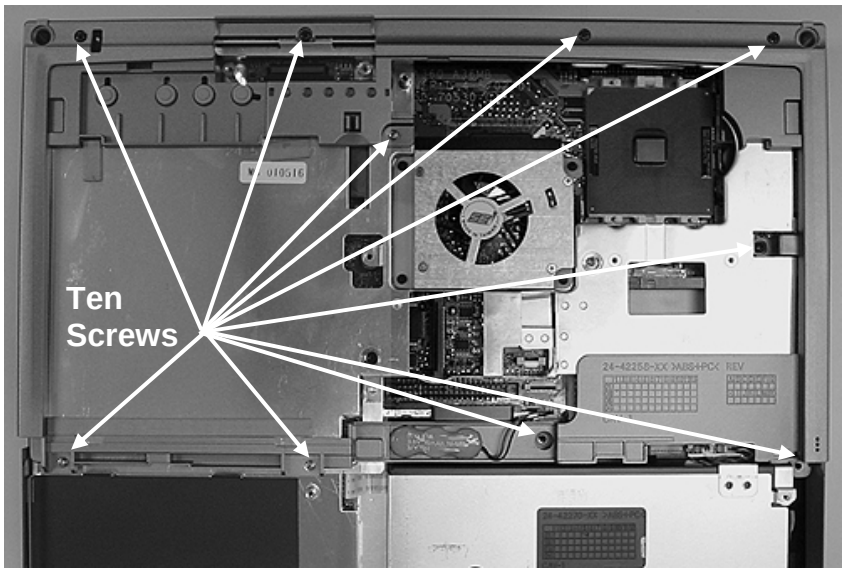


Figure 5-14 Top Cover Screw Locations

2. To remove the top cover, you need to remove several screws. There are ten screws found on the top cover as indicated on the figure previous page. Remove them all.

3. Slowly unsnap the top cover from the system cover. Release one cable connected from the RTC battery to the main board and the other cable connected from the internal microphone to the main board. Then pull out the top cover.

4. Then to remove the system cover, you need to remove several screws. There are five screws and two hex bolts found on the system cover as indicated on the figure below. Remove them all.

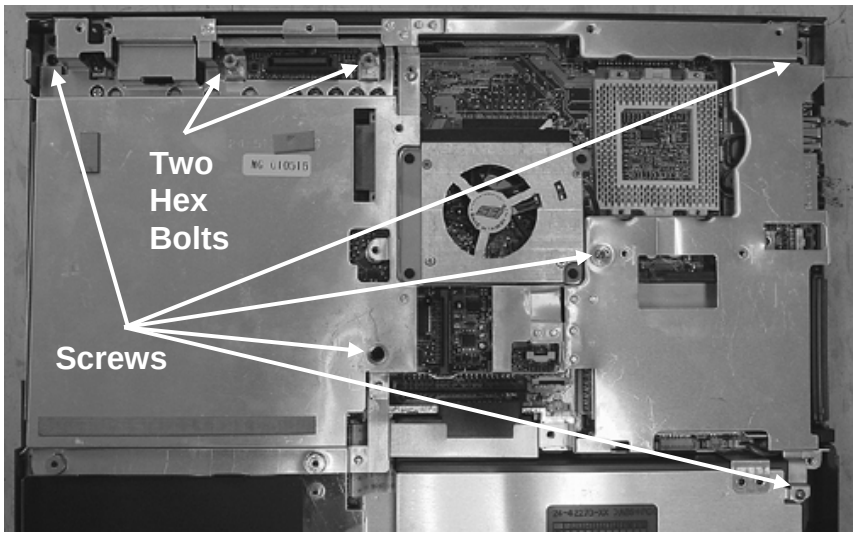


Figure 5-15 System Cover Screw Locations

5. Release one cable connected from the fan to the main board and notice a rubber foot of fan module. Then Slowly unsnap the system cover from the bottom case.

5.5.10 Removing the Internal Speakers

The internal speakers are connected on the front side of the base unit assembly. They are connected to the main board using wire cable. Follow the procedures below and illustration on how to remove the panel:

1. Before removing the internal speaker module, you need first to disassemble keyboard, palm rest, HDD, LCD panel, heat sink plate, CD-ROM, top cover, and system cover.

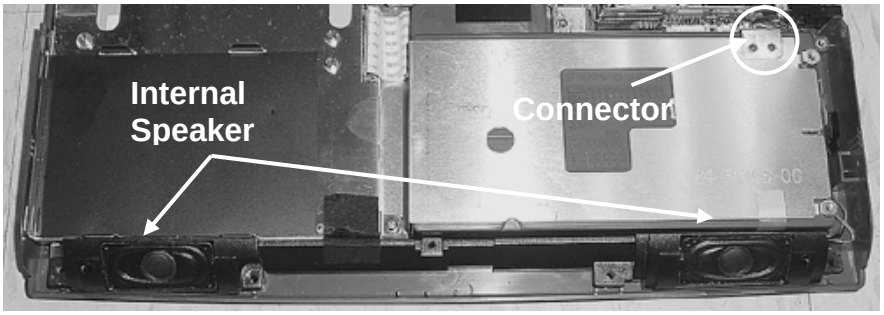


Figure 5-16 Internal Speaker Assembly

2. The speakers are located on the front side of the base unit. There are no screws attached to it, just unhook the panel from the speaker compartment case.

3. The speaker cable is directly connected to the main board. Pull the cable and take it out.

5.5.11 Removing the FDD Module

The procedures for removing and replacing the FDD module is as follows:

1. Before removing the internal speaker module, you need first to disassemble keyboard, palm rest, HDD, LCD panel, heat sink plate, CD-ROM, top cover, system cover, and internal speakers. The FDD cable is connected to main board. Detach the FDD cable also.
2. The FDD module is assembled to the lower left side of the base unit, just on bottom of the hard disk drive.

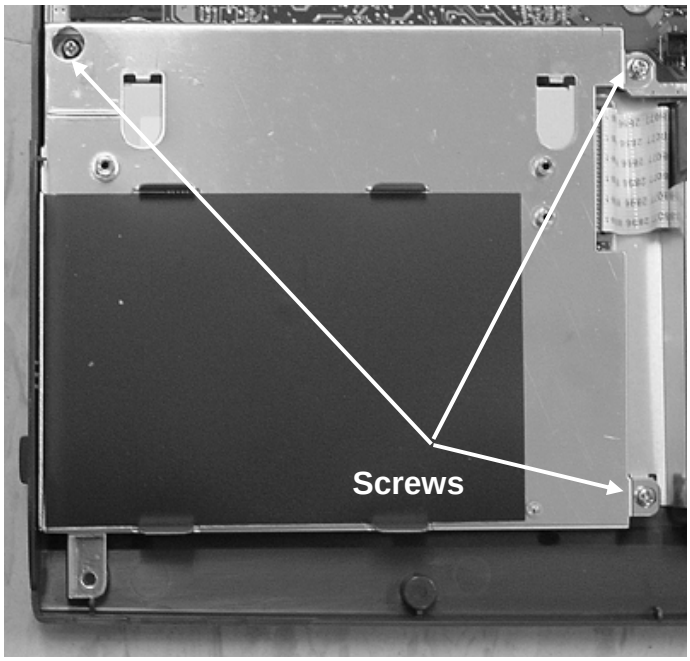


Figure 5-17 Remove Floppy Disk Drive

3. Remove three screws securing around the FDD metal plate.
4. Detach the FDD cable connected to the main board.
5. Slowly lift the entire FDD module and remove from the base unit.
6. To remove the metal plate in order to replace the FDD

5.5.12 Removing / Replacing the Motherboard

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

1. Before removing the motherboard, you need first to disassemble the all basis unit modules mentioned in the previous sections.

2. On the motherboard, there are ten hex bolts and two screws as showed below. Remove these hex bolts and screws.

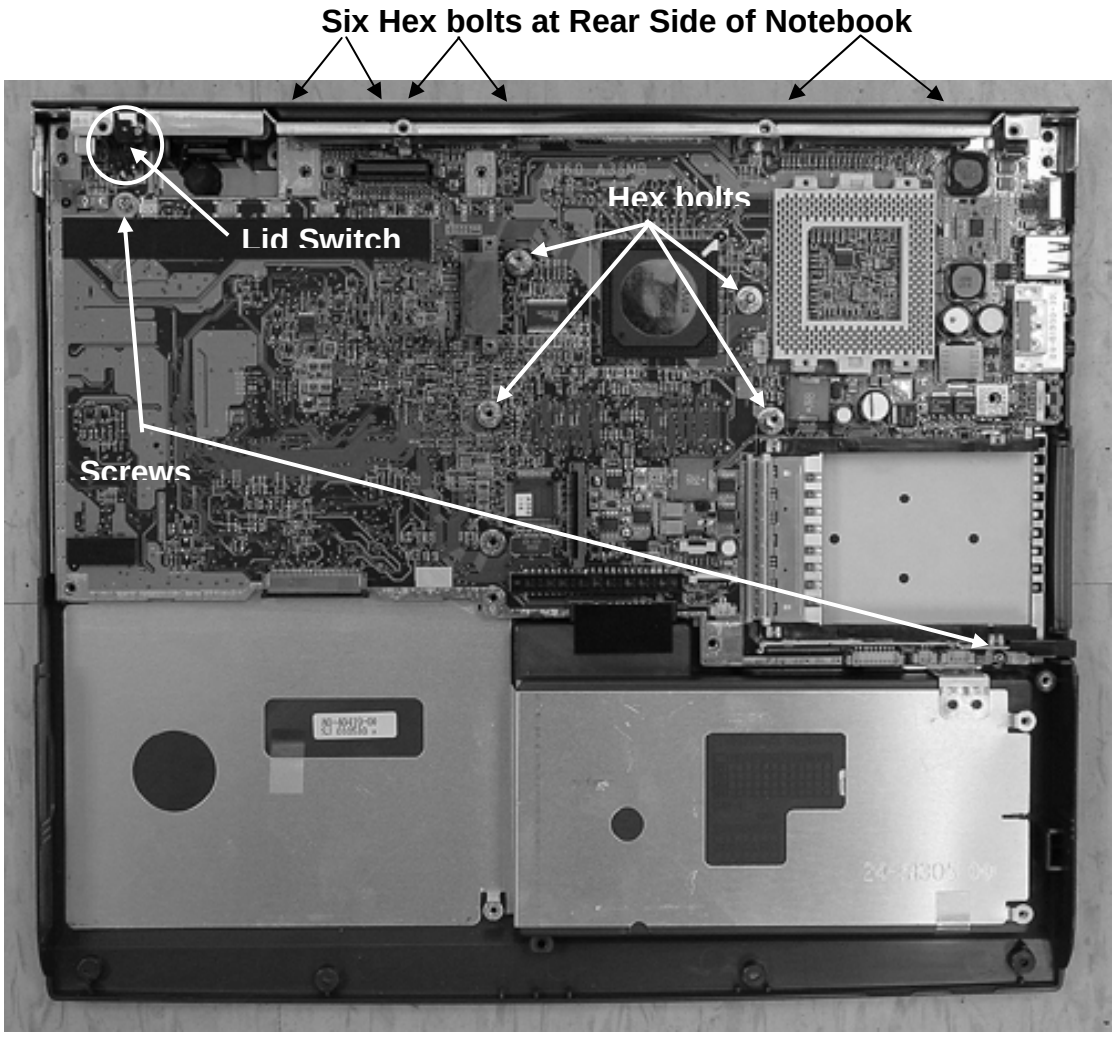


Figure 5-18 Motherboard Screws Location

3. Detach the lid switch cable connected to the main board

4. When all screws ,bolts, and lid switch cable are removed, slowly detached the main board from the base unit casing. Notice the close gap between the volume control knob and button case and may use the specific tooling to separate them more easily.

Chapter 6

Troubleshooting & Repair

6.1 Introduction

This chapter provides the most common problem encountered with the A360 notebook computer and some troubleshooting means. Some of the common problems are:

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

6.1.1 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?
- Does the battery installed been fully charged?
- Is the computer turn on and the POWER LED activated?
- Are all cables connected properly and securely?
- Are all needed device drivers been installed properly?
- Is the Power Management function enabled under OS Setup? Press any key to wake system up again.

6.2 System BIOS Related Problems

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

6.2.1 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 in understanding some of the notebook's problems that may be corrected by entering the BIOS SETUP program and checking the original values.

Table 6-1(a) POST Error Messages

Message	Possible Cause	Action
Diskette drive A failure	The drive failed or is missing. Floppy Disk Controller is disabled.	Check the drive to determine the problem. Enabled the FDD Controller.
Diskette read failure - press F1 to retry boot, F2 for SETUP utility	The diskette is either not formatted or is defective.	Replace the diskette with a bootable diskette and retry.
Display adapter failed, using alternate	The primary video adapter failed.	Check the primary video adapter.
Gate A20 failure	The keyboard controller is not accepting command, specifically, the enable and disable A20 command.	Check the keyboard controller and system board. Turn the power off, then back on again. If the problem persists contact qualified 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.
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.

Table 6-1(b) POST Error Messages

Message	Possible Cause	Action
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.
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.

6.2.2 Informational Messages

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

Table 6-2 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.

6.2.3 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

Table 6-3 (a) 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.
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.

Table 6-3 (b) BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
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.
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.

Table 6-3 (c) BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
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	Color monitor (40-column) operable.	No specific test is performed - just indicates that the BIOS believes a color monitor is installed and is operating. The mode has been set to 40-column as selected by the user in CMOS RAM.
none	33h	Color monitor (80-column) operable.	No specific test is performed - just indicates that the BIOS believes a color monitor is installed and is operating. The mode has been set to 80-column as selected by the user in CMOS RAM.
4-2-1	34h	Timer-tick interrupt test in progress or failure.	All interrupts expect the timer-tick interrupt are masked off at the interrupt controllers. If a timer-tick interrupt does not occur during a specific time period, an error message is displayed on the screen. The system does not halt.
4-2-2	35h	Shutdown test in progress or failure.	A return address is stored in 40:67h and the processor is reset via the keyboard controller. If a timer tick occurs during this time period, an error message is displayed on the screen. Other failures are hard to detect. If possible, the BIOS will continue with POST, skipping the memory tests.

Table 6-3 (d) BIOS Beep Codes

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

6.2.4 Run-time Error Messages

Table 6-4 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.

6.3 Quick Troubleshooting

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

Table 6-5 (a) Quick Troubleshooting

Problem or Symptoms	Corrective Actions
No power (Power LED not on)	1. 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. 2. If using the battery as main power source, check if the battery pack is of the right type, charged and is inserted correctly. 3. Check the internal Battery board of the notebook if it is inserted into the main board connector properly. Otherwise, replace the Battery board.
Power LED is on but no display and system does not turn on	1. Press power button for 4 seconds to reset hardware settings. Check if Power LED turns off. 2. Check memory module if it is inserted properly. Try to check also the module on the internal slot. 3. Reset CMOS RTC. 4. Replace memory module, CPU module, or Battery board.
Display on the LCD is unreadable	1. Adjust the brightness display controls. 2. Check if installed VGA driver is correct and resolution is set according to LCD size and type. 3. Check if the LCD cables are inserted properly. Check also connections inside the LCD panel. 4. Check LCD inverter board inside LCD panel if faulty. 5. Check the North Bridge chip on the main board if there is any cold or loosed soldering. 6. Replace the main board.
LCD screen does not show display	1. Check the LED Status Bar if Power Saving mode is activated. Press any key or press the power button to resume operation and display. 2. Check if the display output is switched to the external monitor. 3. Check if there is power. 4. Check if LCD cables are disconnected or loosed. 5. Replace LCD Inverter board found inside the LCD Panel.
Battery Power does not last or does not read properly under Win98 / Win Me	1. Make sure that the power management options under OS Setup are enabled and set properly. 2. Recharge the battery pack for at 3 least hours before using again. 3. Discharge and recharge the battery twice (Battery Low-Low Suspend Off) to allow more accurate reading of battery meter under Windows 98 or Windows Me. 4. Replace the battery pack.

Table 6-5 (b) Quick Troubleshooting

Problem or Symptoms	Corrective Actions
System halts during boot sequence	1. Check condition of selected boot-load device (diskette or hard disk) for bad boot track or incorrect OS files. 2. Try booting from a new bootable diskette and recopy or repartition hard disk. 3. Check for any BIOS error messages on the display. 4. Replace main board.
I/O processing malfunctions	1. Check the connections of all internal devices. 2. Replace main board.
Diskette drive does not work	1. Check if FDD option is DISABLED under BIOS Setup program. 2. Check if floppy drive cable is connected properly. 3. Check diskette type if correct and not faulty. 4. Replace diskette drive. 5. Replace main board.
Hard disk drive malfunction	1. Check if hard disk drive is set properly on BIOS SETUP. 2. Check cables and connections. 3. Check if disk drive is good. Replace the drive. 4. Replace the main board.
CD-ROM drive malfunction	1. Check if drive is set properly on BIOS Setup. 2. Check if device driver is installed properly. Do not use other CD-ROM driver. 3. Check cables and connections. 4. Replace drive or main board.
Memory malfunction	1. Check if the memory module is inserted properly. Try to insert it also to the other slot. 2. Replace the memory module. 3. Replace the main board.
External keyboard or PS/2 mouse doesn't work	1. 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. 2. Check PS/2 mouse driver if it is installed properly. 3. Replace the keyboard or mouse. 4. Replace the main board.
PCMCIA card does not work	1. Check if the PCMCIA card is inserted properly and all cables and connections are set. 2. Check the PCMCIA card driver installation for any IRQ or IO address conflict. Try to disable the COM2 port (SIR) inside the BIOS Setup menu to free up unused IRQ. 3. If PC card is not detected, insert it to the other PCMCIA slot. Otherwise, replace PC card. 4. Contact the PC card manufacturer for support. 5. Replace the main board.

Table 6-5 (c) Quick Troubleshooting

Problem or Symptoms	Corrective Actions
Glide pad does not work	1. Check if PS/2 mouse driver is properly installed. Remove any external PS/2 mouse. 2. Check the glide pad cable inside the system if it is inserted properly. 3. Replace the glide pad module. 4. Check the keyboard controller chip for any cold or loosed soldering. 5. Replace the main board.
Serial device does not work	1. Check if Serial Port is set to ENABLED under BIOS Setup program (Advanced menu). 2. Check if serial device is connected properly. 3. If using serial mouse, check if internal glide pad is disabled under BIOS Setup. On Windows 98 or Me, check if it detects the serial mouse in System Device Manager under the Control Panel. 4. Check if mouse driver is installed properly. 5. Replace serial device. 6. Check the South Bridge chip on the main board for any cold or loosed soldering. 7. Replace the main board.
Parallel device does not work	1. Check if Printer is set to ENABLED under BIOS Setup program (Advanced menu). 2. Check if all connections are properly set. 3. Check if external device is turned on. 4. Check if Printer Mode is set properly. 5. Check the South Bridge chip on the main board for any cold or loosed soldering. 6. Replace the main board.
USB Port does not work	1. Check if USB port option under BIOS Setup is ENABLED. 2. Check if USB device connection is OK. Unplug and re-plug the device. 3. Check if the USB port driver and the USB device driver are installed. 4. Replace USB device or contact USB device manufacturer for support. 5. Replace main board.
Audio components does not work	1. Check external connections if OK and volume mixer is set properly. 2. Check audio source (CD, tape, etc.) if faulty. 3. Check if audio driver is installed. 4. Check internal connections for speaker and microphone if not working. 5. Check audio board, cables and connections. 6. Replace main board

6.4 Component-Level Troubleshooting

This section provides an easy to follow flowcharts for performing component-level troubleshooting on the A550 notebook.

6.4.1 General Overview

The component-level troubleshooting is broken down as follows:

Troubleshooting Item	Figure
Starting Check	Figure 6-1
Memory Interface Check	Figure 6-2
CRT Interface Check	Figure 6-3
FDD Interface Check	Figure 6-4
HDD Interface Check	Figure 6-5
Internal Keyboard Interface Check	Figure 6-6
Glide Pad Interface Check	Figure 6-7
CD-ROM Interface Check	Figure 6-8
Battery Board Interface Check	Figure 6-9
Serial Port Interface Check	Figure 6-10
Ext. Keyboard Interface Check	Figure 6-11
PS/2 Mouse Interface Check	Figure 6-12
Printer Port Interface Check	Figure 6-13
Audio Port Interface Check	Figure 6-14
PCMCIA Interface Check	Figure 6-15
USB Port Interface Check	Figure 6-16
DC-DC Check	Figure 6-17
LCD Panel Interface Check	Figure 6-18
Suspend Function Check	Figure 6-19
LED Indicator Function Check	Figure 6-20
Cover Switch Function Check	Figure 6-21
Internal Modem Interface Check	Figure 6-22

6.4.2 Starting Check

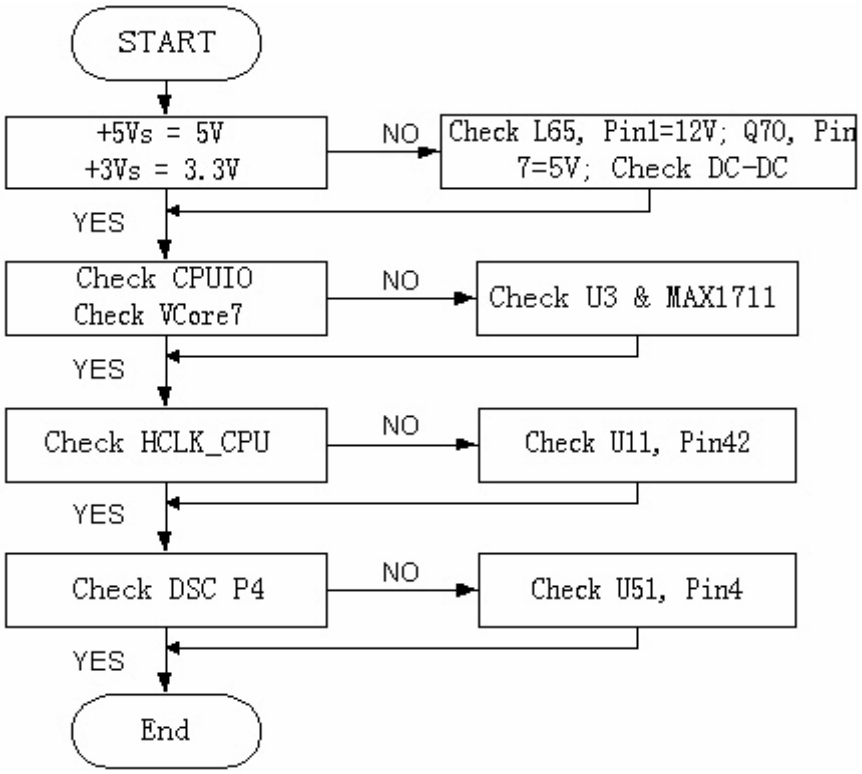


Figure 6-1 Starting Check

6.4.3 Memory Interface Check

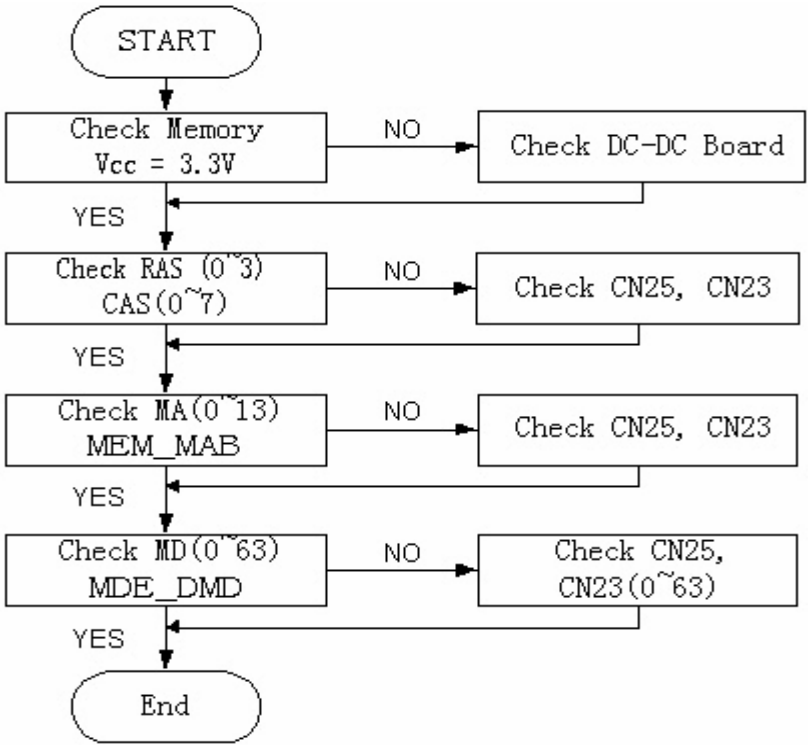


Figure 6-2 Memory Interface Check

6.4.4 CRT Interface Check

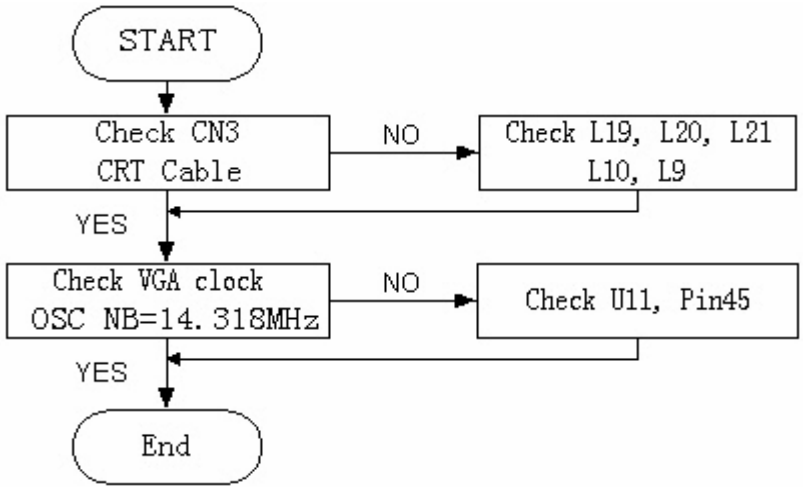


Figure 6-3 CRT Interface Check

6.4.5 FDD Interface Check

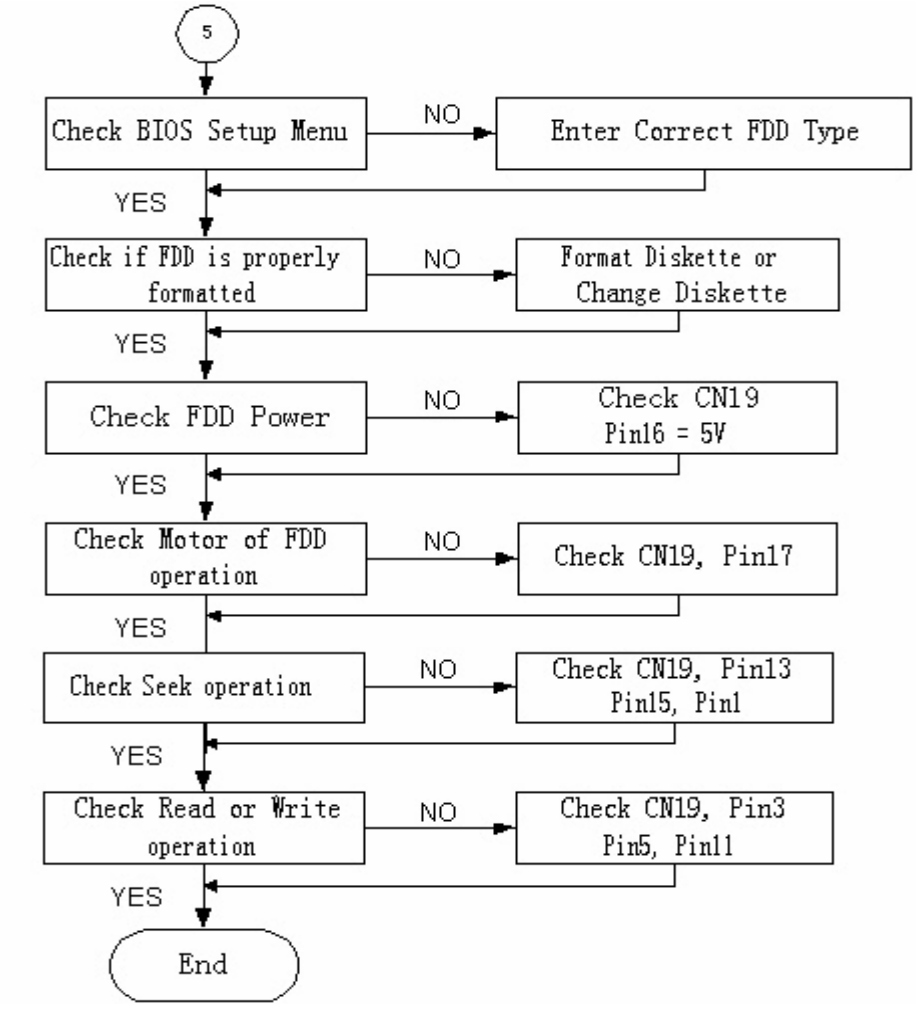


Figure 6-4 FDD Interface Check

6.4.6 HDD Interface Check

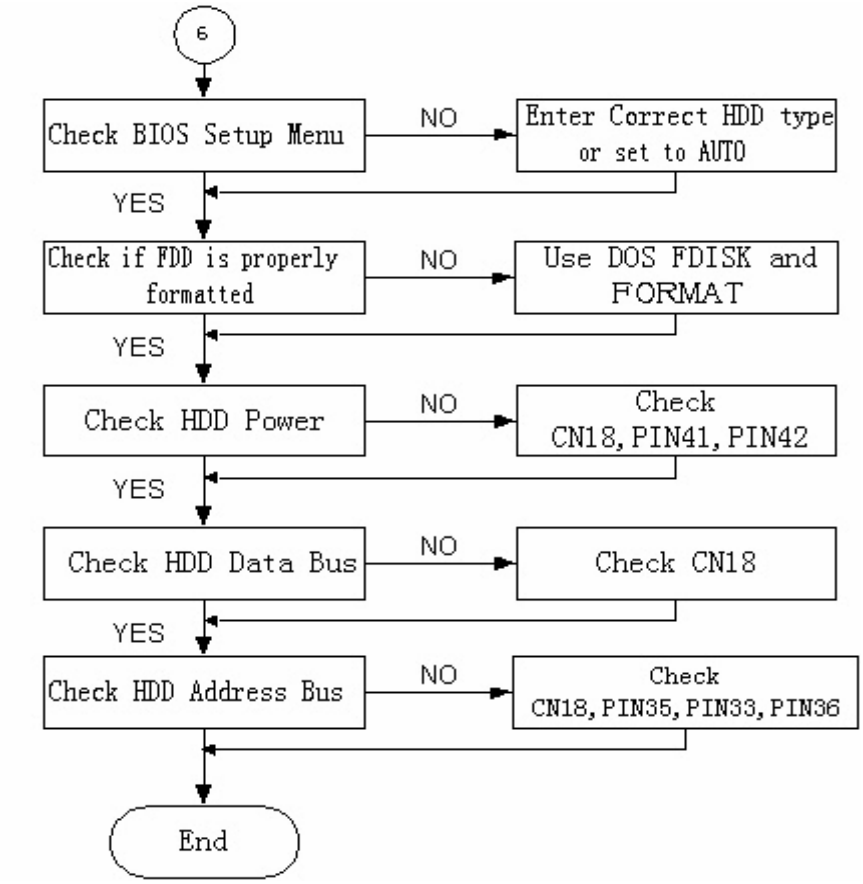


Figure 6-5 HDD Interface Check

6.4.7 Internal Keyboard Check

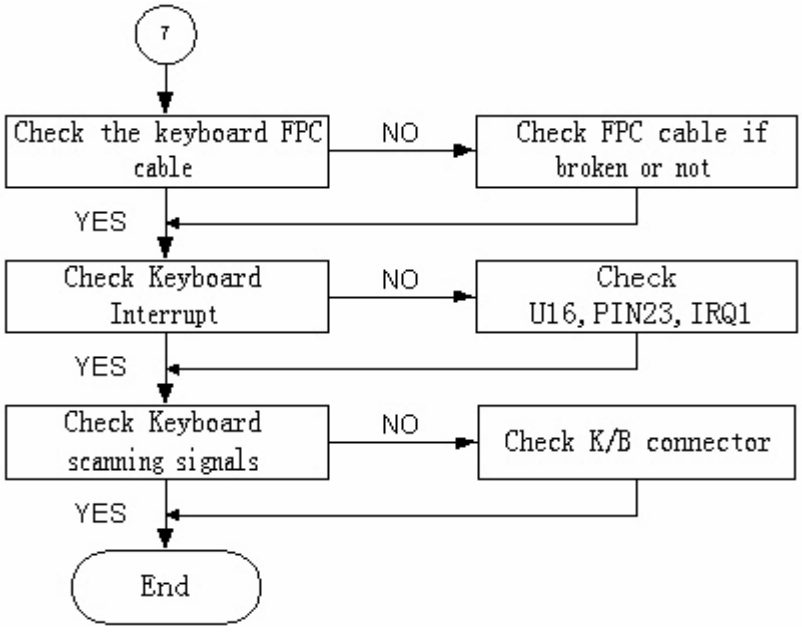


Figure 6-6 Internal Keyboard Check

6.4.8 Glidepad Interface Check

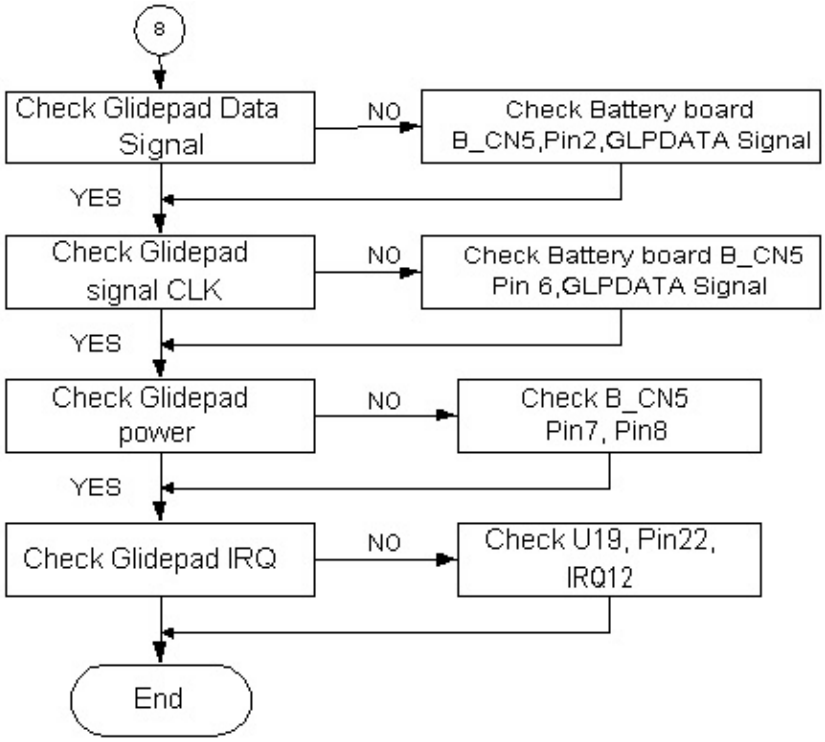


Figure 6-7 Glidepad Interface Check

6.4.9 CD-ROM Interface Check

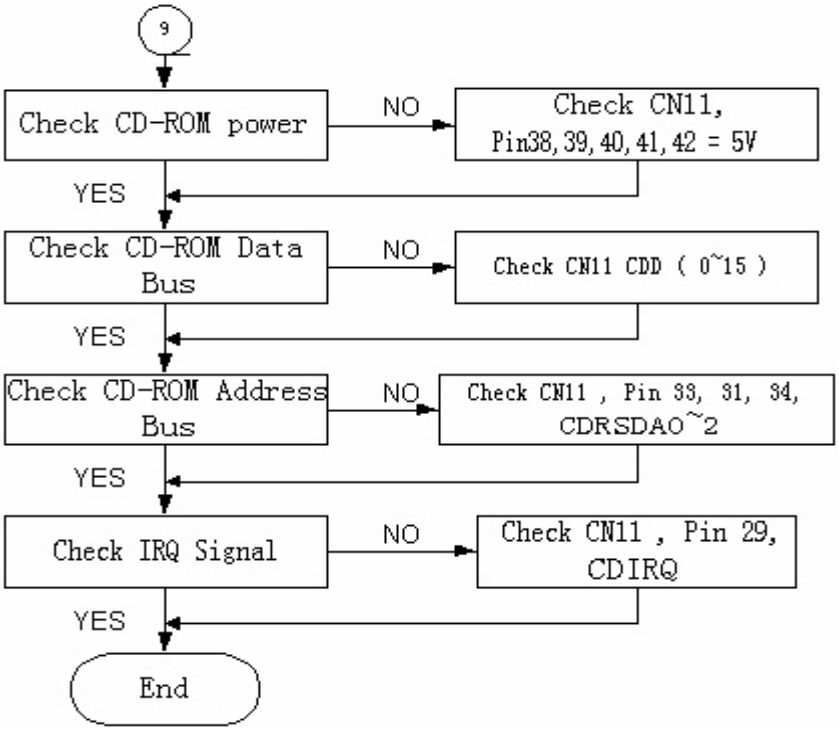


Figure 6-8 CD-ROM Interface Check

6.4.10 Charger Board Interface Check

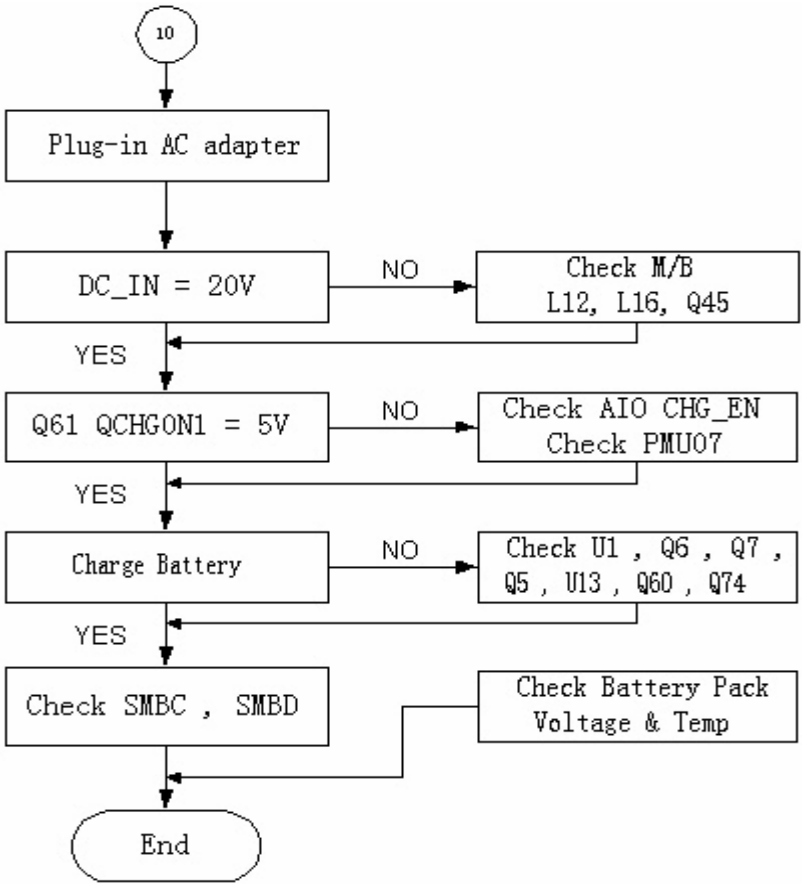


Figure 6-9 Charger Board Interface Check

6.4.11 Serial Port Interface Check

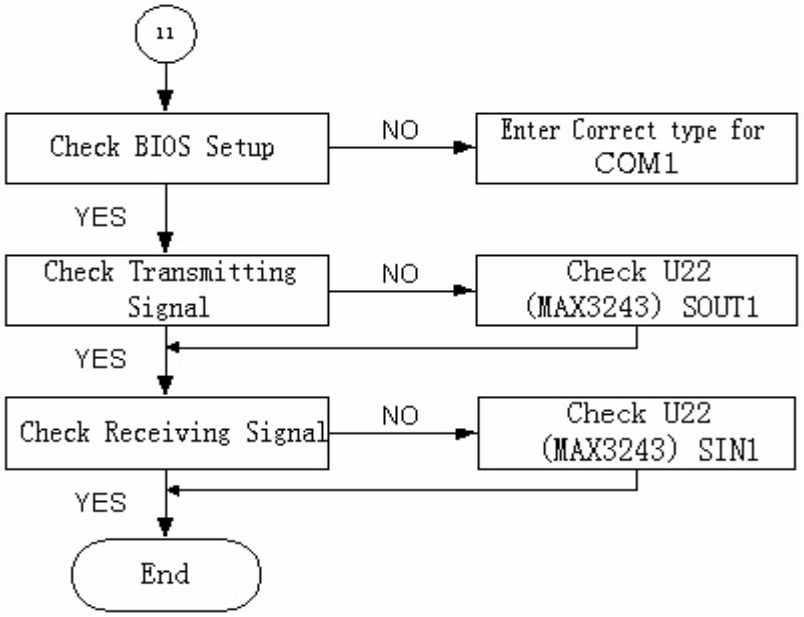


Figure 6-10 Serial Port Interface Check

6.4.12 External Keyboard Check

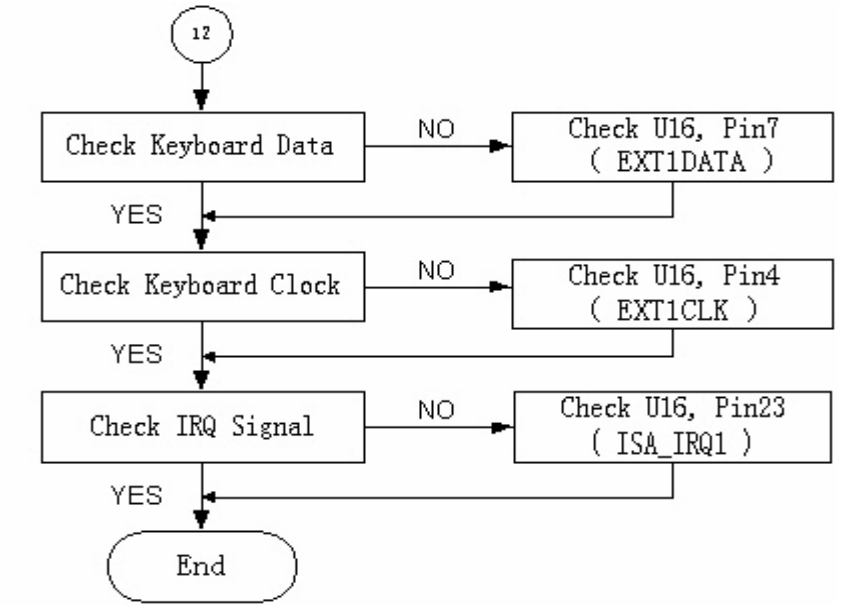


Figure 6-11 Internal Keyboard Check

6.4.13 PS/2 Mouse Interface Check

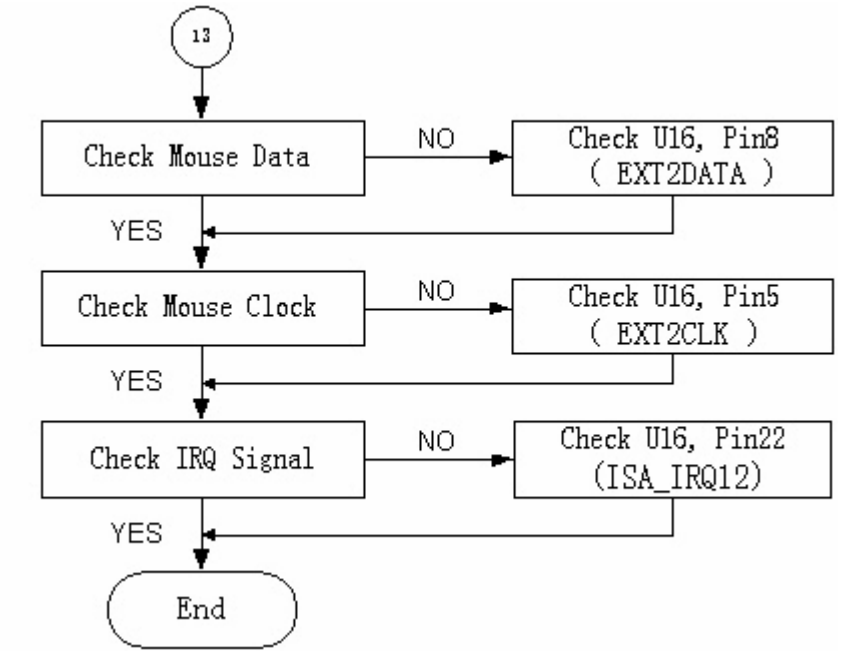


Figure 6-12 Internal Keyboard Check

6.4.14 Printer Port Interface Check

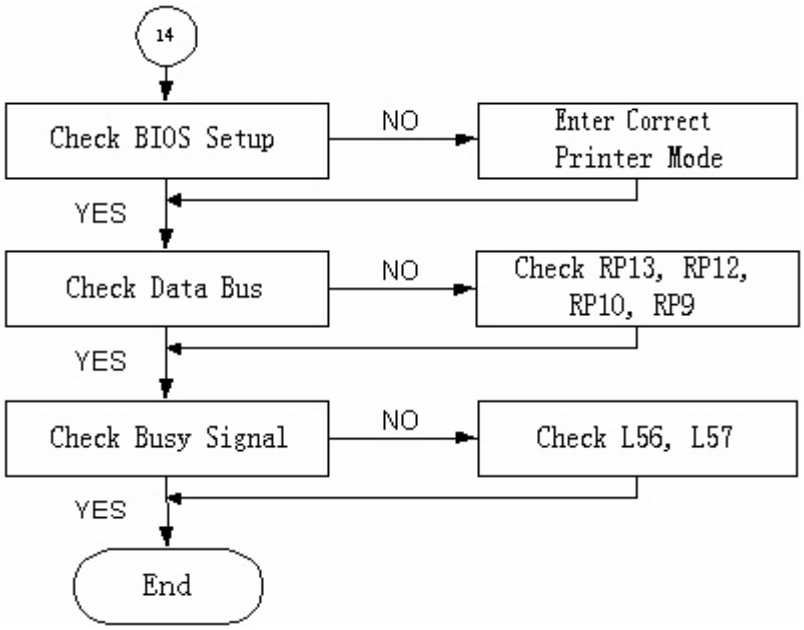


Figure 6-13 Printer Port Interface Check

6.4.15 Audio Port Interface Check

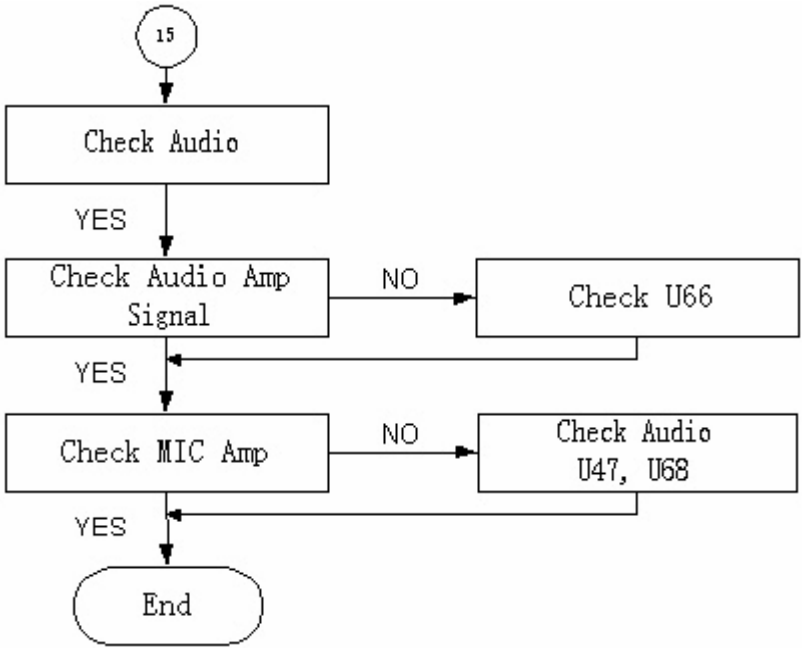


Figure 6-14 Audio Port Interface Check

6.4.16 PCMCIA Interface Check

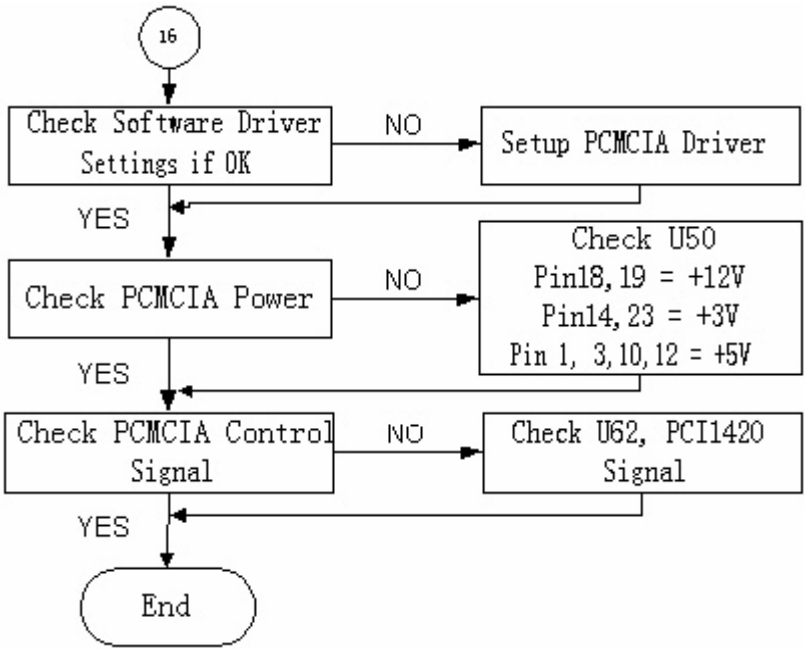


Figure 6-15 PCMCIA Interface Check

6.4.17 USB Port Interface Check

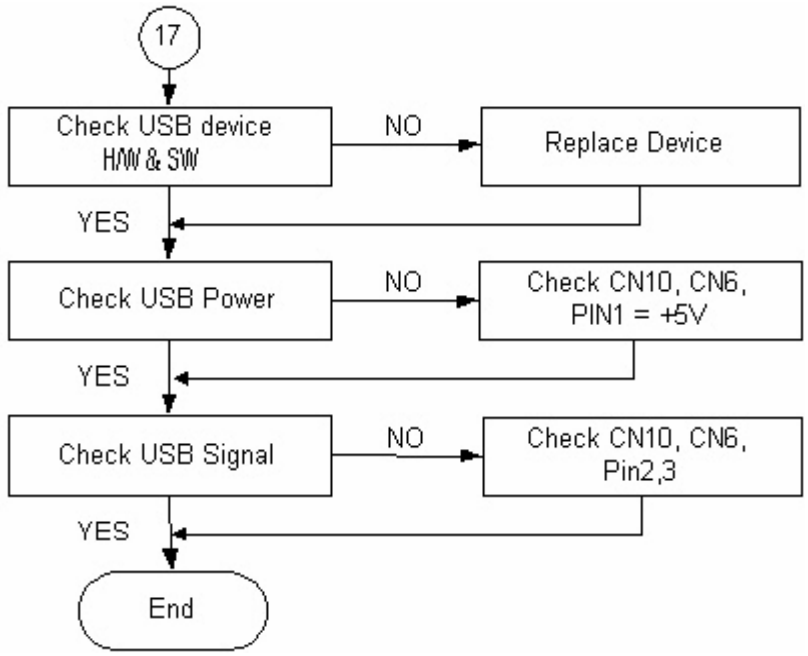


Figure 6-16 USB Port Interface Check

6.4.18 DC-DC Power Check

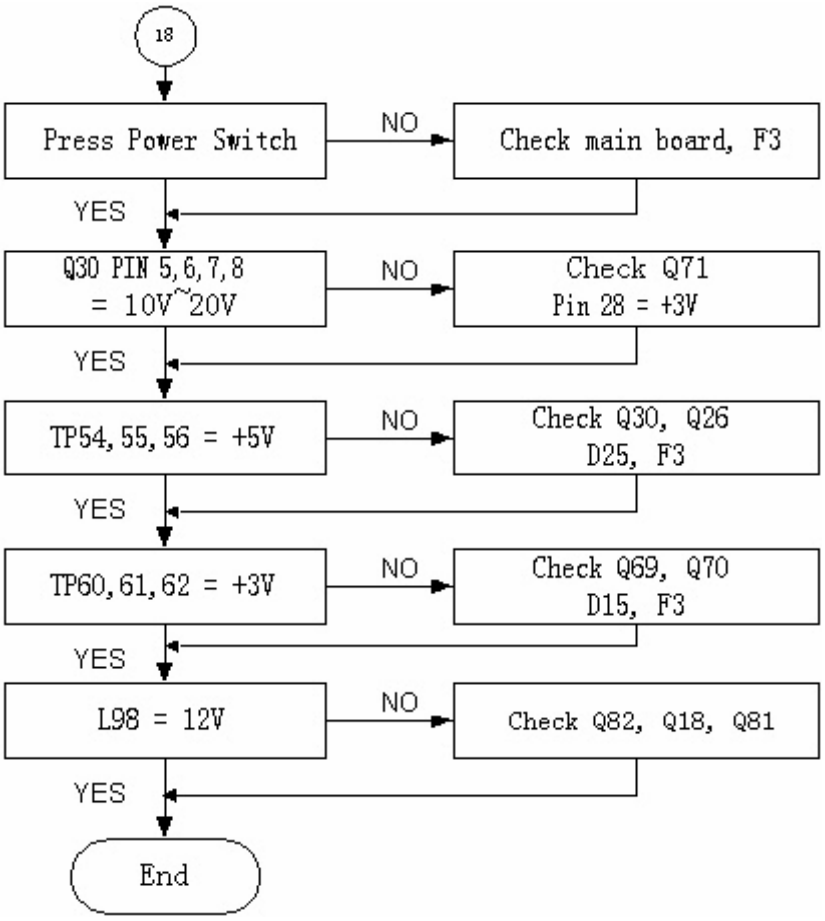


Figure 6-17 DC-DC Power Check

6.4.19 LCD Panel Interface Check

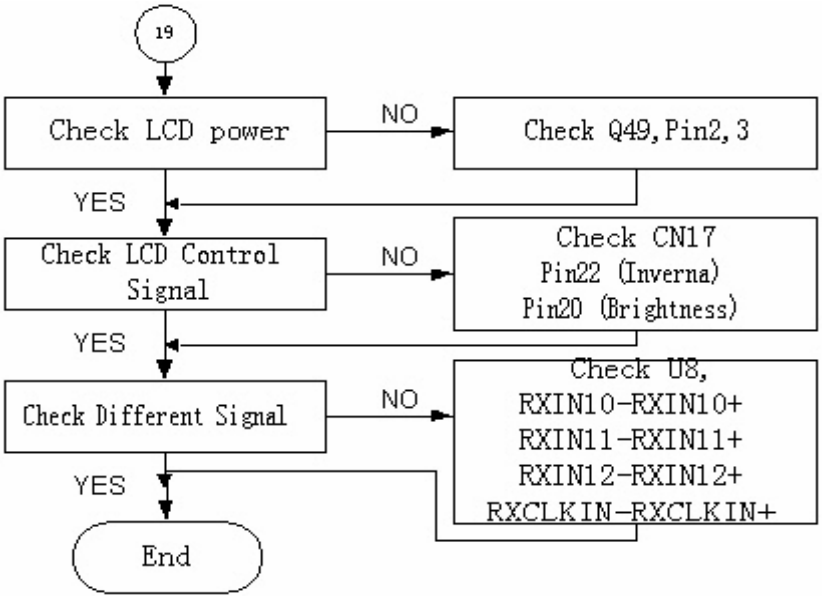


Figure 6-18 LCD Panel Interface Check

6.4.20 Suspend Function Check

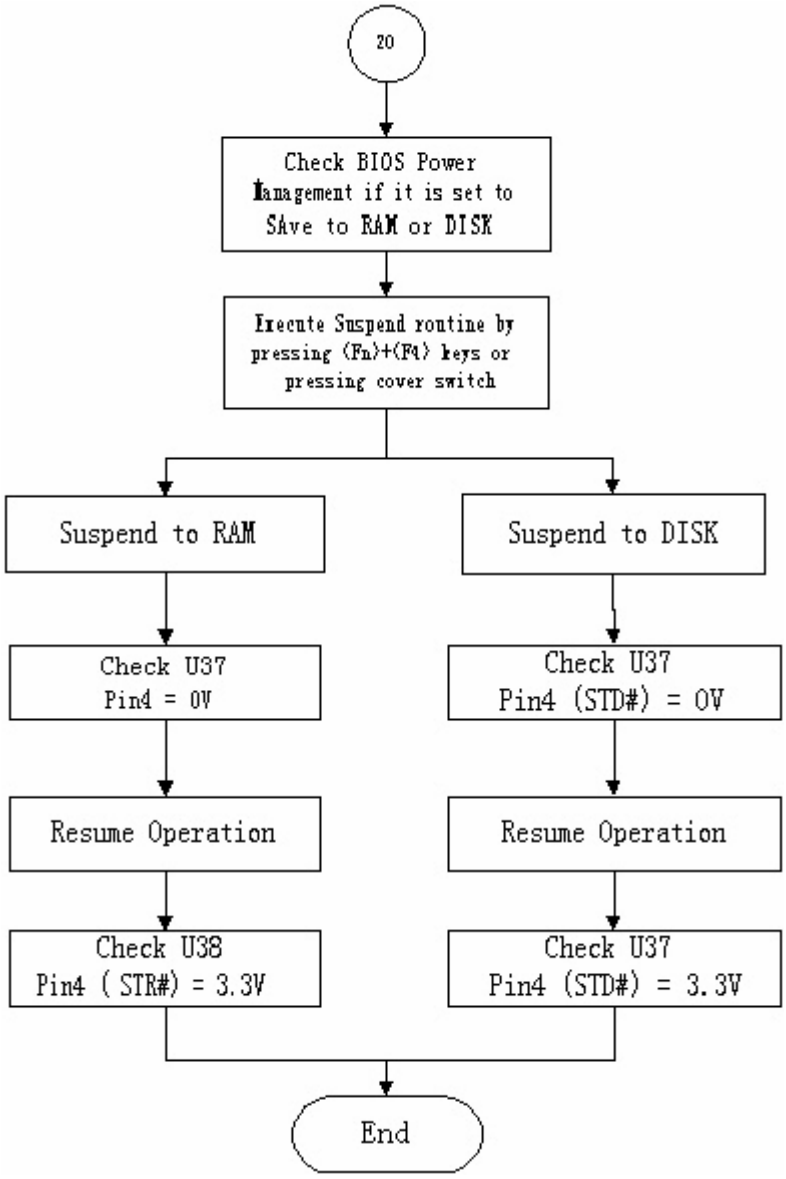


Figure 6-19 Suspend Function Check

6.4.21 LED Indicator Function Check

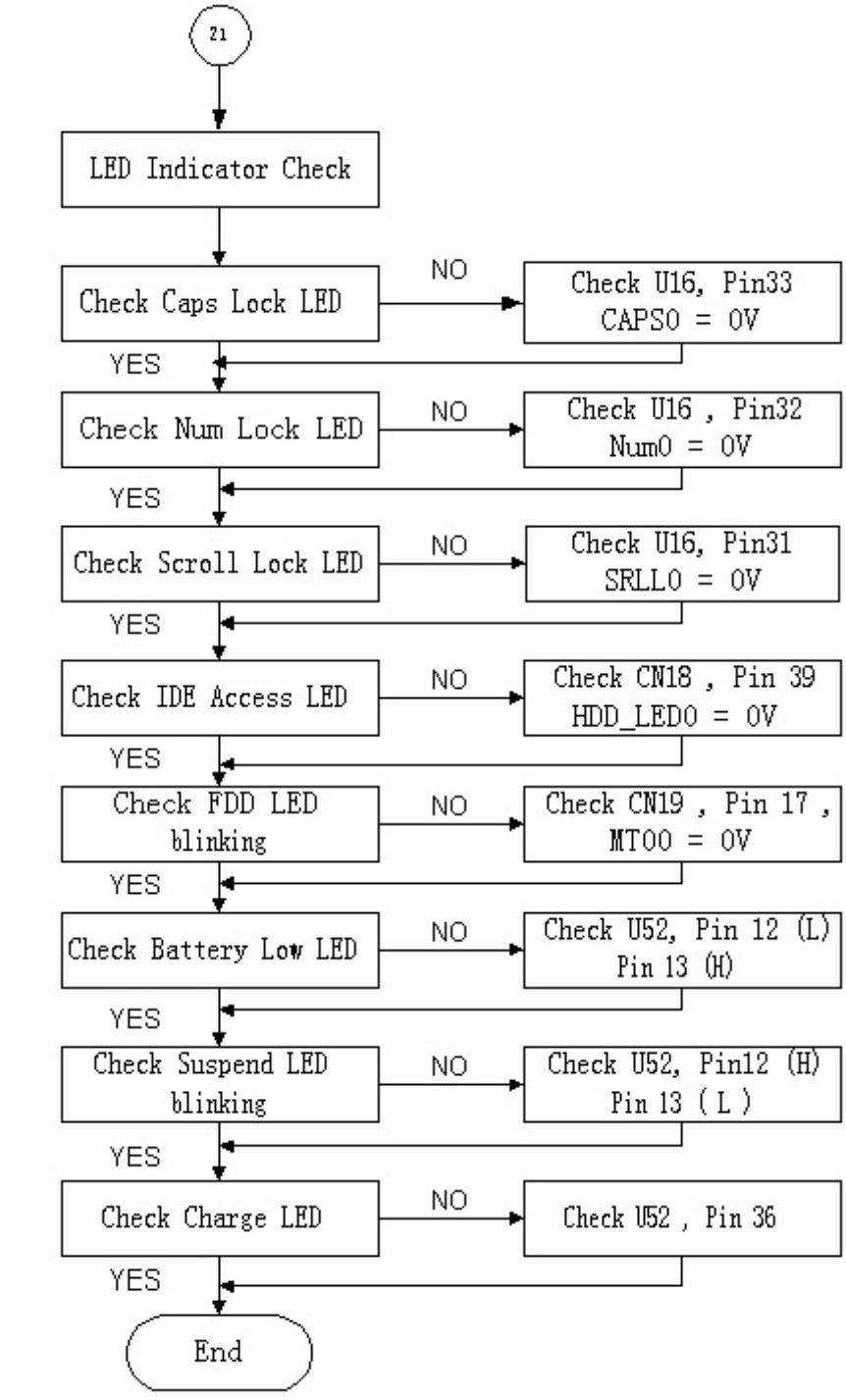


Figure 6-20 Suspend Function Check

6.4.22 Cover Switch Function Check

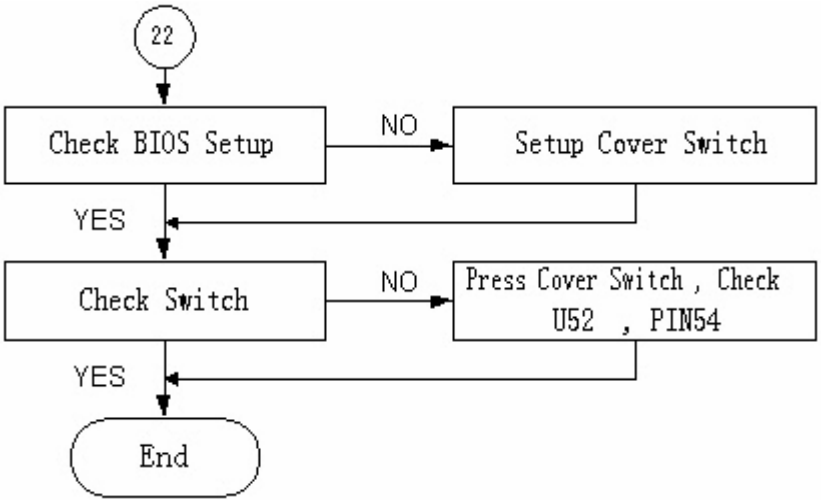


Figure 6-21 Cover Switch Function Check

6.4.23 Internal Modem or LAN Port Check

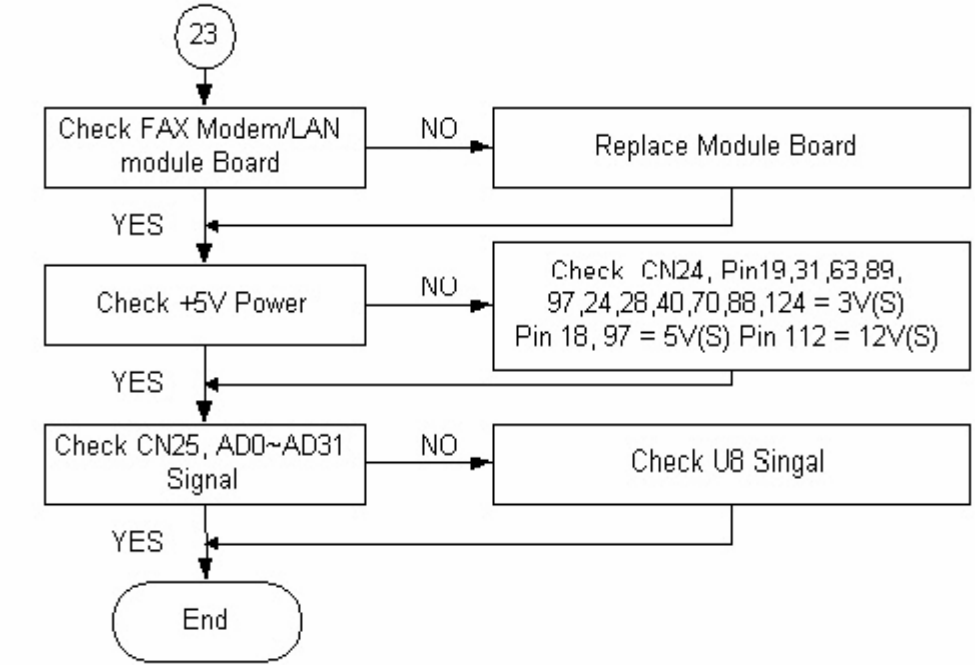


Figure 6-22 Internal Fax/Modem Port Check

6.4.24 Internal Combo Modem / LAN Port Check

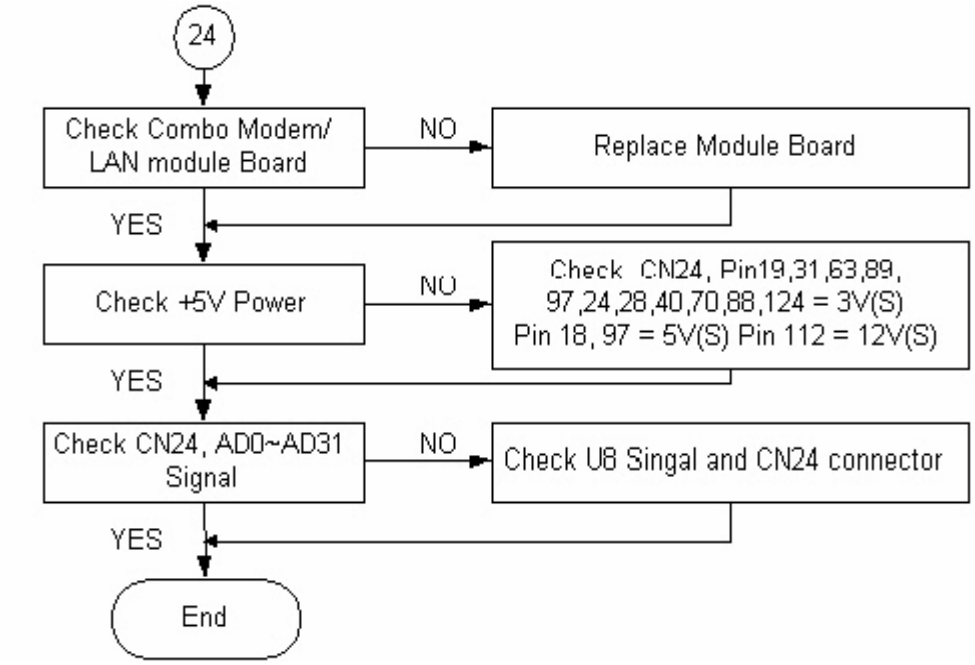


Figure 6-23 Internal Combo Modem / LAN Port Check

6.4.25 SIR Interface Check

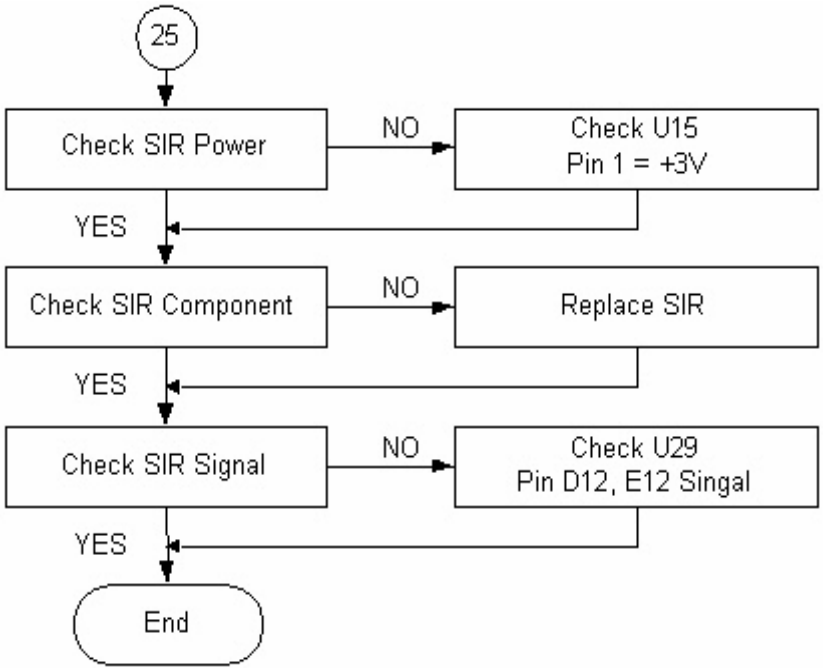


Figure 6-24 SIR Interface Check

6.4.26 IEEE1394 Interface Check

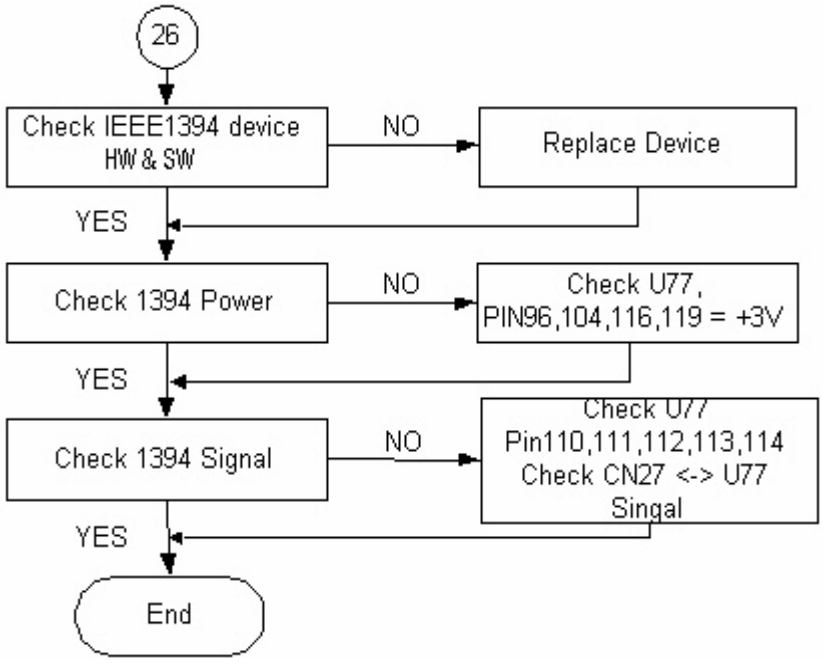


Figure 6-25 IEEE1394 Interface Check

6.4.27 TV-Out Interface Check

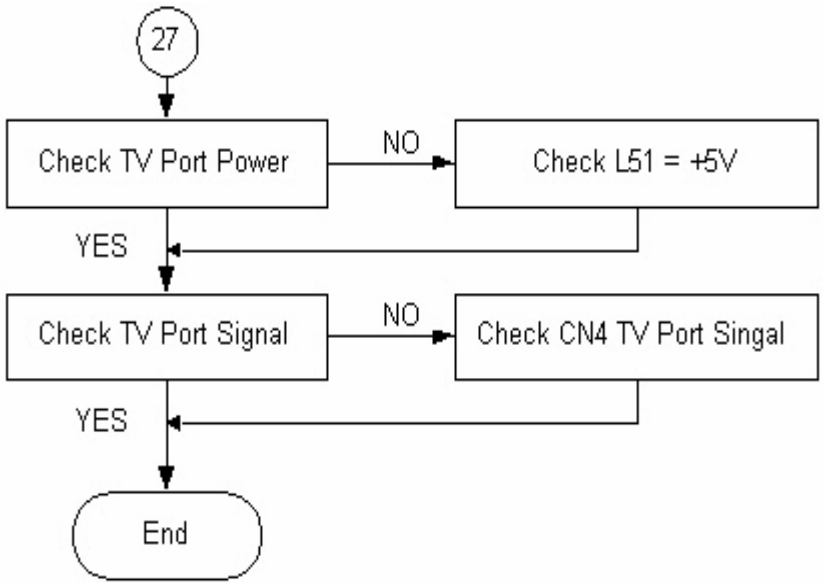


Figure 6-26 TV-Out Interface Check

Appendix

A

Notebook Specification

This appendix provides the technical specification of the A360 notebook:

A.1 System Specification

MICRO PROCESSOR	
CPU Type	Pentium-III / Celeron Processor
Clock Speed and Voltage	• Pentium-III CPU at 933 MHz, 1/1.1GHz • Celeron CPU at 766/800/850/900/950 MHz
External L2 Cache	256 KB (Pentium-III) / 128KB (Celeron)
CPU Package	FC-PGA
SYSTEM LOGIC CHIPSET	
Chipset Type	• VIA Twister - North Bridge • VI82C686A - South Bridge
Thermal controller	Integrated in South Bridge
SYSTEM CLOCK	
System Clock	SMC FDC37869
Package	SSOP
Clock Summary	• CPUCLK = 66/100 /133 MHz • PCICLK = 30/33 MHz • South Bridge / VGA = 14.318 MHz • North Bridge = 48 MHz
Supply Current	Icc Max = 90mA (CPU = 66.6 MHz, PCI = 33 MHz)
MEMORY MODULE	
Package	SDRAM PC100/133 – 32 / 64 / 128 / 256 MB SO-DIMM
Operation Mode	Synchronous Dynamic Mode
Refresh	Auto and Self Refresh
Slow Refresh	4096 refresh cycle / 64ms
Supply Voltage	3.3V
Configuration	• Standard SODIMM DRAM Module – 2 pieces • 640KB Conventional RAM • 128KB BIOS Shadow • 256KB reserved for Power Management usage • 7168KB Extended RAM • Upgradable to max. 512MB using 256 MB SODIMM x 2
Parity Support	No parity bit for all memory

BIOS ROM	
ROM Type	512K x 8 CMOS Flash Memory –28SF040A-90/120 (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 • 10,000 erase/program cycles minimum
Program Voltage	5V
Supply Current	• Icc Typ. = 20mA (active read) • Icc Typ. = 30mA (active program) • Iccsb Max = 50uA (standby)
VIDEO SUBSYSTEM	
Video Chipset	S3 Savage 4 (Integrated in Twister) with AGP 4 x SMA
Video RAM	16MB SDRAM (Using system memory, SMA) (Twister spec is 2/32 MB)
Bus Interface	32-bit PCI Local Bus
Addressing	Linear Addressing
Simul Scan	Yes
Maximum Resolution at CRT	1280 x 1024 at 32-bit color (16 million colors)
Maximum Color at CRT	32-bit color (16 million colors)
External CRT connector	15-pin D-Sub female
I/O SUBSYSTEM	
I/O Controller Chip	Integrated in South Bridge
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)
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

SOUND SUBSYSTEM	
Audio Chip	Integrated in VT82C686B (PCI audio)
Bus Interface	32-bit PCI Bus
Compatibility	Sound Blaster 16 (Pro) & 3D Surround Sound
Wavetable Function	Software
Connection	Full-Duplex
Volume	Analog H/W Volume
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
POINTING DEVICE SUBSYSTEM	
Chipset Controller	Mitsubishi M38867
Package	QFP 80-Pin
Touchpad Type	Synaptics TM41PDG351-1 Glide Point
Interface	PS/2
External PS/2 Mouse	Mini-DIN PS/2 connector (share with PS/2 keyboard)
PCMCIA SUBSYSTEM	
Chipset Controller	O2Micro 026933 PCI-cardbus bridge
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
POWER MANAGEMENT UNIT (PMU)	
PMU Modes	Video Timeout, Hard Disk Timeout, Suspend to RAM (STR) mode, Suspend to Disk (STD) mode
Others	LCD Cover-Switch STR, ACPI, DMI 2.0, Thermal Control
STATUS LED INDICATORS	
Number of LEDs	5 LEDs
Power Status LED	Green color when powering on Green color blinking when in STR or STD Amber color in Battery Low.
Battery Charge LED	Green color in charging status Lights off when the battery is fully charged or no battery installed
Internet / Mail LED	Green color when a new mail is arriving
HDD LED	Green color when accessing the HDD
FDD LED	Green color when accessing the FDD
Num Lock LED	Green color for Num Lock activate on keyboard
Caps Lock LED	Green color for Caps Lock activate on keyboard
Scroll Lock LED	Green color for Scroll Lock activate on keyboard

HOT-KEY DEFINITION	
Number of hot-keys	8 <Fn> key combinations
LCD/CRT Simul	Fn + F3 (toggle) (LCD/ CRT/ TV/ LCD&CRT)
Display Stretch / Normal	Fn + F5 (toggle)
PC Speaker On / Off (Mute)	Fn + F6 (toggle)
Brightness Up	Fn + F8
Brightness Down	Fn + F9
Save to Disk	Fn + Power Button
Internet Function Key	Internet Button
Mail Function Key	Mail Button

A.2 Display Specification

12.1" SVGA TFT LCD (HANNSTAR)	
LCD Model	HannStar HSD121PS11
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 colors	262144 Colors
Module Size	W275 x H199 x D6.0 MAX [mm]
Weight	Approx. 410g
Contrast Ratio	250:1 (typ.)
Power Supply	3.3 V
Power Consumption	2.6 W
Response Time	50ms (max)
Operating Temperature	0 to 50 degrees Celsius
Storage Temperature	-20 to 60 degrees Celsius
12.1" SVGA TFT LCD (ADI)	
LCD Model	ADI AA121SJ23
LCD Type	12.1" SVGA TFT
Display Area	H246 x V184.5 [mm]
Display Pixels	H800 x V600 pixels
Pixel Pitch	H 0.3075mm x V 0.3075mm
Pixel Arrangement	RGB stripe arrangement
Display colors	260K Colors
Module Size	H275 x V199 x T6.0 MAX [mm]
Weight	Approx. 440g
Contrast Ratio	150:1 (Typ.)
Power Supply	3.3 V
Power Consumption	3.8 W

Response Time	50ms (max)
Operating Temperature	0 to 50 degrees Celsius
Storage Temperature	-20 to 60 degrees Celsius
13.3" XGA TFT LCD (UNIPAC)	
LCD Model	UNIPAC UB133X01
LCD Type	13.3 " XGA TFT
Display Area	H270.3 x V202.8 [mm]
Display Pixels	H1024 x V768 pixels
Pixel Pitch	H 0.264 x V 0.264
Pixel Arrangement	RGB vertical stripe
Display colors	262144 Colors
Module Size	H284 x V214.5 x D5.9 MAX [mm]
Weight	Approx. 500g
Contrast Ratio	200:1 (typ.)
Power Supply	3.3V
Operating Temperature	0 to 50 degrees Celsius
Storage Temperature	-20 to 60 degrees Celsius
14.1" XGA TFT LCD (HANNSTAR)	
LCD Model	HannStar HSD141PX11-A
LCD Type	14.1" XGA TFT
Display Area	H285.7 x V214.3 [mm]
Display Pixels	H1024 x V768 pixels
Pixel Pitch	H 0.279 x V 0.279
Pixel Arrangement	RGB vertical stripe
Display colors	262144 Colors
Module Size	H298.5 x V226.5 x D6.0 MAX [mm]
Weight	Approx. 520g
Contrast Ratio	250:1 (typ.)
Power Supply	3.3V
Response Time	15ms (rising typ.) / 35ms (falling typ.)
Operating Temperature	0 to 50 degrees Celsius
Storage Temperature	-20 to 60 degrees Celsius
14.1" XGA TFT LCD (CPT)	
LCD Model	CPT CLAA141XC01
LCD Type	14.1" XGA TFT
Display Area	H285.696 x V214.272 [mm]
Display Pixels	H1024 x V768 pixels
Pixel Pitch	H0.279 x H0.279 [mm]
Pixel Arrangement	RGB vertical stripe
Display colors	262K Colors
Module Size	298.5(W) x 227.5(H) x 5.8(D) [mm]
Weight	Approx. 550g

Contrast Ratio	200:1 (typ.)
Power Supply	3.3V
Power Consumption	4.7(W)
Response Time	30ms (max)
Operating Temperature	0 to 50 degrees Celsius
Storage Temperature	-20 to 60 degrees Celsius

A.3 Floppy Disk Drive Specification

CITIZEN X1DE-32R	
Drive Manufacturer	CITIZEN X1DE-32R
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 (1Mb / 2Mb mode) / 360 rpm (1.6Mb Mode)
FDD Indicator	LED on drive and Media Access LED on LED Indicator
MTBF	15,000
Operating Temperature	5 to 50 degrees Celsius
NEC FD-2238T-220	
Drive Manufacturer	NEC FD-2238T-220
Floppy Diskette Type	3.5" Double Sided, High Density
Physical Dimension	126 x 96 x 12.7 [mm]
Weight	157g
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 (1Mb / 2Mb mode) / 360 rpm (1.6Mb Mode)
FDD Indicator	LED on drive and Media Access LED on LED Indicator
MTBF	30,000
Operating Temperature	5 to 50 degrees Celsius

A.4 CD-ROM Drive Specification

QSI SCR-242 (CAA8)	
Drive Manufacturer	QSI SCR-242
Physical Dimension	128.0 x 129.0 x 12.7 [mm]
Weight	180g 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	230msec (x24-speed)
Disc Speed	5,400rpm
Data Transfer Rate (burst)	16.7 MByte/s (PIO Mode 4) 16.7 MByte/s (Multi word DMA transfer mode-2) 33.3 MByte/s (Ultra DMA transfer mode-2)
Data Transfer Rate (sustained)	1,500 ~ 3,600KB/sec
Starting Time	5 sec. Max.
Data Buffer Capacity	128 KB
Supply Voltage	+5VDC
MTBF	70,000POH or more
MKE CR-177-DPK	
Drive Manufacturer	MKE CR-177-DPK
Physical Dimension	128.0 x 129.0 x 12.7 [mm]
Weight	180g 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	230msec (x24-speed)
Disc Speed	5,400rpm
Data Transfer Rate (burst)	16.7 MByte/s (PIO Mode 4) 16.7 MByte/s (Multi word DMA transfer mode-2) 33.3 MByte/s (Ultra DMA transfer mode-2)
Data Transfer Rate (sustained)	1,500 ~ 3,600KB/sec
Starting Time	5 sec. Max.
Data Buffer Capacity	128 KB
Supply Voltage	+5VDC
MTBF	70,000POH or more

A.5 DVD-ROM Drive Specification

MKE SR-8175-CPK	
Drive Manufacturer	MKE SR-8175-CPK
Physical Dimension	128.0 x 12.7 x 126.1 [mm] (W * H * D)
Weight	290g
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	150ms (DVD-9)/120ms(DVD-5)/95ms(CD) Typ.
Full Stroke Access Time	340ms (DVD-9)/270ms(DVD-5)/200ms(CD) Typ.
Disc Speed	3,400 rpm(DVD); 5,100 rpm(CD)
Data Transfer Rate (burst)	16.7 MByte/s (PIO Mode 4) 16.7 MByte/s (Multi word DMA transfer mode-2) 33.3 MByte/s (Ultra DMA transfer mode-2)
Data Transfer Rate (sustained)	Max. 11.08Mbyte/s (DVD) ; Max.3,600Kbyte/s(CD)
Starting Time	Typical 4 sec / Max. 10 sec (from stand by to ready)
Data Buffer Capacity	512 KB
Supply Voltage	+5VDC
MTBF	60,000POH or more
QSI SDR-081 (EFAA)	
Drive Manufacturer	QSI SDR-081
Physical Dimension	128.0 x 12.7 x 126.1 [mm] (W * H * D)
Weight	290g
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	150ms (DVD-9)/120ms(DVD-5)/95ms(CD) Typ.
Full Stroke Access Time	340ms (DVD-9)/270ms(DVD-5)/200ms(CD) Typ.
Disc Speed	3,400 rpm(DVD); 5,100 rpm(CD)
Data Transfer Rate (burst)	16.7 MByte/s (PIO Mode 4) 16.7 MByte/s (Multi word DMA transfer mode-2) 33.3 MByte/s (Ultra DMA transfer mode-2)
Data Transfer Rate (sustained)	Max. 11.08Mbyte/s (DVD) ; Max.3,600Kbyte/s(CD)
Starting Time	Typical 4 sec / Max. 10 sec (from stand by to ready)
Data Buffer Capacity	512 KB
Supply Voltage	+5VDC
MTBF	60,000POH or more

A.6 CD-RW Drive Specification

Drive Manufacturer	MKE UJDA330FC1-Z

Physical Dimension	128.0 x 12.7 x 129 [mm] (W * H * D)
Weight	250g +/- 10g
Loading	Manual tray loading
Ejection	Manual eject using the eject button Auto eject using the eject command on software
Host Interface	Enhanced IDE (ATAPI)
Average Access Time	150ms Typ.
Data Transfer Rate (burst)	16.7 MByte/s (PIO Mode 4) 16.7 MByte/s (Multi word DMA transfer mode-2) 33.3 MByte/s (Ultra DMA transfer mode-2)
Data Transfer Rate (sustained)	Max. 2,100Kbyte/s (CD-RW) ; Max.3,600Kbyte/s(CD)
Data Write Rate	Max. 1,200Kbyte/s (CD-R) ; Max.600Kbyte/s(CD-RW)
Starting Time	Max. 10 sec (from stand by to ready)
Data Buffer Capacity	2MB
Supply Voltage	+5VDC +/- 15%
MTBF	50,000POH or more

A.7 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
Travel	3.0 mm ± 0.3 mm
Keyboard Height	6.8 ± 0.3 mm 7.0 ± 0.3 mm (SPACE Key)
Keycap Pull Off Force	≥ 500g
Supply Voltage	6V
Operating Temperature	-10 to 60 degrees Celsius

A.8 Touch Pad Specification

Touch Pad Type	Synaptics GlidePoint TM41PD-351
Interface	PS/2 (compatible with Microsoft Mouse Driver)
Supply Voltage	5V
Supply Current	4.0mA (Max) Operating
Dimension	W65 x H49 x D2.82 (D1.07 PCB) mm
Weight	8g.
Operating Temperature	0 to 60 degrees Celsius
Storage Temperature	-40 to 65 degrees Celsius

A.9 Internal Modem Specification

Modem Type	Askey 1456VQL19R-4
Chipset	Lucent Mars3 1648

Wake Up Function	Supports Ring-in Resume Wake Up function
Connection Mode	V.90 Kbps
Speakerphone	Full duplex speakerphone (FDSP)
Fax Transmission Way	Half Duplex
Modem Speed	56 Kbps
Modulation Format	V.90 PCM

A.10 Internal LAN Specification

LAN Type	Intel 82559
LAN Chip Interface	Mini-PCI Bus
Speed	10/100 Mbps
Wake Up Function	Supports Wake-on-LAN (WOL) function

A.11 Power Supply

AC POWER ADAPTER (LITEON)	
Adapter Type	Liteon PA1600-01
Input Voltage	100 to 240VAC
Input Frequency	50 to 60 Hz
Input Current	1.32A Max at 110VAC 0.66A Max at 220VAC
Efficiency	83% Min
In-Rush Current (Cold Start)	50A Max at 100 VAC 100A Max at 240 VAC
Output Power	60W
Output Voltage	+19Vdc (main)
Output Current	3.16A (Max)
Over Voltage Protection	24V Max
Over Current Protection	19V / 5A (max)
LED Display	Yellow LED (On / Off)
Dimension	L110 x W50 x H29 [mm]
Weight	250g
DELTA ADP-65DB	
Adapter Type	Delta ADP-65DB
Input Voltage	90 to 264VAC
Input Frequency	47 to 63 Hz
Input Current	1.5A Max at 110VAC 0.75A Max at 220VAC
Efficiency	85% Min
In-Rush Current (Cold Start)	50A Max at 100 VAC 100A Max at 240 VAC
Output Power	60W
Output Voltage	+19Vdc (main)

Output Current	3.42A (max)
Over Voltage Protection	24V (Max)
Over Current Protection	19V / 5A (max)
LED Display	Green LED (On / Off)
Dimension	L114.5 x W49.5 x H29 [mm]
Weight	275g
NICKEL-METAL HYDRIDE (NI-MH) BATTERY PACK	
Model	Sanyo Ni-MH Rechargeable Smart Battery
Cell Number	8
Rating (Nominal) Voltage	9.6V
Typical Capacity	3800 mAH
Watts	50 W (max)
Charging Current	1700mAh
Charging Efficiency	95%
EVD1	8.8V
EVDF	8.0V
LITHIUM ION (LI-ION) BATTERY PACK	
Model	Sanyo Li-Ion Rechargeable Smart Battery
Cell Number	8
Rating (Nominal) Voltage	14.4V
Typical Capacity	3800 mAH
Watts	51.84 W
Charging Voltage	16.8V
Charging Efficiency	100%
EVD1	14.0V
EVDF	12.0V

A.12 Inverter Specification

Input Voltage	5.0V
Start Voltage	1200Vrms (min)
Output Current	6mA (max)
Frequency	30~70KHz
Efficiency	75% (min)
Brightness Control Voltage	0.94~1.86V

A.13 DC/DC Specification

Controller	MAX1631
Input Voltage	8 ~ 20V
Output Current	4A (5V) / 4A (3.3V) / 100mA (12V)
Frequency	200KHz
Support Mode	OVP / OCP

A.14 Charger Specification

Controller	Mitsubishi 3886X
Input Voltage	18.5 ~ 20V
LITHIUM ION (LI-ION) BATTERY PACK	
Max. Temperature	60 degrees
Max. Charger Voltage	4.35V / cell
Charger Entry Temperature	0 – 50 degrees
Max. Timer	300 minutes
Trickle Charger Detect	0 < V < 3V / cell
Output Current (system off)	1.6A (Min) / 1.7A (Typ) / 1.8A (Max)
Output Current (system on)	constant power
Trickle Charger Current	120mA
Ripple & Noise	500mV
Efficiency	90%

A.15 Mechanical Specification

Unit Dimensions (W x D x H) in millimeters	308 x 268 x 39 mm(front), 42(rear)
Unit Weight	Approximately 3Kg (6.6 lbs) with 14.1" LCD System with HDD, FDD, CD-Rom & One Li-Ion Battery Pack

A.16 Environmental Requirements

Temperature Operating Temperature Storage Temperature	 $5^{o}C$ to $35^{o}C$ $-20^{o}C$ to $60^{o}C$
Humidity Operating Storage	 10% to 80% RH without condensation 5% to 90% RH without condensation
Shock (Non-operating) Unpacked	 Acceleration: 30G/50G Duration Time: 11ms No. of Times: 3 Times Direction: 6 face
Drop Package	 Drop Height: 91cm (under 10Kg) 76cm (over 10Kg) Drop Phase: 1 corner, 3 line, 6 face
Electro-Static Discharge (ESD)	Contact: +/- 6KV Air: +/-10KV

Appendix

B

Pin Assignments

B.1 CRT (VGA) Connector

The pin assignment of the VGA connector is as follows:

No	PIN ASSIGEMENT(by: sort)	DESCRIPTION
1	RED Video_5 :O (analog)	**Red** this **DAC** analog output drives the **CRT** interface**.**
2	GREEN Video_5 :O (analog)	**Green** this **DAC** analog output drives the **CRT** interface**.**
3	BLUE Video_5 :O (analog)	**Blue** this **DAC** analog output drives the **CRT** interface**.**
4	Monitor ID Bit 2 :	**Option**
5	GROUND :	**Ground**
6	RED Return (ground) :	**Ground**
7	GREEN Return (ground) :	**Ground**
8	BLUE Return (ground) :	**Ground**
9	KEY (no connector) :	**VCC**
10	SYNC Return (ground) :	**Ground**
11	MONITOR ID Bit 0_5 :	**Monitor** Sense Indicator
12	MONITOR ID Bit 1_5 :I	DDC monitor data
13	HORIZONTAL SYNC_5 :O (t/s)	**CRT Horizontal Sync** this output is The **Horizontal** sync pulse for the **CRT** Monitor.
14	VERTICAL SYNC_5 :O (t/s)	**CRT Vertical Sync** this output is the **Vertical** sync pulse for the **CRT** Monitor.
15	MONITOR ID Bit 3_5 :I/O	**DDC** monitor clock

Absolute Maximum Conditions

The following parameters are maximum ratings for VGA. Permanent device damage may occur if these rating are exceeded. Extended exposure to these ratings may also cause device failure.

PARAMETER	MIN	MAX	UNIT
I/O VOLTAGE	-0.5	+6.00V	V
OUTPUT CURRENT		-12mA(source) +24mA(sink)	m A

B.2 Serial Port Connector

The pin assignment of the serial (COM1) port connector is as follows:

No	PIN ASSIGMENT (by: sort)	DESCRIPTION
1	DCDA#_T:I	Active low **Data Carrier Detect** inputs for the serial port.
2	SINA_T:I	Receiver **serial data input** for port 1.
3	SOUTA_12:O	Transmit **serial data output** for port 1.
4	DTRA#_6:O	Active low **Data Terminal Ready** outputs for the serial port.
5	GND	Ground
6	DSRA#_T:I	Active low **Data Set Ready** inputs for the serial port.
7	RTSA#_6:O	Active low **Request to Send** Outputs for the serial port.
8	CTSA#_T:I	Active low **Clear to Send** inputs for the serial port.
9	RI#_T:I	Active low **Ring Indicator** inputs for the serial port.

B.3 Parallel Port Connector

The pin assignment of the parallel/printer (LPT1) port connector is as follows:

No	PIN ASSIGMENT(by: sort)	Description
1	STB#/DS0#_D14/_P14/_D12:O	An active low pulse on this output is used to strobe the printer data into the printer. The STROBE output is the complement of Bit 0 of the printer control register. Refer to parallel port description for use of this pin in ECP and EPP mode. Active low outputs select driver 0
2	PD0/INDEX3#_P14/_S:IO/I	Port data 0 This active low Schmidt trigger input senses from the disk drive that the head is positioned over the beginning of a track as marked by an index hole.
3	PD1/TRK0#_P14/_S:IO/I	Port data 1 This active low Schmidt trigger input senses from the disk drive that the head is positioned over the outermost track.
4	PD2/WRTPRT#_P14/_S:IO/I	Port data 2 This active low Schmidt trigger input senses from the disk drive that a disk is write protected. Any write command is ignored.
5	PD3/RDATA#_P14/_S:IO/I	Port data 3 Raw serial bit stream from the disk drive, low active. Each falling edge represents a flux transition of the encoded data.
6	PD4/DSKCHG_P14/_S:IO/I	Port data 4 This input senses that the driver door is open or that the diskette has possibly been changed since the last drive selection.
7	PD5_P14:IO	Port data 5
8	PD6/MTR0#_P14/_D12:IO/O	Port data 6 This active low outputs select motor drives 0.
9	PD7_P14:IO	Port data 7
10	ACK#/DS1#_T_D12:I/O	A low active output from the printer indicating that it has received the data and is ready to accept new data. Bit 6 of the printer status register reads the ACK# Input. Refer to parallel port description for use of this pin in ECP and EPP mode.
11	BUSY/MRT1#_T/_D12:_I/O	This is a status output from the printer, a high indicating that the printer is not ready to receive new data.

		Bit 7 of the Printer status register is the complement Of the BUSY input. Refer to parallel port description for use of this pin in ECP and EPP mode. This active low outputs select motor Drives 1.
12	PE/WDATA#_T/_D12:I/O	Another status output from the printer, a high indicating that printer is out of paper. Bit 5 of the printer status register reads the PE input. Refer to parallel port description for use of this pin in ECP and EPP mode. This active low high current driver provide the encoded data to the disk drive. Each falling edge cause a flux transfer on the media.
13	SLCT/WGATE#_T/_D12:I/O	This high active output from the printer indicates that it has power on. Bit 4 of the printer status register read the SLCT input. Refer to parallel port description for use of this pin in ECP and EPP mode. This active low high current driver allows current to flow through the write head. It become active just prior to writing to the diskette.
14	AFD#/DSB#_D14,_P14/_D12:O,O/O	This output goes low to cause the printer to automatically feed one line after each line is printed. The AFD# output is the complement of bit 1 of the printer control register. Refer to parallel pot description for use of this pin in ECP and EPP mode.
15	ERR#/HDSEL_T/D12:I/O	A low on this input from the printer indicates that there is a error condition at the printer. Bit 3 of the printer status register reads the ERR# input. Refer to parallel port description for use of this pin in ECP and EPP mode. This high current output selects the floppy disk side for reading or writing. A logic “1” on this pin means side 0 will be accessed while a logic “0” means side 1 will be acessed.
16	INIT#/DIR#_D14,_P14/D12:O,O/O	This output is bit 2 of the printer control register. This is used to initiate the printer when low. Refer to parallel port description for use of this pin in ECP and EPP mode. This high current low active output determines the direction of the head movement. A logic “1” on this pin means outward motion, while a logic “0” means inward motion.
17	SLIN#/STEP#_D14,_P14/_D12:O,O/O	This active low output selects the printer. This is the complement of bit 3 of the printer control register. Refer to parallel port description for use of this pin in ECP and EPP mode. This active low high current driver issues s low pulse for each track to track movement of the head.
18	GND:	Ground
19	GND:	Ground
20	GND:	Ground
21	GND:	Ground
22	GND:	Ground
23	GND:	Ground
24	GND:	Ground
25	GND:	Ground

B.4 PS/2 Mouse / Ext. Keyboard Mini-DIN Connector

Following is the pin assignment of the PS/2 connector:

No	Signal	Description	Type
1	MOUSE_CLK	External clock for mouse or keyboard	I/O
2	EKB_CLK	External clock for mouse or keyboard	I/O
3	+5vs	5v power supply	O
4	Gnd	Ground	I
5	EKB_DATA	External data for mouse or keyboard	I/O
6	MOUSE_DATA	External data for mouse or keyboard	I/O

B.5 USB Connector

The pin assignment of the USB port connector is as follows:

No	Signal	Description	Type
1, 5, 9, 10, 11, 12	GND	Ground	O
2	USBP0+	USB port0 bus signal	O
3	USBP0-	USB port0 bus signal	O
4	+5VS	USB port0 power	
6	USBP1+	USB port1 bus signal	
7	USBP1-	USB port1 bus signal	
8	+5VS	USB port1 power	

B.6 CD-ROM IDE Connector

The following is the pin assignment for the CD-ROM IDE connector:

NO.	Signal	Description	Type
5	CDROMRESET#	Reset secondary disk	O
33	RSDA0	Secondary disk address 0	O
31	RSDA1	Secondary disk address 1	O
34	RSDA2	Secondary disk address 2	O
21	RSDD0	Secondary disk data 0	I/O
19	RSDD1	Secondary disk data 1	I/O
17	RSDD2	Secondary disk data 2	I/O
15	RSDD3	Secondary disk data 3	I/O
13	RSDD4	Secondary disk data 4	I/O
11	RSDD5	Secondary disk data 5	I/O
9	RSDD6	Secondary disk data 6	I/O
7	RSDD7	Secondary disk data 7	I/O
6	RSDD8	Secondary disk data 8	I/O
8	RSDD9	Secondary disk data 9	I/O
10	RSDD10	Secondary disk data 10	I/O
12	RSDD11	Secondary disk data 11	I/O
14	RSDD12	Secondary disk data 12	I/O
16	RSDD13	Secondary disk data 13	I/O
18	RSDD14	Secondary disk data 14	I/O
20	RSDD15	Secondary disk data 15	I/O
35	RSDCS1#	Secondary disk chip select for 100 range	O
36	RSDCS3#	Secondary disk chip select for 300 range	O
28	RSDDACK#	Secondary DMA acknowledge	O
22	RSDDREQ	Secondary DMA request	I

24	RSDIOR#	Secondary disk IO read	O
25	RSDIOW#	Secondary disk IO write	O
27	RSIORDY	Secondary disk IO channel ready	I
29	IRQ15	Secondary disk interrupt	I
50	NC		NC
49	NC		NC
37	CDROMLED#	CDROM access indicator	O
2	CD_R	CDROM sound right signal	O
4	GND	Ground	I
1	CD_L	CDROM sound left signal	O
3	CD_RGND	Left Ground	I
39,41,38,40,42	+5Vs	+5V power supply	I
23,43,44,45,46,48	Gnd	Ground	O
47	CSEL	SELECT MASTER OR SLAVE	I

B.7 DC-IN Jack Pin Assignment

The pin assignment of the DC-IN connector is as follows:

No	Signal	Description	Type
1	ADAPV+	Adapter input voltage	I
2	Gnd	Ground	O

B.8 LCD Connector Pin Assignment

The pin assignment of the LCD connector is as follows:

NO.	Signal	Description	Type
22	INVENA	Flat panel backlight signal control the LCD backlight.	O
2	LCDID0	LCD type bit0	I
4	LCDID1	LCD type bit1	I
6	LCDID2	LCD type bit2	I
8	LCDID3	LCD type bit3	
20	BRIGHTNESS	LCD brightness adjust voltage	O
23	TXOUTU0-		O
21	TXOUTU0+		O
17	TXOUTU1-		O
15	TXOUTU1+		O
11	TXOUTU2-		O
9	TXOUTU2+		O
5	TXCLK-		O
3	TXCLK+		O
16	MAIL LED		
10	LED GREEN		
12	LED AMBER		
14	LED CHG		
46,48,50	+3V		
24,26,28,30,32	+5V		
1,7,13,19,25,31,37,43,49,34,36,38, 40,42,44	GND		
18	NC		

B.9 FDD Connector

The pin assignment for the FDD connector is as follows:

NO.	Signal	Description	Type
24	RDATA#	Read disk data. Raw serial bit stream form the disk drive, low active. Each falling edge represents a flux transition of the encoded data.	I
18	WGATE#	Write gate. This active low high current driver allows current to flow through the write head . It becomes active just prior to writing to the diskette.	O
16	WDATA#	Write data. This active low high current driver provides the encoded data to the disk drive. Each falling edge causes a flux transition on the media.	O
26	HDSEL#	Head select. The high current select the floppy disk side for reading or writing. A logic “1” on the pin means side 0 will be accessed, while a logic “0” means side 1 will be accessed.	O
12	DIR#	Direction control. This high current low active output determines the direction of the head movement. A logic “1” on this pin means outward motion , while a logic “0” means inward motion.	O
14	STEP#	Step pulse. The active low high current driver issues a low pules for each track-to-track movement of the head.	O
6	DSKCHG#	Disk change. This input senses that the drive door is open or that the diskette has possibly been changed since the last drive selection. This input is inverted and read via bit 7 of I/O address 3F7H. The DSKCHG# bit also depends upon the state of the Force Disk Change bits in the Force FDD Status Change configuration register.	I
4	DS0#	Drive select 0. Active low outputs select drives 0.	O
10	MOTR0	Motor on. These active low output motor on.	O
13	3MODE	3 Mode FDD select.	O
22	WRTPRT#	Write protected. This active low Schmitt trigger input senses from the disk drive that a disk is write protected.	I
20	TRK0#	Track 00. This active low Schmitt trigger input senses from the disk drive that the head is positioned over the outermost track.	I
2	INDEX#	This active low Schmitt Trigger input senses from the disk drive that head is positioned over the beginning of a track , as marked by an index hole.	I
7,8,9	NC		
25,23,21, 19,17,15	Gnd	Ground	I
11,5,3,1	+5Vs	+5V power supply	O

B.10 HDD Pin Assignment

The pin assignment of the internal HDD is as follows:

NO.	Signal	Description	Type
1	HDDRESET#	Reset primary disk	O
35	RPDA0	Primary disk address 0	O
33	RPDA1	Primary disk address 1	O
36	RPDA2	Primary disk address 2	O
17	RPDD0	Primary disk data 0	I/O
15	RPDD1	Primary disk data 1	I/O
13	RPDD2	Primary disk data 2	I/O
11	RPDD3	Primary disk data 3	I/O
9	RPDD4	Primary disk data 4	I/O
7	RPDD5	Primary disk data 5	I/O
5	RPDD6	Primary disk data 6	I/O
3	RPDD7	Primary disk data 7	I/O

4	RPDD8	Primary disk data 8	I/O
6	RPDD9	Primary disk data 9	I/O
8	RPDD10	Primary disk data 10	I/O
10	RPDD11	Primary disk data 11	I/O
12	RPDD12	Primary disk data 12	I/O
14	RPDD13	Primary disk data 13	I/O
16	RPDD14	Primary disk data 14	I/O
18	RPDD15	Primary disk data 15	I/O
37	RPDCS1#	Primary disk chip select for 100 range	O
38	RPDCS3#	Primary disk chip select for 300 range	O
29	RPDDACK#	Primary DMA acknowledge	O
21	RPDDREQ	Primary DMA request	I
25	RPDIOR#	Primary disk IO read	O
23	RPDIOW#	Primary disk IO write	O
27	RPIORDY	Primary disk IO channel ready	I
31	IRQ14	Primary disk interrupt	I
39	HDDLED#	HDD access indicator	O
2,19,22,24,26 ,28,3040,43	Gnd	Ground	I
41,42	+5Vs	+5v power supply	O

B.11 Internal Keyboard FPC Connector

The pin assignment of the internal keyboard connector is as follows:

No	Signal	Description	Type
1,25	X15	Keyboard matrix column 15	I
2,26	X14	Keyboard matrix column 14	I
3,27	X13	Keyboard matrix column 13	I
4,28	X12	Keyboard matrix column 12	I
5,29	X11	Keyboard matrix column 11	I
6,30	X10	Keyboard matrix column 10	I
7,31	X9	Keyboard matrix column 9	I
8,32	X8	Keyboard matrix column 8	I
9,33	X7	Keyboard matrix column 7	I
10,34	X6	Keyboard matrix column 6	I
11,35	X5	Keyboard matrix column 5	I
12,36	XY7	Keyboard matrix row 7	O
13,37	XY6	Keyboard matrix row 6	O
14,38	XY5	Keyboard matrix row 5	O
15,39	XY4	Keyboard matrix row 4	O
16,40	X4	Keyboard matrix column 4	I
17,41	X3	Keyboard matrix column 3	I
18,42	XY3	Keyboard matrix row 3	O
19,43	XY2	Keyboard matrix row 2	O
20,44	XY1	Keyboard matrix row 1	O
21,45	XY0	Keyboard matrix row 0	O
22,46	X2	Keyboard matrix column 2	I
23,47	X1	Keyboard matrix column 1	I
24,48	X0	Keyboard matrix column 0	I

B.12 Battery Connector

The pin assignment for the battery connector is as follows:

No	Signal	Description	Type
1	Gnd	Ground	-
2	B_PMU5V		I
3	BAT+	Battery output/input voltage	I/O

4	CLK	SMBus clock signal	I/O
5	DTA	SMBus data signal	I/O
6	TH1	THERMAL	O
7	BIN1		O
8	GND	GROUND	-

B.13 Audio Jack

The audio jack comprises of the headphone jack, line-out jack, and microphone jack:

SPDIF & Headphone Jack

The pin assignment of the headphone jack is as follows:

No	Signal	Description	Type
4	GND	Ground	I
2	HP_L	Headphone left sound	O
3	HP_R	Headphone right sound	O
5	SPDIFDET	SPDIF insert detect	I
1	HPDET	Headphone insert detect	I
8	SPDIF PWR	SPDIF power	O
7	SPDIF	SPDIF signal	O
9	GND	Ground	I

Line-In Jack

The pin assignment of the line-in jack is as follows:

No	Signal	Description	Type
1	GND	Ground	I
2	LINEINL	Line in left sound	I
3	LINEINR	Line in right sound	I
4	GND	Ground	I
5	GND	Ground	I

Microphone Jack

The pin assignment of the microphone jack is as follows:

No	Signal	Description	Type
1	GND	Ground	I
2	MICIN	External Microphone input signal	I
3	GND	Ground	I
4	EXTMICDET	EXTERNAL MIC detect	I
5	GND	Ground	I

B.14 Internal Microphone Connector

The pin assignment of the internal microphone is as follows:

No	Signal	Description	Type
1	MICIN	External Microphone input signal	
2	GND	Ground	

Appendix

C

FRU Parts Listing

This appendix provides you with the field replaceable unit (FRU) parts listing of the A360 Series. Refer to this appendix whenever ordering for spare parts or requesting for RMA (Returned Merchandise Authorization) number.

FRU	FIC Part Number
CPU MODULE FC-PGA 866MHZ	01-10418-01
CPU MODULE FC-PGA 933MHZ	01-10409-01
CPU MODULE FC-PGA 1GBMHZ	01-10410-01
CPU MODULE FC-PGA 1.13GBMHZ	01-10820-00
CPU CELERON-700	01-10407-01
CPU CELERON-733	01-10429-01
CPU CELERON-766	01-10430-01
CPU CELERON-800	01-10818-00
CPU CELERON-819	01-10819-00
SDRAM-M Apacer 64MB(PC133)	02-33007-00
SDRAM-M Pan Ram 64MB(PC133)	02-32060-03
SDRAM-M Apacer 128MB(PC133)	02-33007-01
SDRAM-M Pan Ram 128MB(PC133)	02-33004-01
SDRAM-M Pan Ram 256MB(PC133)	02-33004-03
Module - CD-ROM 24X QSI	25-02396-00
CD-ROM 24X QSI	23-40295-00
CD-ROM BRACKET L1	24-50823-00
PLASTIC-M CD-ROM PANEL	80-40423-00
Module - CD-ROM 24X MKE	25-02396-10
CD-ROM 24X MKE	23-40280-02
CD-ROM BRACKET L1	24-50823-00
PLASTIC-M CD-ROM PANEL	80-40424-00
Module - DVD-ROM 8X QSI	25-02397-00
DVD-ROM 8X QSI	23-40293-00
CD-ROM BRACKET L1	25-50823-00
CD-ROM CYBERLINK POWER DVD SW	24-70110-20
PLASTIC-M DVD-ROM PANEL	80-40425-00

FRU	FIC Part Number
Module - DVD-ROM 8X MKE	25-02397-10
DVD-ROM 8X MKE	23-40319-00
CD-ROM BRACKET L1	25-50823-00
CD-ROM CYBERLINK POWER DVD SW	24-70110-20
PLASTIC-M DVD-ROM PANEL	80-40426-00
Module - CD-RW MKE	25-02398-00
DVD-ROM 8XW/4XW/24X MKE	23-40233-13
CD-ROM BRACKET L1	24-50823-00
S/W ADAPTEC EASY CD CREATOR	26-00975-03
PLASTIC-M CD-RW PANEL	80-40427-00
Module - CD-RW SONY	25-02398-20
CD-RW 8XW/20XR SONY	23-40323-02
CD-ROM BRACKET L1	24-50823-00
S/W ADAPTEC EASY CD CREATOR	26-00975-03
PLASTIC-M CD-RW PANEL	80-40428-00
Module HDD _10 GB _HIT	25-02394-00
HDD 10GB HIT	23-20723-00
HDD BRACKET	24-51297-00
F-CABLE	22-21104-00
Module HDD _10 GB _FUJ	25-02394-10
HDD 10GB FUJ	23-20725-00
HDD BRACKET	24-51297-00
F-CABLE	22-21104-00
Module HDD _10 GB _IBM	25-02394-20
HDD 10GB IBM	23-20740-00
HDD BRACKET	24-51297-00
F-CABLE	22-21104-00
Module HDD _20 GB _HIT	25-02395-00
HDD 20GB HIT	23-20726-00
HDD BRACKET	24-51297-00
F-CABLE	22-21104-00
Module HDD _20 GB _FUJ	25-02395-10
HDD 20GB FUJ	23-20728-00
HDD BRACKET	24-51297-00
F-CABLE	22-21104-00

FRU Parts Listing

FRU	FIC Part Number
Module HDD _20 GB _IBM	25-02395-20
HDD 20GB IBM	23-20741-00
HDD BRACKET	24-51297-00
F-CABLE	22-21104-00
Battery Pack NI-MH 3800MA	21-91081-00
Module-FAX_MODEM US	71-40103-00
Module-FAX_MODEM EUR	71-40104-00
Module-FAX_MODEM UK	71-40105-00
Battery Pack NI-MH 4500MA	21-91082-00
Battery Pack LI-LON 3800MA	21-91083-00
FAX/MODEM MODULE	71-40170-00
LAN MODULE	71-40172-00
COMBO MODULE	71-40195-00
Main Module	N/A
Main Board	51-70650-XX
BOTTOM CASE FDD Module	80-40419-00
Module TOP CASE	80-40420-00
K/B Cover	80-40422-00
TOP PLATE	80-50122-00
W/O CARE COVER	24-42293-00
SPEAKER COVER	24-42260-00
Audio DJ/SW Module	80-00058-00
F-CABLE FFC FOR AUDIO-DJ	22-21101-00
CASE BUTTON AUDIO-DJ-R	24-42137-00
CASE BUTTON AUDIO-DJ-L	24-42138-00
CASE BUTTON AUDIO-DJ (ON/OFF)	24-42139-00
AUDIO DJ COVER	80-40464-00
RUBBER AUDIO-DJ BTTON	24-82341-00
DJ SWITCH BOARD	51-70656-00
Module FDD_NEC	25-02413-00
FDD 3.5" NEC	23-10274-00
F-CABLE FDD FPC	22-21102-00
FDD PLATE	24-51299-00

FRU	FIC Part Number
Module PALM REST	25-02399-00
F-CABLE GLIDE PAD TO SW CABLE	22-21099-00
F-CABLE GLIDE PAD TO M/B CABLE	22-21100-00
FRAME G/P	24-51298-00
GLIDE PAD/B	51-71080-21
GLIDE PAD	71-20186-00
PLASTIC-M PALM-REST Module	80-40421-00
Module LCD TFT 12.1" Hann Star	56-10450-00
LCD 12.1" Hann Star	71-10582-00
INVETER/B	12-01368-01
CABLE INVT.	22-10680-00
LCD MICRO-COAXIAL	22-10691-00
LCD BEZEL COVER	80-40415-00
LCD COVER BACK	80-40418-00
FRAME HINGE-R	24-51308-00
FRAME HINGE-L	24-51307-00
FRAME BRACKET R	24-51294-00
FRAME BRACKET L	24-51293-00
Module LCD TFT 13.3" ADT	56-10451-00
LCD 13.3" ADT	71-10546-03
INVETER/B	12-01368-01
LCD MICRO-COAXIAL	22-10660-00
LCD BEZEL COVER	80-40416-00
LCD COVER BACK	80-40418-00
FRAME HINGE-R	24-51308-00
FRAME HINGE-L	24-51307-00
FRAME BRACKET R	24-51292-00
FRAME BRACKET L	24-51291-00
Module LCD TFT 14.1" ADT	56-10463-00
LCD 14.1" ADT	71-10574-01
INVETER/B	12-01368-01
LCD MICRO-COAXIAL	22-10732-00
LCD BEZEL COVER	80-40417-00
LCD COVER BACK	80-40418-00
FRAME HINGE-R	24-51308-00
FRAME HINGE-L	24-51307-00

FRU Parts Listing

FRU	FIC Part Number
Module LCD TFT 14.1" CPT	56-10452-00
LCD 14.1" CPT	71-10547-02
INVETER/B	12-01368-01
LCD MICRO-COAXIAL	22-10693-00
LCD BEZEL COVER	80-40417-00
LCD COVER BACK	80-40418-00
FRAME HINGE-R	24-51308-00
FRAME HINGE-L	24-51307-00
AC ADAPTOR (3 PIN)	12-01305-21
Keyboard(US)	71-30411-00
Keyboard(UK)	71-30411-02
Keyboard(JAP)	71-30411-03