User's Manual

An Intel Socket 478 Processor Based Mainboard (400/533MHz)

Supports PC1600/2100/2700 Memory Modules (DDR Memory)

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6000002GEM100

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80 Port Frequently Asked Questions (Optional)

Below is a list of some basic POST Codes, possible problems, and solutions. For more detailed information about POST Codes, refer to Appendix E in this manual.

POST CODE	Problem	Solution
FFh or CFh	1.BIOS chip inserted incorrectly 2. Incorrect BIOS update version 3. Mainboard problem 4. Add-on card inserted incorrectly.	1. Reinsert the BIOS chip 2. Download the correct BIOS version update from the manufacturer's Web site. 3. Replace mainboard 4. Remove and replace the add-on card
C1h - C5h	1. Memory module inserted incorrectly 2. Memory compatibility problem 3. Memory module damaged	1. Reinsert memory module 2. Replace memory with correct type 3. Replace memory module
2Dh	1. Error occured in VGA BIOS 2. VGA card inserted incorrectly	1. Replace VGA card 2. Reinsert the VGA card
26h	Overclock error	Clear CMOS or press the insert key to power on the system
07h - 12h	1. Initial Keyboard controller error 2. RTC error	1. Ensure that the keyboard and mouse are connected correctly. 2. Replace the RTC battery.

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INTRODUCTION

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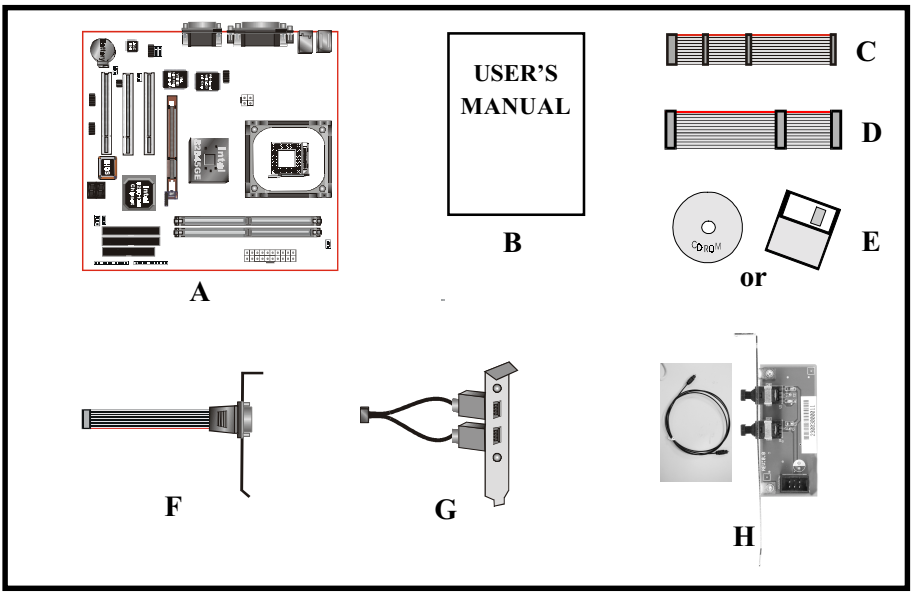
G. (1) USB2.0 Cable

H. (1) SPD650 card



System Overview

This board is designed with Intel® 845GE chipset. The Intel® 845GE chipset includes GMCH(FW82845GE), ICH4(FW82801DB) and FWH three chips. The Intel® 845GE chipset is designed for Intel's FC-PGA2 socket 478 package architecture and support the 4X capability of the AGP 2.0 Interface Specification. A new chipset component interconnect, the hub interface, is designed into the Intel® 845GE chipset to provide more efficient communication between chipset components.

Support of AGP 4X, 266/333MHz DDR SDRAM and the hub interface provides a balanced system architecture for the Pentium® 4 in the Socket 478 architecture processor minimizing bottlenecks and increasing system performance. By increasing memory bandwidth to 2.128GB/s through the use of AGP 4X, the Intel® 845GE chipset will deliver the data throughput necessary to take advantage of the high performance provided by the powerful Pentium® 4 in the Socket 478 architecture processor.

The Intel® 845GE chipset architecture removes the requirement for the ISA expansion bus that was traditionally integrated into the I/O subsystem of Intel chipsets. This removes many of the conflicts experienced when installing hardware and drivers into legacy ISA systems. The elimination of ISA will provide true plug-and play for the Intel® 845GE platform.

Intel® 845GE chipset contains three core components: the Graphic Memory Controller Hub (GMCH), the I/O Controller Hub (ICH4) and the Firmware Hub (FWH). The GMCH integrates the data transfer rate of 400/533MHz, Pentium® 4 processor bus controller, AGP 2.0 controller, 266/333MHz DDR SDRAM controller and a high-speed hub interface for communication with the ICH4. The ICH4 integrates an Ultra ATA/66/100 controller, USB host controller, LPC interface controller, FWH interface controller, PCI interface controller, and a hub interface for communication with the GMCH. The Intel® 845GE chipset will provide the data buffering and interface arbitration required to ensure that system interfaces operate efficiently and provide the system bandwidth necessary to obtain peak performance the Pentium® 4 in the Socket 478 architecture.

Chipset Components

The Intel® 845GE chipset consists of the Graphic Memory Controller Hub (GMCH), the I/O Controller Hub (ICH4) and the Firmware Hub (FWH).

- **Graphic Memory Controller Hub (GMCH)**

  The GMCH provides the interconnect between the DDR SDRAM and the system logic. It integrates:

  - Support for single processor with a data transfer rate of 400/533MHz.
  - 200/266/333MHz DDR SDRAM interface supporting 2GB of DDR SDRAM.
  - 4X 1.5V AGP interface (Only support 1.5V on AGP interface).
  - Downstream hub link for access to the ICH4.

- **I/O Controller Hub (ICH4)**

  The I/O controller Hub provides the I/O subsystem with access to the rest of the system. Additionally, it integrates many I/O functions. The ICH4 integrates:

  - Upstream hub link for access to the GMCH
  - 2 Channel Ultra ATA/33/66/100 Bus Master IDE controller
  - USB controller
  - SMBus controller
  - FWH interface
  - LPC interface
  - PCI 2.2 interface
  - Integrated System Management Controller

- **Firmware Hub (FWH)**

  The FWH component is a key element to enabling a new security and manage-ability infrastructure for the PC platform. The device operates under the FWH interface and protocol. The hardware features of this device include a unique a Random Number Generator (RNG), register-based locking, and hardware-based locking.

Intel Pentium 4 processors

Formally known as the Willamette, the Pentium™ 4 is the next generation IA-32 processor from Intel. This next generation design is based upon a new micro-architecture that brings higher clock speeds and performance than previous processors could deliver. Among other advanced features the Pentium 4 offers Streaming SIMD extensions 2, Advanced Dynamic Execution, Hyper Pipelined Technology, and a data transfer rate of 400/533MHz system bus.

Streaming SIMD Extensions 2

Building upon the foundations of core features of their previous line of processors the Pentium 4, this new version introduces Streaming SIMD Extensions 2 technology commonly referred to as SSE2. But what does this mean? SIMD stands for Single Instruction Multiple Data. Usually, processors process one data element in one instruction, called Single Instruction Single Data, or SISD. In contrast, with Single Instruction Single Data (SISD), SIMD has the ability to process more than one piece of data element during one instruction.

This technology is useful for 3D graphics applications that handle considerable amounts of floating-point numbers. With SIMD applications such as 3D graphics will be able to processor more data per instruction when equates to better performance. This technology adds 144 new instructions to the CPU core that can be used in a wide variety of applications. Software programmers can for example, take advantage of these new instructions and write more optimized code that take advantage of newer SIMD double-precision floating-point, integer, and cache ability instructions. In theory, this will enable better next generation services such as Interactive Digital TV to be produced.

Advanced Dynamic Execution

Advanced Dynamic Execution describes the improved implementation and abilities over the older P6 processor line's out-of-order decoupled super scalar execution. Dynamic execution allows instructions to the processor to be executed without the need to do so in order. The ability to do this can add a significant performance increase versus ordered execution.

Hyper Pipelined Technology & 400/533MHz System Bus

Hyper Pipelined Technology doubles the pipeline depth the Pentium 4 delivers to 20 stages. This significantly increases the performance and frequency capabilities. Pentium 4 also introduces a 400/533MHz system bus as opposed to the 100 and 133MHz bus seen in previous Pentium III processors. This allows 3.2Gbytes per second of throughput while the Pentium III had a limited 1.06Gbyte/s throughput. Willamette will reportedly be introduced in the 0.18-micron using aluminum.

Hyper-Threading Technology

Hyper-Threading Technology is a new features in the IA-32 Intel Architecture that provides a performance boost for future Intel-32 processors based on the Intel NetBurst™ micro architecture. This technology enables a single processor to run two separate threads simultaneously, this arrangement looks like two processors. Hyper-Threading Technology makes a single physical processor appear as multiple logical processors, there is one copy of the architecture state for each logical processor, and the logical processor share a single set of physical execution resources. From a software or architecture perspective, this means operating systems and user programs can schedule processors or threads to logical processors as they would on conventional physical processors in a multi-processor system. From a micro architecture perspective , this means that instructions form logical processors will persist and execute simultaneously on shared execution resources.

For more information about all the new features the Pentium 4 delivers *check out the Intel website at http://www.intel.com*

Accelerated Graphics Port (AGP or A.G.P.)

Typically, 3D graphics rendering requires a tremendous amount of memory, and demands ever increasing throughput speed as well. As 3D products for the personal computer become more and more popular, these demands will only increase. This will cause a rise in costs for both end users and manufacturers. Lowering these costs as well as improving performance is the primary motivation behind AGP. By providing a massive increase in the bandwidth available between the video card and the processor, it will assist in relieving some of these pressures for quite sometime.

The board provides the AGP 2.0 interface. The AGP Interface Specification revision 2.0 enhances the functionality of the original AGP Interface Specification (revision 1.0) by allowing 4X data transfers (4 data samples per clock) and 1.5 volt (power supply) operation. The AGP 2.0 interface, along with SDRAM memory technology, allows graphics controllers to access main memory at over 1GB/s. In order to match the 4X AGP Card. The board used the Universal AGP connector. (1.5 volt AGP Card supports only).

Ultra ATA/66/100

The ICH4 provides two channel Ultra ATA/66/100 Bus Master IDE controllers, that support Ultra ATA/66/100 protocols, perfect for such demanding applications as real-time video, multimedia, and high performance operating system. A new IDE cable is required for Ultra ATA/66/100. This cable is an 80 conductor cable; however the connectors are, of course, backwards compatible with ATA/33.

Hardware Monitoring

Hardware monitoring allows you to monitor various aspects of your system operations and status. The features include CPU temperature, voltage and RPM of fan.

Bandwidth Overview

Table 1 provides a summary of the bandwidth requirements for the Intel® 845GE chipset.

Interface	Clock Speed (MHz)	Samples Per Clock	Data Rate (Mega-samples/s)	Data Width (Bytes)	Bandwidth (MB/s)
CPU Bus	**100/133**	**4**	**400/533**	**8**	**3200/4264**
DDR SDRAM	**100/133/166**	**2**	**200/266/333**	**8**	**1600/2128/2664**
AGP 2.0	**66.6**	**4**	**266**	**4**	**1066**
Hub Link	**66.6**	**4**	**266**	**1**	**266**
PCI 2.2	**33.3**	**1**	**33.3**	**4**	**133**

Table 1: Intel® 845GE platform Bandwidth Summary

Mainboard Form-Factor

The board is designed with Micro ATX form factor - the latest industry standard of chassis. The Micro ATX form factor is essentially a Baby-AT baseboard rotated 90 degrees within the chassis enclosure and a new mounting configuration for the power supply. With these changes the processor is relocated away from the expansion slots, allowing them all to hold full length add-in cards. Micro ATX defines a double height aperture to the rear of the chassis which can be used to host a wide range of onboard I/O. Only the size and position of this aperture is defined, allowing PC manufacturers to add new I/O features (e.g.; TV input, TV output, joystick, modem, LAN, audio, etc.) to systems. This will help systems integrators differentiate their products in the marketplace, and better meet your needs.

- By integrating more I/O down onto the board and better positioning the hard drive and floppy connectors material cost of cables and add-in cards is reduced.
- By reducing the number of cables and components in the system, manufacturing time and inventory holding costs are reduced and reliability will increase.
- By using an optimized power supply, it's possible to reduce cooling costs and lower acoustical noise. An ATX power supply, which has a side-mounted fan, allows direct cooling of the processor and add-in cards making a secondary fan or active heatsink unnecessary in most system applications.

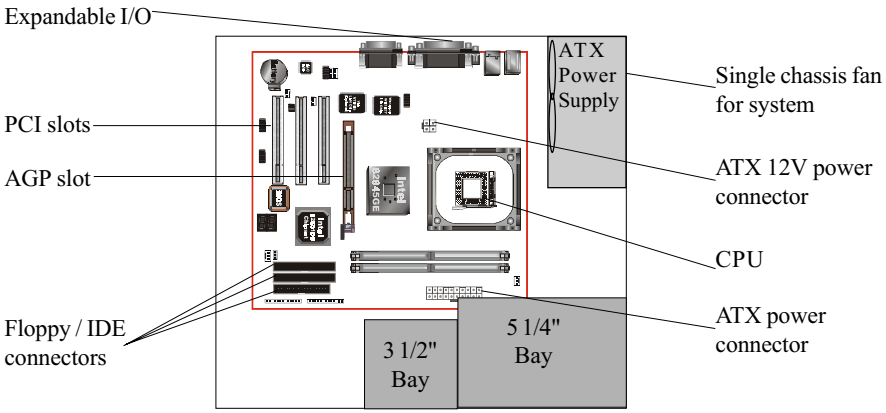


Figure 2: Summary of Micro ATX chassis features

I/O Shield Connector

The board is equipped with an I/O back panel. Please use the appropriate I/O shield (figure 3).

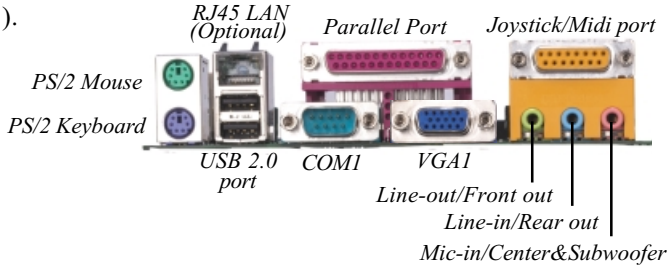


Figure 3: I/O back panel layout

Power-On/Off (Remote)

The board has a single 20-pin ATX and 4-pin ATX12V connector for power supplies (Figure 4). For power supplies that support the **Remote On/Off** feature, this should be connected to the mainboard front panel PW_ON connector for the computer power On/Off button.

The board has been designed with “Soft Off" function. You can turn off the system two ways: pressing the front panel power On/Off button, using the "Soft Off" function (incorporated in the mainboard’s onboard circuit controller) that can be controlled by an operating system such as Windows®XP/ME/2000/98/95.

Note: For maintaining the DDR SDRAM power during STR (ACPI S3) function, it is strongly recommend to use power supplies that have a +5VSB current of (>=) 1A (1000mA). Please check the 5VSB’s specification that has been printed on the power supply’s outer case.

Note: The board requires a minimum of 250 Watt power supply to operate. Your system configuration (amount of memory, add-in cards, peripherals, etc.) may exceed the minimum power requirement but to ensure that adequate power is provided, use a 300 Watt (or greater) power supply.

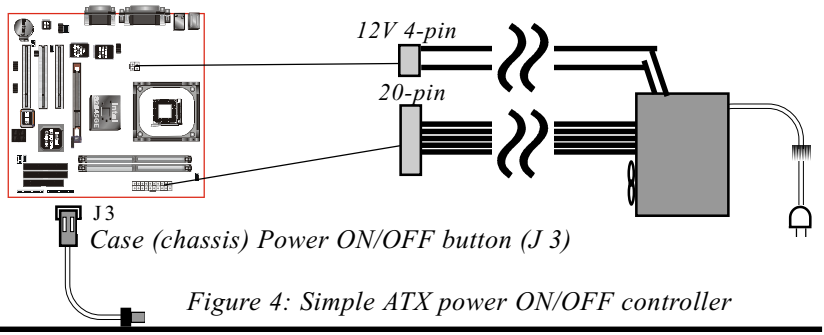


Figure 4: Simple ATX power ON/OFF controller

System Block Diagram

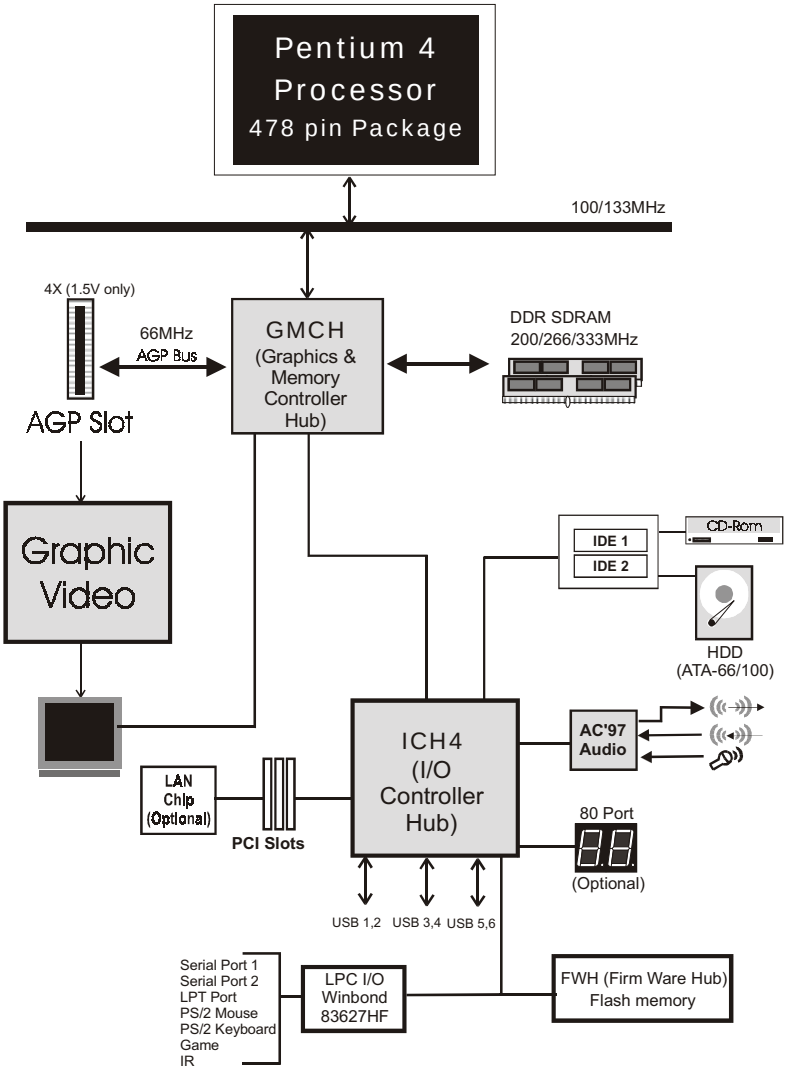


Figure 5: System Block Diagram

Section 2
FEATURES

Mainboard Features

Processor

- Socket 478 Intel® Pentium® 4 processor from 1.4 to 3.06GHz with 400/533MHz Front Side Bus
- Supports Hyper-Threading Technology

  Enabling the functionality of Hyper-Threading Technology for your computer system requires ALL of the following platform Components:

  ☞**CPU**: An Intel® Pentium® 4 Processor with HT Technology.

  ☞**Chipset**: An Intel® Chipset that supports HT Technology.

  ☞**BIOS**: A BIOS that supports HT Technology and has it enabled.

  ☞**OS**: An operating system that supports HT Technology.

Chipset

- Intel 82845GE Chipset (82845GE + ICH4)

Built-in VGA

- Intel Extreme Graphics

Main Memory

- Two 184-pin DDR DIMM sockets for PC1600/2100/2700 DIMMs
- Supports up to 2GB memory size

BIOS

- 4Mb Flash EEPROM with Award BIOS

  - ACPI v2.0 compliant
  - S3 (Suspend to DRAM) sleep-state support
  - SMBIOS (System Management BIOS) v2.2 compliant

- Supports Power failure recovery
- Capable to waked the computer up from specific states by LAN, Power switch, PME#, RTC alarm, USB, PS2 devices, Modem Ring-in COM#1…

Onboard PCI Devices

- LAN --> (Optional) Embedded 10/100Mbps Fast Ethernet controller with VIA 6105 LAN Chipset
- IDE --> Embedded IDE controller supports 2 IDE ports for up to 4 IDE devices
  - Supports ATA-100 with up to 100Mbps bandwidth

Legacy IO Controller

- Winbond W83627HF LPC IO controller with floppy, printer, game, serial and CIR/SIR interface

Audio

- Six channel audio with analog and digital output using ALC-650 AC'97 CODEC
  - AC'97 v2.2 compliant
  - In 2-CH mode, supports Mic-In (Pink), Line-In (Blue) and Line-Out (Green) at rear panel
  - In 6-CH mode, supports Center/Subwoofer (Pink), Rear out (Blue), Front out (Green) at rear panel
  - Supports CD-In, Aux-In and S/PDIF-In/out interface
  - Supports Line-out and Mic-In for front panel

Peripheral Interfaces

- PS/2 keyboard and mouse ports (at rear panel)
- One Parallel (printer) port (at rear panel)
- One RJ45 LAN connector (at rear panel)(Optional)
- Two Serial ports (1 at rear panel)
- One VGA ports (at rear panel)
- One game port (at rear panel)

- One floppy drive interface
- Two IDE interfaces with up to ATA-100 support
- Six USB2.0 ports (2 at rear panel)
- Three Fan connectors

Front Panel Controller

- Supports Reset & Soft-Off switches and KeyLock
- Supports HDD & Power LEDs
- Supports PC speaker

Expansion Slots

- One AGP slot supporting 1.5v 4X AGP card
  - AGP v2.0 compliant
- Three PCI bus sockets with Bus Master support
  - PCI v2.2 compliant

Other Features

- Magic Health – USDM, a H/W monitoring software utility, for voltages, temperatures and fan-speeds sensing
- EZ Boot – An easy way let end-user can choose to boot from hard drive, CD-ROM, floppy, …
- Excellent Over clocking capabilities by
  - subtle voltage tuning on CPU, Memory, AGP
  - subtle frequency tuning on FSB
- Supports complete FSB/Memory and FSB/AGP, PCI Asynchronous scheme for over-clocking
- Supports AGP card 3.3V Protection
- P80P for system debugging (Optional)

Form Factor

- 245 x 220 mm Micro ATX size

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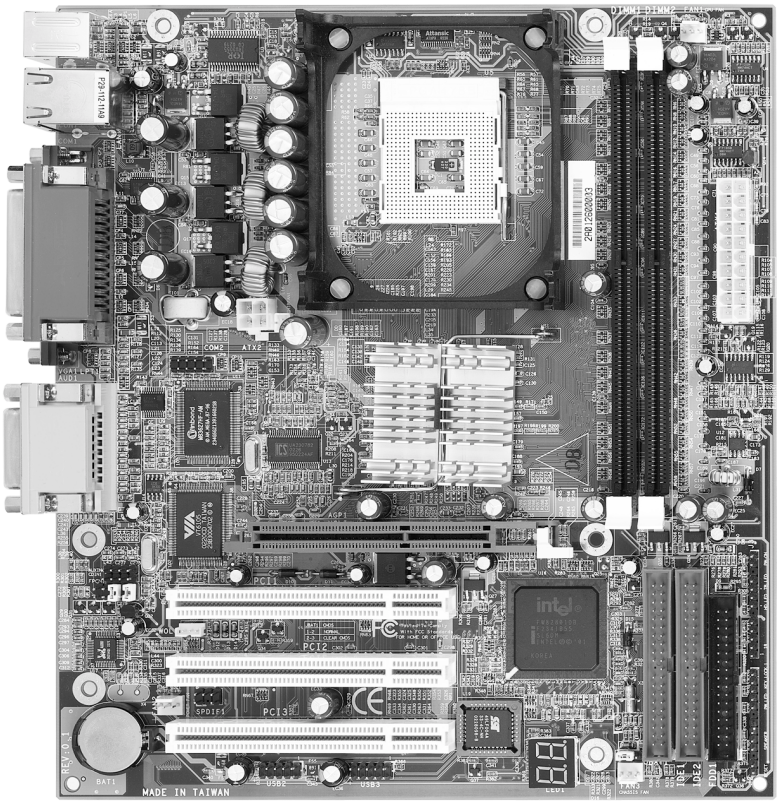
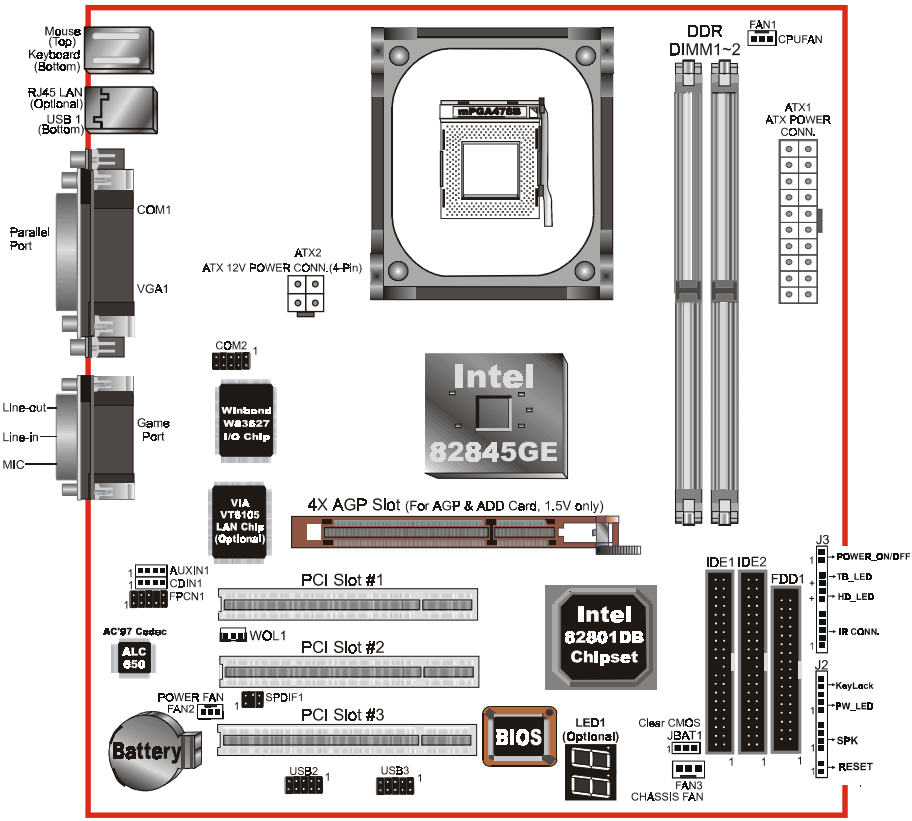
Section 3
INSTALLATION



Mainboard Layout



Easy Installation Procedure

The following must be completed before powering on your new system:

3-1. CPU Installation
3-2. Jumper Settings
3-3. System Memory Configuration
3-4. Device Connectors
3-5. External Modem Ring-in Power ON and Keyboard Power ON Functions (KBPO)
3-6. STR Function
3-7. Supports AGP Card 3.3V Protection

Section 3-1
CPU Installation

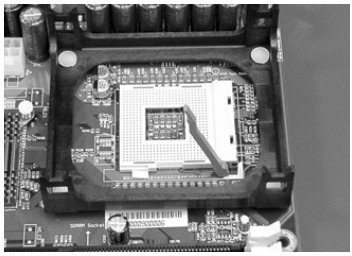


Figure 1

Step 1

Open the socket by raising the actuation lever.

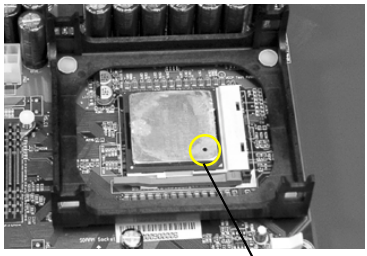


Figure 2

Step 2

Align pin 1 on the CPU with pin 1 on the CPU socket as shown in the illustration above. The CPU is keyed to prevent incorrect insertion. Don't force the processor into the socket. If it does not go in easily, check for mis-orientation and reinsert the CPU. Make sure the processor is fully inserted into the socket.

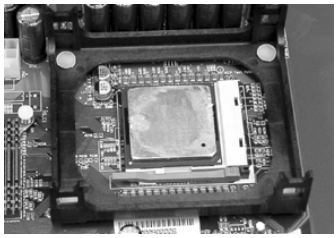


Figure 3

Step 3

Close the socket by lowering and locking the actuation lever.

Figure 4

Step 4

Apply thermal compound to the top of the CPU and install the heatsink as shown.

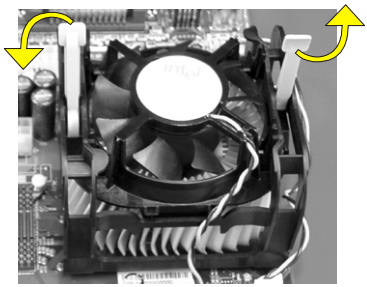


Figure 5

Step 5

Install the cooling fan assembly. Press the two clips in the direction of the arrows shown in Figure 5 to secure the assembly to the CPU socket.

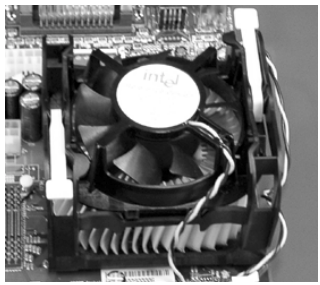


Figure 6

Step 6

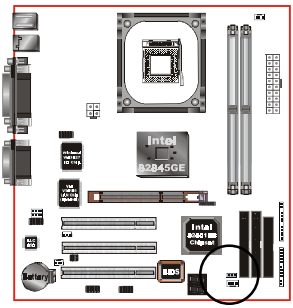
Plug the CPU fan into the CPU fan connector (FAN1).

The installation is complete.

NOTES:

- Damage to Intel Pentium™ 4 processors might result if installed with incorrect CPU fan and heatsink assemblies. Use Intel's design thermal solution shown in the illustrations above: an active heatsink; an extruded aluminum heatsink base; and a fan attached to the top on the fin array.
- Apply heatsink thermal compound or paste to the CPU to avoid CPU overheating and damage.
- In accordance with Intel Corp. specifications, do not install a CPU over 50 times to avoid bending the pins and damaging the CPU.

Section 3-2
Jumper Settings



JBAT1

CMOS Clear
1-2: Normal (Default)
2-3: Clear CMOS

Section 3-3
System Memory Configuration

Memory Layout

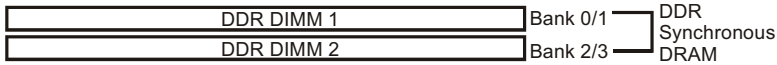
The mainboard accommodates two PC1600/PC2100/2700 184-pin DIMMs (Dual In-line Memory Modules):

- Supports up to 2.0GB of 200/266/333MHz DDR SDRAM.
- Supports up to 2 DDR DIMMs (refer to Table 1).
- Supports DDR 200/266/333 unregistered 184-pin non-ECC DDR SDRAM DIMMs.
- Supports configurations defined in the JEDEC DDR DIMM specification

NOTE: The mainboard does not support double-sided x 16 DDR DIMMs. Use DDR SDRAM (Double-Data-Rate Synchronous DRAM) modules only.

Figure 7 and Table 1 show several possible memory configurations.

<Figure 7>



<Table 1>

Total Memory	DDR DIMM 1 (Bank 0/1)	DDR DIMM 2 (Bank 2/3)
= 1GB Maximum	DDR SDRAM* 64MB, 128MB, 256MB, 512MB, 1GB* X 1	None
= 2GB Maximum	DDR SDRAM* 64MB, 128MB, 256MB, 512MB, 1GB* X 1	DDR SDRAM* 64MB, 128MB, 256MB, 512MB, 1GB* X 1

* DDR SDRAM supports 64, 128, 256, 512MB and 1GB DIMM modules using 512Mb technology.

NOTES:

- Using non-compliant memory with higher bus speeds (overclocking) may severely compromise the integrity of the system.

DIMM Module Installation

Figure 8 displays the notch on the DDR DIMM memory module.

DIMMs have 184 pins and one notch that matches with the DDR DIMM socket. DIMM modules are installed by placing the chip firmly into the socket and pressing straight down as shown in figure 9 until the white clips close and the module fits tightly into the DIMM socket (figure 10).

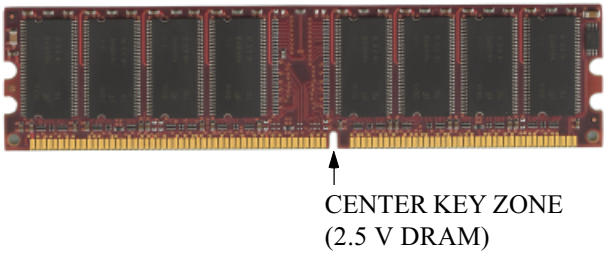


Figure 8 - DIMM notch

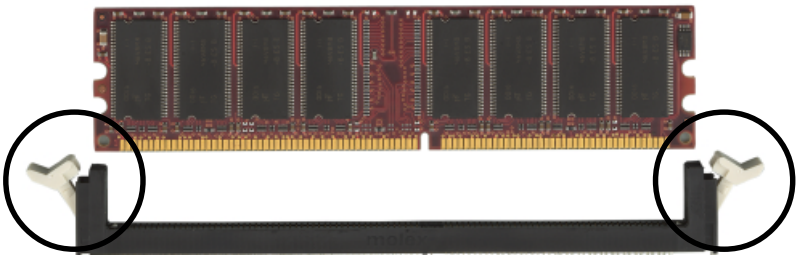


Figure 9 - DIMM module clips before installation

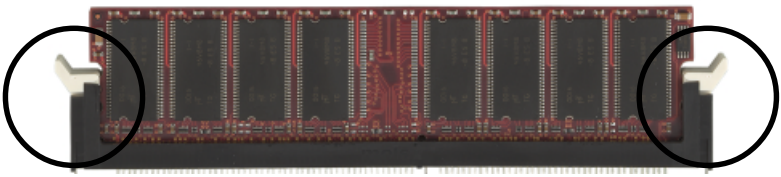


Figure 10 - DIMM module clip after installation

To remove the DIMM module press down the white clips and the module is released from the socket.

Section 3-4
Device Connectors

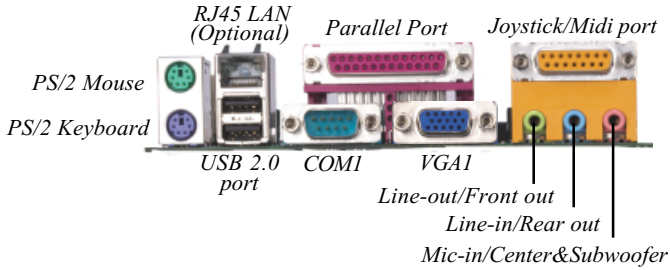
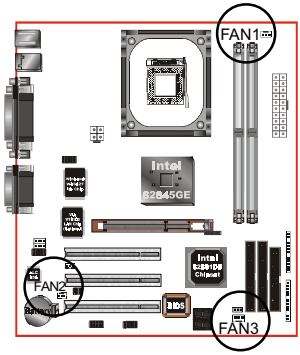


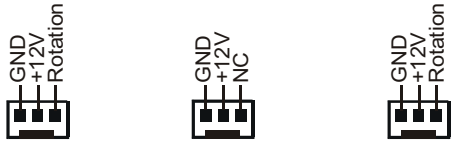
Figure 11 - I/O Ports

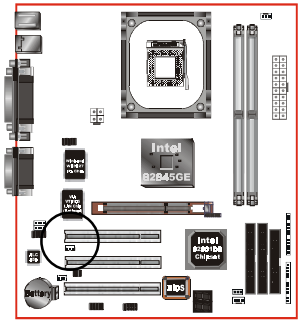


FAN1 / FAN2 / FAN3:

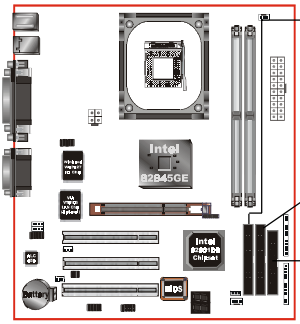
CPU/Power/Chassis Fan Power Connectors

FAN1:	FAN2:	FAN3:
CPU Fan	Power Fan	Chassis Fan





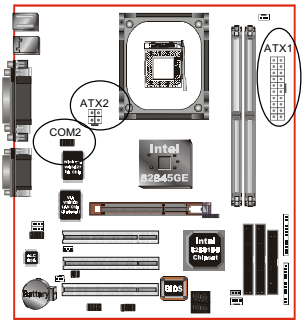
WOL1: WOL (Wake On LAN) Connector
Reserved for an NIC (Network Interface Card) to wake the system from power saving mode.



IDE1: Ultra DMA-66/100 Primary IDE Connector (Blue)

IDE2: Ultra DMA-66/100 Secondary IDE Connector (Blue)

FDD1: Floppy Controller Connector (Black)



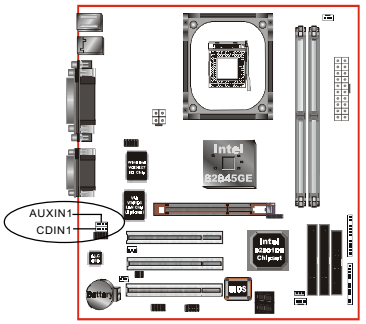
ATX1: 20-pin ATX Power Connector

ATX2: 4-pin ATX12V Power Connector

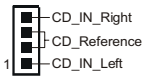
Caution:
Be sure that the ATX1 and ATX2 Power Connector must be used simultaneously or else boot-up may not be possible.

Note: The board requires a minimum of 250 Watt power supply to operate. Your system configuration (amount of memory, add-in cards, peripherals, etc.) may exceed the minimum power requirement but to ensure that adequate power is provided, use a 300 Watt (or greater) power supply.

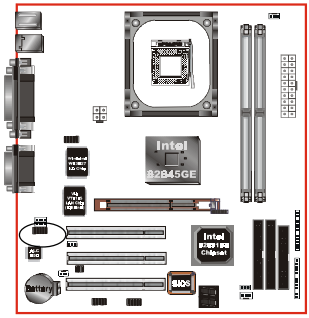
COM2: RS232 COM2 Connector



CDIN1: CD Audio_IN Connector

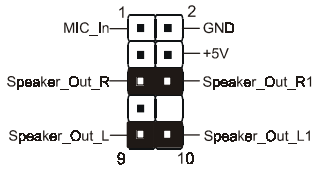


AUXIN1: Auxiliary Line_IN Connector



FPCN1: Front Panel Audio Connector

When the jumpers are removed and this connector is used for front panel audio. The type of front panel line-out phone jack is normal close. Without phone plug inserted, the rear panel audio is enabled. With phone plug inserted, the rear panel audio is disabled.

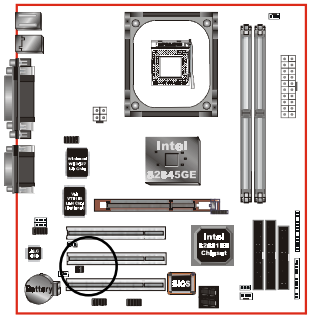


Settings

Pins (5-6) & (9-10) Short (default): Only the Onboard Rear Audio Speaker can be used.

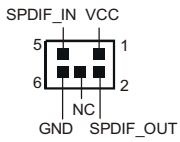
Pins (5-6) & (9-10) Open: Only Front Panel Audio Speaker can be used.

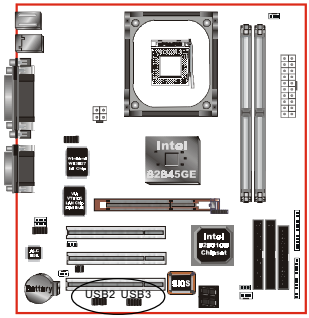
In 2-Channel audio mode, Mic-In is shared for both front panel and rear panel. In 6-Channel audio mode, the Mic-In is dedicated for front panel used, and rear panel Mic-In function will switch to Center and subwoofer support.



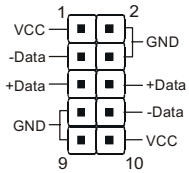
SPDIF1: Sony/Philips Digital Interface

This connector is the digital link between the motherboard and your devices, such as CD player, sampler or DAT recorder. It allows the digital transmission of audio data in SPDIF format.





USB2/3: USB port header for four USB2.0 ports. It will help your more efficient for the transfer speed up to 480Mbps.

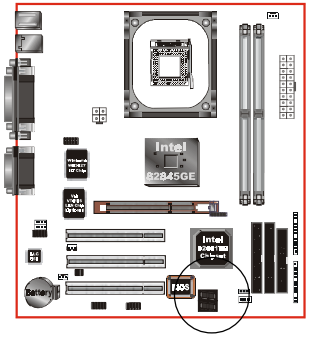


USB port header pin descriptions

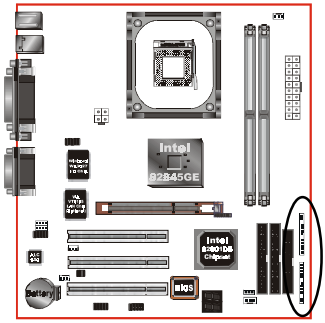
PIN#	Wire color	Signal Name	Comment
1	Red	Vcc	Cable Power
2	Black	Ground	Case Ground
3	White	-Data	Data
4	Black	Ground	Cable Ground
5	Green	+Data	Data
6	Green	+Data	Data
7	Black	Ground	Cable Ground
8	White	-Data	Data
9	Black	Ground	Case Ground
10	Red	Vcc	Cable Power

CAUTION !

Please make sure the USB cable has the same pin assignment. The different pin assignment may be caused damage of system.
If you need the USB cable, please contact our retailer.



LED1: (Optional) 80 Port Debug 7-segment LED display. Provides two digits LED light to show why system boots failed for quick and easy optimization.
(Please refer to Appendix E for POST codes)

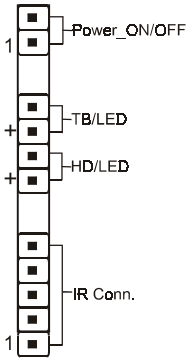


◆ **Power On/Off**

This is connected to the power button on the case. Using the Soft-Off by Pwr-BTTN feature, you can choose either Instant Off (turns system off immediately), or 4 sec delay (push the button for 4 seconds before the system turns off). When the system is in 4 sec delay mode, suspend mode is enabled by pushing the button momentarily.

◆ **Turbo LED indicator**

J3



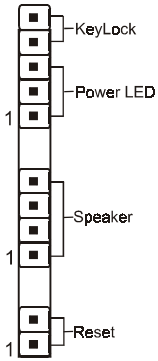
◆ **IDE LED indicator**

LED on when onboard PCI IDE Hard disks are being accessed.

◆ **IR Connector**

1. VCC
2. CIRRX
3. IRRX
4. GND
5. IRTX

J2



◆ **KeyLock**

Keyboard lock switch & power LED connector

1. Power LED(+)
2. N/C
3. GND
4. KeyLock
5. GND

* The power LED lights when the system is powered on and blinks in SLEEP Mode or STR Mode.

◆ **Speaker**

Connect to the system's speaker for beeping

1. Speaker
2. N/C
3. GND
4. VCC

◆ **Reset**

Closed to restart system.

Section 3-5
External Modem Ring-in Power ON and Keyboard Power ON Functions (KBPO)

Modem Ring-in Power ON Function

The I/O chipset provides the two serial ports with the External Modem Ring-in Power ON function. Once you connect an external modem to COM1 or COM2, the mainboard enables you to turn on the system through remote and host dial-up control.

Keyboard Power ON Function

The mainboard features a keyboard power on function that enables you to turn on the power supply using a keypress. Follow these instructions to enable the Keyboard Power ON function .

Step : Use the Keyboard Power ON function (KBPO) to turn on the system by using a key press, password, or hot key combination etc. as set in the BIOS Power Management Setup menu (refer to the BIOS Power Management Setup for details). The BIOS default setting is keyboard Hot key (<Ctrl> + <F1>). To power off the system, use the soft-OFF function under Windows XP/2000/98/95 (refer to Windows online help).

NOTES:

- Intel ATX version 2.0 specification recommends you use a power supply that supplies >=1.0 A in 5.0 VSB. However, this mainboard supports a 5.0 VSB standby power supply > = 1A.
- We recommend you use the power supply with 1.0 A in 5.0 VSB, which supports PCI 2.2 specification for remote power-on and wake-up functions.

3-6 STR (Suspend To RAM) Function

This mainboard supports the STR (Suspend To RAM) power management scheme by maintaining the appropriate power states in the DDR SDRAM interface signals. The power source to the DDR SDRAM must be kept active during STR (ACPI S3). Advanced Configuration Power Interface (ACPI) provides many Energy Saving Features for operating systems that support Instant ON and QuickStart™ function.

1. Use the STR functionality to save system power, you are recommended to confirm the following requirements:
   a. Install ACPI qualified add-on cards (such as AGP, LAN, and modem cards).
   b. In BIOS under Power Management Setup (refer to Section 4), select "ACPI Suspend Type: S3(STR)" and "USB Wake-Up From S3: Enabled" (if you have a USB mouse or keyboard device).
   c. Install Windows® XP/2000/ME/98SE.
   d. Restart the system.
   e. Open the Control Panel Power Management application, and click the Advanced tab. In the Power buttons section, select "Stand By" from the drop-down lists.
2. To enable the STR function, click the START button and choose Shut Down. In the Shut Down Windows dialog box, select the Stand By option to enter STR mode.

   The following lists the differences between STR power saving mode and Green (or Suspend) mode:
   a. STR is the most advanced Power Management mode.
   b. STR cuts all the power supplied to peripherals except to memory - max. power saving.
   c. STR saves and keeps all on-screen data including any executed applications to DDR SDRAM.
   d. In STR mode, you must push the power button (connected to the onboard J3 pin), click your USB mouse buttons, or press your USB keyboard keys to wake up your system to the last display.

3-7 Supports AGP Card 3.3V Protection

The Intel® 845GE chipset supports 1.5 volt AGP graphics cards only. Using a 3.3 volt AGP card in an Intel® 845GE chipset-based board might damage the chipset on an 845GE-equipped mainboard. However, this mainboard features a protection function that prevents the system from powering on when a 3.3V AGP card is inadvertently inserted into the AGP slot.

If this happens, we recommend you to follow these steps:

Step 1: Remove the 3.3V AGP card from the AGP slot.

Step 2: Unplug the ATX/ATX12V power cable.

Step 3: Insert a 1.5V AGP card into the AGP slot.

Step 4: Wait for 5 ~ 7 seconds and then plug in the ATX/ATX12V power cord again (or turn on the ATX/ATX12V power switch) to turn on your system.

Note: There should be an interval of 5 ~ 7 seconds between unplugging and plugging in the power cord, or turning the ATX/ATX12V power supply on and off.

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Section 4
AWARD BIOS SETUP

Main Menu

Award's ROM BIOS provides a built-in Setup program which allows user to modify the basic system configuration and hardware parameters. The modified data is stored in a battery-backed CMOS, so that data will be retained even when the power is turned off. In general, the information saved in the CMOS RAM will stay unchanged unless there is a configuration change in the system, such as hard drive replacement or a device is added.

It is possible for the CMOS battery to fail causing CMOS data loss. If this happens you will need install a new CMOS battery and reconfigure your BIOS settings.

To enter the Setup Program :

Power on the computer and press the <Del> key during the POST (Power On Self Test). The BIOS CMOS SETUP UTILITY opens. (Figure 1)

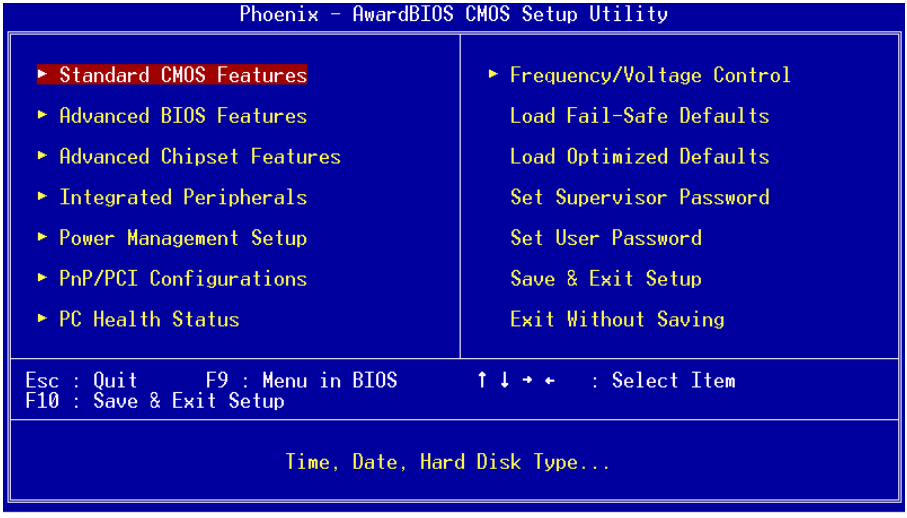


Figure 1: CMOS Setup Utility

The main menu displays all the major selection items. Select the item you need to reconfigure. The selection is made by moving the cursor (press any direction (arrow key) to the item and pressing the 'Enter' key. An on-line help message is displayed at the bottom of the screen as the cursor is moved to various items which provides a better understanding of each function. When a selection is made, the menu of the selected item will appear so that the user can modify associated configuration parameters.

4-1 Standard CMOS Setup

Choose "STANDARD CMOS FEATURES" in the CMOS SETUP UTILITY Menu (Figure 2). Standard CMOS Features Setup allows the user to configure system settings such as the current date and time, type of hard disk drive installed, floppy drive type, and display type. Memory size is auto-detected by the BIOS and displayed for your reference. When a field is highlighted (use direction keys to move the cursor and the <Enter> key to select), the entries in the field can be changed by pressing the <PgDn> or the <PgUp> key.

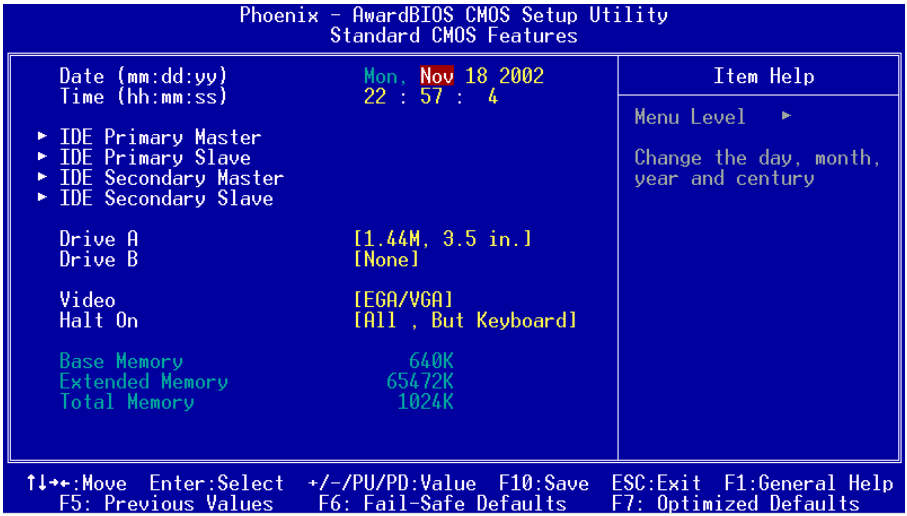


Figure 2: Standard CMOS Setup

Notes:

- If the hard disk Primary Master/Slave and Secondary Master/Slave are set to Auto, then the hard disk size and model will be auto-detected.
- The "Halt On:" field is used to determine when to halt the system by the BIOS if an error occurs.
- Floppy 3 Mode support is a mode used to support a special 3.5-inch drive used in Japan. This is a 3.5-inch disk that stores 1.2 MB. The default setting for this is disabled.

4-2 Advanced BIOS Features

Selecting the "ADVANCED BIOS FEATURES" option in the CMOS SETUP UTILITY menu allows users to change system related parameters in the displayed menu. This menu shows all of the manufacturer's default values for the board.

Pressing the [F1] key displays a help message for the selected item.

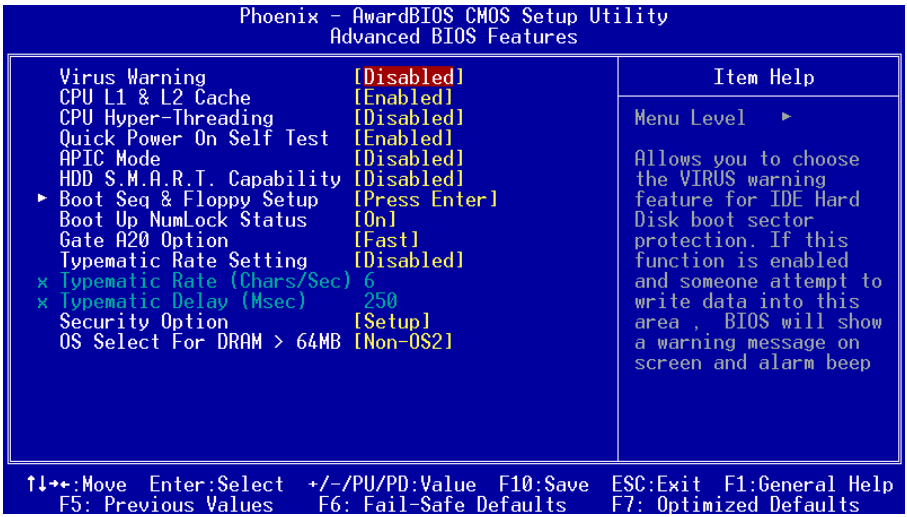


Figure 3: BIOS Features Setup

Virus Warning

During and after system boot up, any attempt to write to the boot sector or partition table of the hard disk drive halts the system and an error message appears.
You should then run an anti-virus program to locate the virus. Keep in mind that this feature protects only the boot sector, not the entire hard drive. The default is Disabled.

Enabled: Activates automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector.

Disabled: No warning message appears when anything attempts to access the boot sector.

Note: Many disk diagnostic programs that access the boot sector table can trigger the virus warning message. If you plan to run such a program, we recommend that you first disable the virus warning.

CPU L1 & L2 Cache

This controls the status of the processor's internal Level One and Level Two cache. The default is Enabled.

Enabled: This activates the processor's internal cache thereby increasing performance.

Disabled: This deactivates the processor's internal cache thereby lowering performance.

CPU Hyper-Threading

Enables the CPU Hyper-Threading Technology.
Options: Enables, Disabled.

Note: Recommends enabling Hyper-Threading Technology on system with Windows XP and Linux 2.4 and disabling for legacy OS.

Quick Power On Self Test

This category speeds up the Power On Self Test (POST). The default is Enabled.

Enabled: This setting will shorten or skip of the items checked during POST.

Disabled: Normal POST.

APIC Mode

This item allows you to enable APIC (Advanced Programmable Interrupt Controller) functionality. APIC is an Intel chip that provides symmetric multiprocessing (SMP) for its Pentium systems. The default is Disabled.
Options: Enabled, Disabled.

HDD S.M.A.R.T. Capability

The S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) system is a diagnostics technology that monitors and predicts device performance. S.M.A.R.T. Software resides on both the disk drive and the host computer.
The disk drive software monitors the internal performance of the motors, media, heads, and electronics of the drive. The host software monitors the overall reliability status of the drive. If a device failure is predicted, the host software, through the Client WORKS S.M.A.R.T applet, warns the user of the impending condition and advises appropriate action to protect the data. The default is Disabled.
Options: Enabled, Disabled.

Boot Up NumLock Status

This controls the state of the NumLock key when the system boots. The default is On.
On: The keypad acts as a 10-key pad.
Off: The keypad acts like cursor keys.

Gate A20 Option

This refers to the way the system addresses memory above 1 MB (extended memory). The default is Normal.
Normal: The A20 signal is controlled by the keyboard controller or chipset hardware.
Fast: The A20 signal is controlled by Port 92 or chipset specific method.

Typematic Rate Setting

This determines the keystrokes repeat rate. The default is Disabled.
Enabled: Allows typematic rate and typematic delay programming.
Disabled: The typematic rate and typematic delay will be controlled by the keyboard controller in your system.

Typematic Rate (Chars/Sec)

This is the number of characters that will be repeated by a keyboard press. The default is 6.
Options: 6 ~ 30 characters per second.

Typematic Delay (msec)

This setting controls the time between the first and the second character displayed by typematic auto-repeat. The default is 250.
Options: 250/500/750/1000 msec.

Security Option

This category allows you to limit access to the System and Setup, or just to Setup. The default is Setup.

System: The system will not boot and access to Setup will be denied unless the correct password is entered at the prompt.

Setup: The system will boot, but access to Setup will be denied unless the correct password is entered at the prompt.

OS Select For DRAM > 64 MB

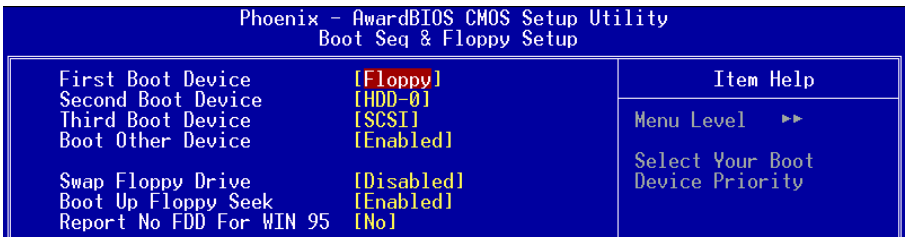
Some operating systems require special handling. Use this option only if your system has greater than 64 MB of memory. The default is Non-OS2.

OS2: Select this if you are running the OS/2 operating system with greater than 64 MB of RAM.

Non-OS2: Select this for all other operating systems and configurations.

▸ *Boot Seq & Floppy Setup*

Scroll to Boot Seq & Floppy Setup and press <Enter>. The following screen appears:



First /Second/Third/Other Boot Device

The BIOS attempts to load the operating system from the devices in the sequence selected in these items.

Options: Floppy, LS120, HDD-0, SCSI, CDROM, HDD-1, HDD-2, HDD-3, ZIP100, USB-FDD, USB-ZIP, USB-CDROM, USB-HDD, LAN, Disabled.

Boot Other Device

When enabled, the system searches all other possible locations for an operating system if it fails to find one in the devices specified under the first, second, and third boot devices. The default is Enabled.

Options: Enabled, Disabled.

Swap Floppy Drive

This will swap your physical drive letters A & B if you are using two floppy disks. The default is Disabled.

Enabled: Floppy A & B will be swapped under the O/S.

Disabled: Floppy A & B will be not swapped.

Boot Up Floppy Seek

If this item is enabled, it checks the size of the floppy disk drives at start-up time. You don't need to enable this item unless you have a legacy diskette drive with 360K capacity. The default is Disabled.

Options: Enabled, Disabled.

Report No FDD For Win 95

If you are running a system with no floppy drive under Windows 95, select Yes for this item to ensure compatibility with the Windows 95 logo certification. Otherwise, select No.

Yes: The system has no floppy drive when you are using Windows 95.

No: The system has an operating system other than Windows 95.

4-3 Advanced Chipset Features

Choose the "ADVANCED CHIPSET FEATURES" option in the CMOS SETUP UTILITY menu to display following menu.

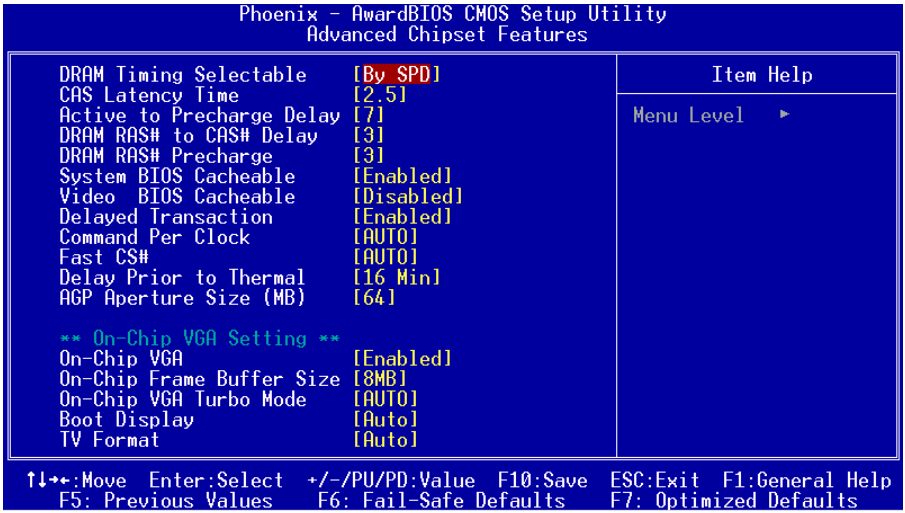


Figure 4: Chipset Features Setup

DRAM Timing Selectable

For setting DRAM Timing, By SPD is follow Intel PC DDR SDRAM Serial Presence Detect Specification.

Options: Manual, By SPD.

CAS Latency Time

Enables you to select the CAS latency time. The value is set at the factory depending on the DRAM installed. Do not change the values in this field unless you change specifications of the installed DRAM and DRAM clock from DRAM Timing Selectable. The default is by DRAM SPD.

Options: 1.5, 2, and 2.5.

Active to Precharge Delay

This item specifies the number of clock cycles needed after a bank active command before a precharge can occur (sets the minimum RAS pulse width.). The default is by DRAM SPD.

Options: 5, 6, 7.

DRAM RAS# to CAS# Delay

This item sets the timing parameters for the system memory such as the CAS (Column Address Strobe) and RAS (Row Address Strobe). The default is by DRAM SPD.
Options: 2, 3.

DRAM RAS# Precharge

This item refers to the number of cycles required to return data to its original location to close the bank or the number of cycles required to page memory before the next bank activate command can be issued. The default is by DRAM SPD.
Options: 2, 3.

System BIOS Cacheable

This item allows the system to be cached in memory for faster execution. The default is Enabled.
Options: Disabled, Enabled.

Video BIOS Cacheable

This item allows the video to be cached in memory for faster execution. The default is Disabled.
Options: Disabled, Enabled.

Delayed Transaction

The mainboard's chipset has an embedded 32-bit post write buffer to support delay transactions cycles. Select Enabled to support compliance with PCI specification version 2.1. The default is Enabled.
Options: Disabled, Enabled.

Command Per Clock

Enabling this item improves performance. The default is Auto.
Options: Auto, Enabled, Disabled.

Fast CS#

When set to "Enabled" and SDRAM is idle, CS# is asserted in the same time the SDRAM tracking transitions to active state. The fast CS# timing is also applicable for pipelined assertion that follows page hit cycle.
Auto: This selection will Auto detect.
Disabled: Normal CS# mode (CS# active two clocks after internal SDRAM-start indication)

Enabled: Fast CS# mode (CS# active one clocks after internal SDRAM-start indication)

Delay Prior to Thermal

Set this item to enable the CPU Thermal function to engage after the specified time. The default is 16 minutes.
Options: 4, 8, 16, 32 minutes.

AGP Aperture Size (MB)

This item defines the size of the aperture if you use an AGP graphics adapter. It refers to a section of the PCI memory address range used for graphics memory. The default is 64 MB.
Options: 32, 64, 128, 256 MB.

*** On-Chip VGA Settings ***

On-Chip VGA

This item allows you to control the on-chip VGA.
Options: Enabled, Disabled.

On-Chip Frame Buffer Size

This item allows you to control the on-chip frame buffer size.
Options: 1MB, 8MB.

On-Chip VGA Turbo Mode

This item allows you to turn on/off on-chip VGA Turbo Mode.
Options: Auto, Enabled, Disabled.

Boot Display

This item allows you to selcet the boot display device.
Options: Auto, CRT, TV, EFP.

TV Format

This item allows you to selcet the TV format.

4-4 Integrated Peripherals

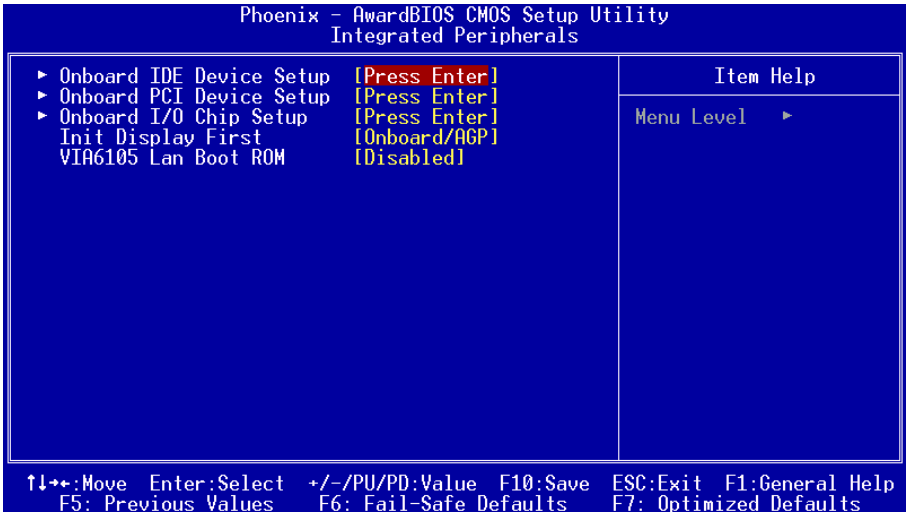


Figure 5: Integrated Peripherals

Notes:

- If you do not use the Onboard IDE connector, then you will need to set that Onboard Primary PCI IDE: Disabled and Onboard Secondary PCI IDE: Disabled
- The Onboard PCI IDE cable should be equal to or less than 18 inches (45 cm.).

Init Display First

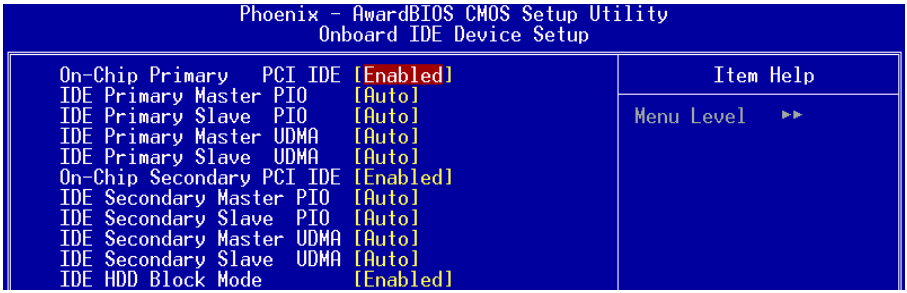
If two video cards are used (1 AGP and 1 PCI) this specifies which one will be the primary display adapter. The default is PCI Slot.
Options: PCI Slot, AGP.

VIA6105 Lan Boot ROM (Optional)

Enables and disables the onboard LAN Boot ROM. The default is Disabled.
Options: Enabled, Disabled.

Onboard IDE Device Setup

Scroll to Onboard IDE Device Setup and press <Enter>. The following screen appears:



On-Chip Primary PCI IDE

The integrated peripheral controller contains an IDE interface with support for two IDE channels. Select Enabled (default) to activate each channel separately.
Options: Enabled, Disabled.

IDE Primary/Secondary Master/Slave PIO

The four IDE PIO (Programmed Input/Output) fields let you set a PIO mode (0-4) for each of the four IDE devices that the onboard IDE interface supports. From Modes 0 to 4 provide successively increased performance. In Auto mode, the system automatically determines the best mode for each device. The default is Auto.
Options: Auto, Mode 0 ~ 4.

IDE Primary/Secondary Master/Slave UDMA

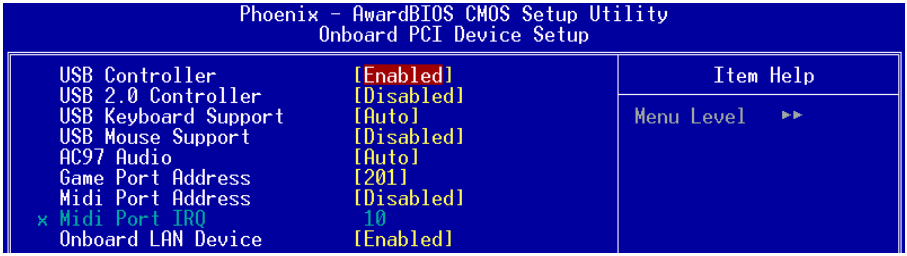
This allows you to select the mode of operation for the Ultra DMA-33/66/100 implementation is possible only if your IDE hard drive supports it and the operating environment includes a DMA driver (Windows 95 OSR2 or a third-party IDE bus master driver). If your hard drive and your system software both support Ultra DMA-33/66/100, select Auto to enable UDMA mode by BIOS or you can select mode by manual.
Options: Auto, Disabled.

IDE HDD Block Mode

IDE Block Mode allows the controller to access blocks of sectors rather than a single sector at a time. The default is Enabled.
Options: Enabled, Disabled.

Onboard PCI Device Setup

Scroll to Onboard PCI Device Setup and press <Enter>. The following screen appears:



USB Controller

Enables the all USB controller.

Options: Disabled, Enabled.

USB 2.0 Controller

Enables the EHCI (USB2.0) controller.

Options: Disabled, Enabled.

USB Keyboard Support

Your system contains a Universal Serial Bus (USB) controller and you have a USB keyboard. The default is Auto detect.

Options: Auto, Enabled, Disabled.

USB Mouse Support

Your system contains a Universal Serial Bus (USB) controller and you have a USB Mouse . The default is Disabled.

Options: Enabled, Disabled.

AC97 Audio

This item allows you to decide to auto or disable the chipset family to support AC97 Audio. The function setting AC97 Audio Codec states. The system default is Auto.

Options: Auto, Disabled.

Game Port Address

Select an address for the Game port.

Options: 201 (default), 209, Disabled.

Midi Port Address

Select an address for the Midi port.

Options: 290, 300, 330, Disabled (default).

Midi Port IRQ

Select an interrupt for the Midi port.

Options: 5, 10 (default).

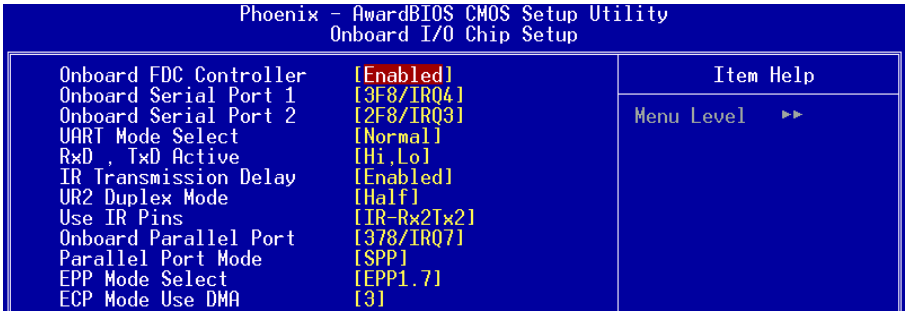
Onboard LAN Device (Optional)

Enables the onboard LAN feature.

Options: Enabled, Disabled.

▸ *Onboard I/O Chip Setup*

Scroll to Onboard I/O Chip Setup and press <Enter>. The following screen appears:



Onboard FDC Controller

Select Enabled if your system has a floppy disk controller (FDC) installed on the system board and you wish to use it. If you install add-in FDC or the system has no floppy drive, select Disabled in this field.

Options: Enabled, Disabled.

Onboard Serial Port 1/2

Select an address and corresponding interrupt for the first and second serial ports.

Options: 3F8/IRQ4, 2E8/IRQ3, 3E8/IRQ4, 2F8/IRQ3, Disabled, Auto.

UART Mode Select

This filed allows the users to configure what IR mode the 2nd serial port should use. The default is Normal.

Options: Normal, IrDA and ASKIR.

RxD, TxD Active

This field configures the receive and transmit signals generated from the IR port. The default is Hi Lo (when UART Mode Select is not set to Normal).
Options: Hi Hi, Hi Lo, Lo Hi, and Lo Lo.

IR Transmission delay

This item allows you to enabled/disable IR transmission delay.
Options: Enabled, Disabled.

UR2 Duplex Mode

This item allows you to select IR half/full duplex function.
Options: Half, Full.

Use IR Pins

This item allows you to select IR transmission routes, one is RxD2, TxD2 (COM Port) and the other is IR-Rx2Tx2.
Options: IR-Rx2Tx2, RxD2, TxD2.

Onboard Parallel Port

This field allows the user to configure the LPT port.
Options: 378/IRQ7, 278/IRQ5, 3BC/IRQ7, Disabled.

Parallel Port Mode

This field allows the user to select the parallel port mode.
Options: SPP, EPP, ECP, ECP+EPP.

EPP Mode Select

This item allows you to determine the IR transfer mode of onboard I/O chip.
Options: EPP1.9, EPP1.7.

ECP Mode USE DMA

This field allows the user to select DMA1 or DMA3 for the ECP mode.
Options: DMA1, DMA3.

4-5 Power Management Setup

Choose the "POWER MANAGEMENT SETUP" in the CMOS SETUP UTILITY to display the following screen. This menu allows the user to modify the power management parameters and IRQ signals. In general, these parameters should not be changed unless it's absolutely necessary.

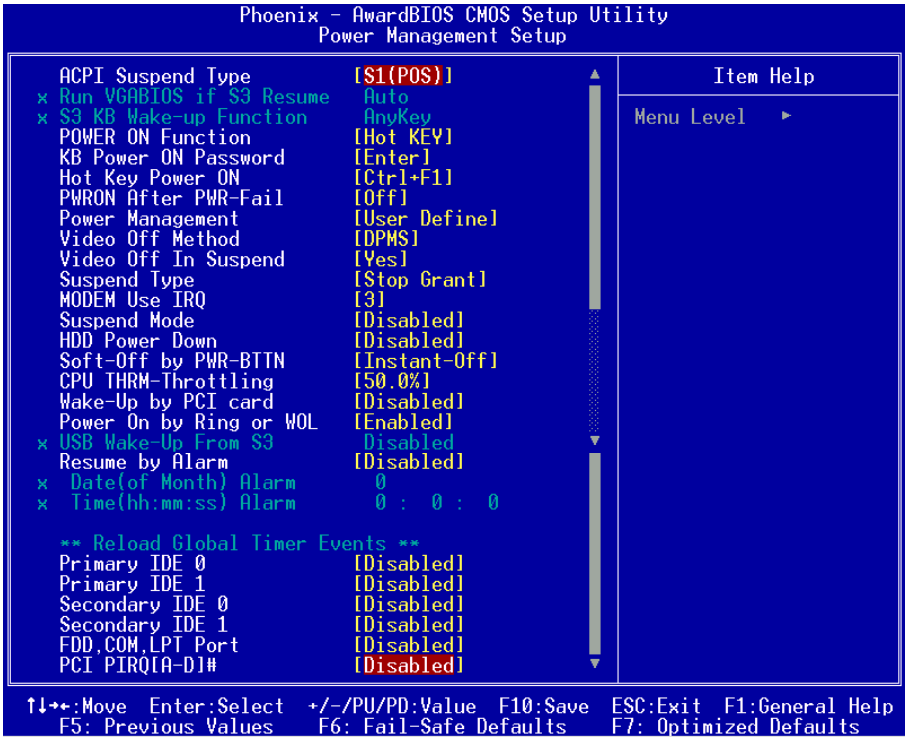


Figure 6: Power Management

ACPI Suspend Type

This item allows you to select S1(POS) or S3(STR) function. When set to "S3(STR)" or "S1&S3" the following two fields become available.

Options: S1(POS), S3(STR), S1&S3.

Run VGABIOS if S3 Resume

This determines whether or not to enable the system to run the VGA BIOS when resuming from S3(STR) or S1&S3.

Options: Auto, Yes, No.

S3 KB Wake-up Function

This determines whether or not to enable keyboard/mouse activity to awaken the system from S3(STR) or S1&S3.
Options: AnyKey or Mouse, By PowerOn Func., AnyKey, Mouse.

POWER ON Function

Enables computer power on by keyboard, mouse, or hotkey activity. The default is HotKEY.

Password: Requires you to enter a password when using the keyboard to power on. Set the password in the next field "KB Power ON Password."

HotKEY: Enables you to use a hot key combination to power on the computer. Set the hot key combination in the "Hot Key Power ON" field.

AnyKEY: Enables you to set any keyboard activity to power on the computer.

BUTTONONLY: Requires you to push the computer power button to power on the system.

Keyboard 98: Enables you to set the Windows 98 key to power on the system.

Keyboard Power ON Password

Press "Enter" to create a password that is required when you use the keyboard to power on the system. You must set the POWER ON Function to "Password" to be prompted for a password at power on.

Hot Key Power ON

Enables you to set a hot key combination to be used for powering on the system. The default is Ctrl-F1.
Options: Ctrl-F1 ~ Ctrl F12.

PWRON After PWR-Fail

This item enables your computer to automatically restart or return to its last operating status after power returns from a power failure.

Off: The system stays off after a power failure.

Former-Sts: The system returns to the state it was in just prior to the power failure.

Power Management

Use this to select your Power Management selection. The default is User define.

Max. saving: Maximum power savings. Inactivity period is 1 minute in each mode.

Min. saving: Minimum power savings. Inactivity period is 1 hour in each mode.

User define: Allows user to define PM Timers parameters to control power saving mode.

Video Off Method

This option allows you to select how the video will be disabled by the power management. The default is V/H Sync + Blank

V/H Sync + Blank: System turns off vertical and horizontal synchronization ports and writes blanks to the video buffer.

DPMS Support: Select this option if your monitor supports the Display Power Management Signaling (DPMS) standard of the Video Electronics Standards Association (VESA). Use the software supplied for your video subsystem to select video power management values.

Blank Screen: System only writes blanks to the video buffer.

Video Off In Suspend

Lets you enable the video to power off in suspend mode.

No: Video power off not controlled by power management.

Yes: Video powers off after time shown in suspend mode setting.

Suspend Type

Determines CPU status during power saving mode.

Stop Grant: CPU goes into idle mode during power saving mode.

PwrOn suspend: CPU and system remain powered on in suspend mode.

MODEM Use IRQ

Name the interrupt request (IRQ) line assigned to the modem (if any) on your system. Activity of the selected IRQ always awakens the system. Default is IRQ 3.
Options: N/A, 3, 4, 5, 7, 9, 10, 11

Suspend Mode

enabled and after the set time of system inactivity, all devices except the CPU will be shut off.
Options: Disabled, 1, 2, 4, 8, 12, 20, 30, 40 Min and 1 Hour.

HDD Power Down

When enabled and after the set time of system inactivity, the hard disk drive will be powered down while all other devices remain active.
Options: Disabled, 1 ~ 15 Min.

Soft-Off by PWRBTN

Use this to select your soft-off function. The default is Instant Off.

Instant Off: Turns off the system instantly.

Delay 4 Second : Turns off the system after a 4 second delay. If momentary press of button, the system will go into Suspend Mode. Press the power button again to make system back to work.

CPU THRM-Throttling

This item sets the percentage of time that the CPU is idled if CPU throttling is initiated by excess heat. The default setting is 50%.
Options: 12.5%, 25.0%, 37.5%, 50.0%, 62.5%, 75.0%, 87.5%.

PowerOn by PCI Card

An input signal form PME on the PCI card awakens the system from a soft off state.
Options: Enabled, Disabled.

Power On by Ring or WOL

When enabled, any modem or LAN activity awakens the system from power savings mode.
Options: Enabled, Disabled.

USB Wake-Up From S3

When enabled, any USB activity awakens the system from power savings mode.
Options: Enabled, Disabled.

RTC Alarm Resume

When enabled, you can set the date and time in the following two fields. Any event occurring at the specified date or time awakens the system from power savings mode.

** Reload Global Timer Events **

Primary/Secondary IDE 0/1

Any activity occuring on these channels awakens the system from power savings mode.

FDD, COM, LPT Port

When enabled, any event occurring on these ports awakens the system from power savings mode.

PCI PIRQ[A-D]#

When enabled, any event occurring on these PCI slots awakens the system from power savings mode.

4-6 PNP/PCI Configuration

The PNP/PCI configuration program is for the user to modify the PCI/ISA IRQ signals when various PCI/ISA cards are inserted in the PCI or ISA slots.

WARNING: Conflicting IRQ's may cause the system to not find certain devices.

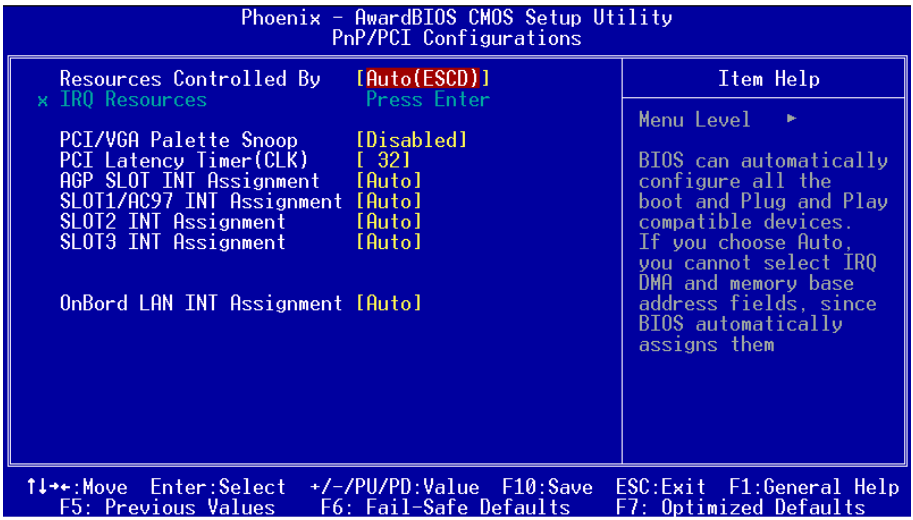


Figure 7: PNP/PCI Configuration Setup

Resources Controlled By

Determines what controls system PNP/PCI resources. The default is Auto (ESCD).

Manual: PNP Card's resources are controlled manually. The "IRQ Resources" field becomes available and you can set which IRQ-X and DMA-X are assigned to PCI/ISA PNP or Legacy ISA Cards.

Auto: If your ISA card and PCI cards are all PNP cards, BIOS assigns the interrupt resource automatically.

PCI/VGA Palette Snoop

This item is designed to overcome problems that can be caused by some nonstandard VGA cards. This board includes a built-in VGA system that does not require palette snooping so you must leave this item disabled.

Options: Enabled, Disabled.

PCI Latency Timer (CLK)

The latency timer defines the minimum amount of time, in PCI clock cycles, that the bus master can retain the ownership of the bus.
Options: 0-255.

AGP SLOT INT Assignment

This setting enables the user to specify what IRQ will be assigned to the AGP devices in the AGP slot.
Options: Auto, 3, 4, 5, 7,9 ,10, 11, 12, 14 & 15. The default is Auto.

AC97 INT Assignment

This setting enable the user to specify what IRQ will be assigned to the AC97 device .
Options: Auto, 3, 4, 5, 7,9 ,10, 11, 12, 14 & 15. The default is Auto.

PCI Slot 1 ~ Slot 3 INT Assignment

These settings enables the user to specify what IRQ will be assigned to PCI devices in the chosen slot.
Options: Auto, 3, 4, 5, 7,9 ,10, 11, 12, 14 & 15. The defaults are Auto.

Onboard LAN INT Assignment

This setting enable the user to specify what IRQ will be assigned to the onboard LAN device .
Options: Auto, 3, 4, 5, 7,9 ,10, 11, 12, 14 & 15. The default is Auto.

Interrupt requests are shared as shown below:

	INT A	INT B	INT C	INT D	INT E	INT F	INT G	INT H
AGP Slot	V							
AC97/MC97		V						
Slot 1		V						
Slot 2			V					
Slot 3				V				
Onboard LAN (Optional)							V	
Onboard USB1	V							
Onboard USB2		V						
Onboard USB3			V					
USB 2.0				V				
SM BUS		V						

IMPORTANT!
If using PCI cards on shared slots, make sure that the drivers support "Shared IRQ" or that the cards don't need IRQ assignments. Conflicts will arise between the two PCI groups that will make the system unstable or cards inoperable.

4-7 PC Health Status

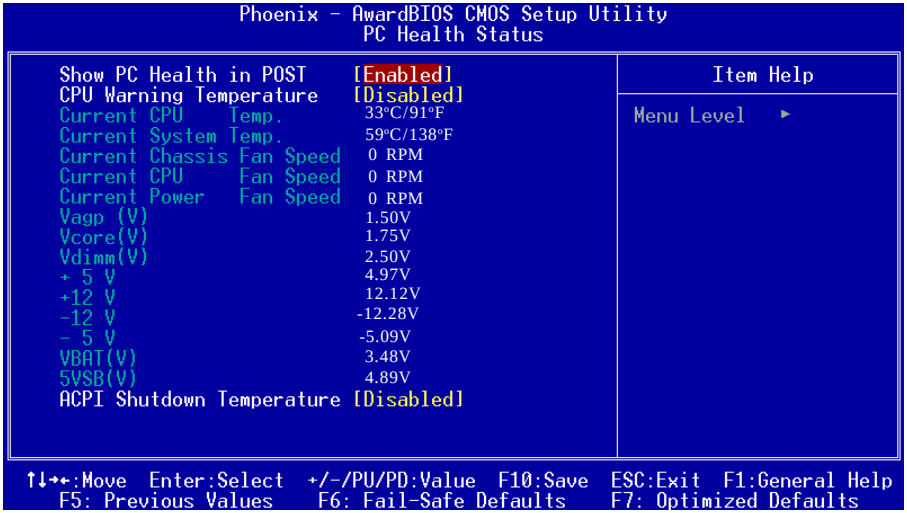


Figure 8: PC Health Status

Show PC Health in POST

When this function is enabled the PC Health information is displayed during the POST (Power On Self Test).

Options: Enabled, Disabled.

CPU Warning Temperature

Sets the temperature at the time which the computer will respond to an overheating CPU. The default is Disabled.

Options: Disabled, 50°C/122°F ~ 70°C/158°F.

Current CPU Temperature

Displays the current CPU temperature.

Current System Temperature

Displays the current system temperature.

Current CPU/Chassis/Power FAN Speed

Displays the current speed of the CPU, chassis, and power fan speed in RPMs.

Vagp (V)

The voltage level of Power supplied to AGP card.

Vcore (V)

The voltage level of the CPU(Vcore).

Vdimm(V)

The voltage level of the DRAM.

± 5V, ± 12V, VBAT(V), 5VSB(V)

The voltage level of the switching power supply.

ACPI Shutdown Temperature

This is the temperature that the computer will turn off the power to combat the effects of an overheating system. (requires ACPI to be enabled in Power Management BIOS and ACPI compliant operating system.) The default is Disabled. Options available are 60°C/140°F to 95°C/203°F in increments of 5°C.

4-8 Frequency/Voltage Control

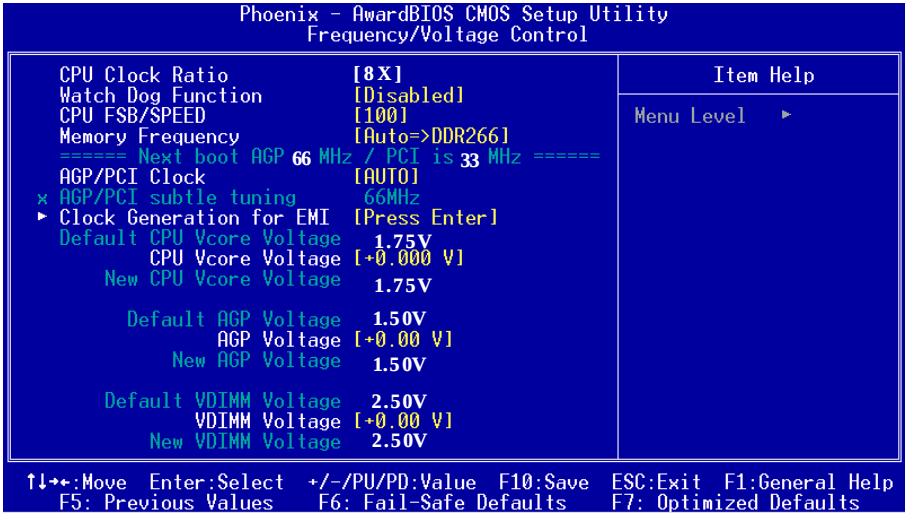


Figure 9: Frequency/Voltage Control

CPU Clock Ratio

Use this item to select a multiplier for the system front side bus (FSB) frequency. The value of the multiplier must be set so that:

Multiplier x Front side Bus Frequency = CPU Clock Speed

For example, if you have a processor that is rated to run at 450 MHz and the system is running a front side bus frequency of 100 MHz, you should select a multiplier of 4.5 so that:

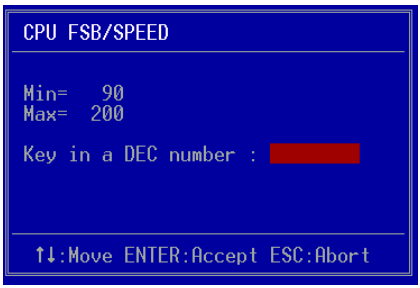
4.5 (Multiplier) x 100 MHz (front side bus frequency) = 450 MHz (CPU clock)

Watching-Dog Function

If you select enabled and overclock fail before POST code 26h, the system will reset automatically by default configuration.
Options: Enabled, Disabled.

CPU FSB/SPEED

Enables you to set the CPU front side bus speed. The default is 100 MHz. Enables you to adjust CPU clock 1MHz by step. Pressing Enter displays the following screen:



Key in the DEC (decimalism) number for the CPU FSB/SPEED.

Note: Overclocking failure will cause system No display problem. At this moment, please press "*Insert*" key to back to the initial or default setting to boot up your system.

Memory Frequency

Enables you to select a ratio of the Double Data Rate Synchronous DRAM to match the installed DRAM frequency 200 or 266 MHz. We recommend that you leave this item at the default value.

When the FSB is 400MHz the options will display 1:1 =>DDR200, 3:4 =>DDR266, Auto =>DDR266.

When the FSB is 533MHz the options will display 1:1 =>DDR266, 4:5 =>DDR333, Auto =>DDR266.

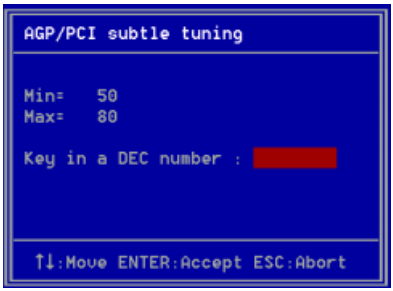
AGP/PCI Clock

Enables you to set the host clock to work concurrently with the PCI bus or the AGP bus. The default is AUTO.

AUTO:	The system sets the item automatically.
AGP-FSB*2/3 PCI-FSB/3:	The system sets the host clock to work with the PCI and AGP bus.
By subtle tuning item:	The system sets the host clock according to the number produced by the subtle tuning item.

AGP/PCI subtle tuning

Enables you to set the AGP/PCI frequency, enables you to subtle tuning AGP clock 1MHz by step. The default is 66 MHz. Pressing Enter displays the following screen:



Key in the DEC (decimalism) number for the AGP/PCI subtle tuning.

In the following items, "Default Voltage" indicates the original factory value, and "New Voltage" indicates the value that you assign.

CPU Vcore Voltage

This item allows you to set the CPU Vcore voltage. The default is -0.075V.
Options: -0.100V to +0.350V in 0.025V increments. We recommend that you leave this at the default value.

AGP Voltage

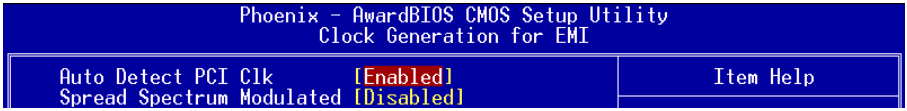
This item allows you to set the AGP slot voltage. The default is +0.00V.
Options: +0.00V to +0.70V in 0.10V increments. We recommend that you leave this at the default value.

DIMM Voltage

This item allows you to set the DIMM slot voltage. The default is +0.00V.
Options: +0.00V to +0.70V in 0.10V increments. We recommend that you leave this at the default value.

Clock Generation for EMI

Scroll to Clock Generation for EMI and press <Enter>. The following screen appears:



Auto Detect PCI Clk

When enabled the mainboard automatically disables the clock source for a PCI slot which does not have a module in it, reducing EMI (ElectroMagnetic Interference). The default is Enabled.

Spread Spectrum Modulated

If you enable spread spectrum, it can significantly reduce the EMI (ElectroMagnetic Interference) generated by the system.

4-9 Defaults Menu

Selecting “Defaults” from the main menu shows you two options which are described below

Load Fail-Safe Defaults

When you press <Enter> on this item you get a confirmation dialog box:

Load Fail-Safe Defaults (Y/N) ? N

Pressing ‘Y’ loads the BIOS default values for the most stable, minimal-performance system operations.

Load Optimized Defaults

When you press <Enter> on this item you get a confirmation dialog box:

Load Optimized Defaults (Y/N) ? N

Pressing ‘Y’ loads the default values that are factory settings for optimal performance system operations.

4-10 Supervisor/User Password Setting

These items are used to install a password. A Supervisor password takes precedence over a User password, and the Supervisor limits the activities of a User. You can set either a supervisor or user password, or both of them:

Supervisor password: authorized to enter and change the options of the setup menus.

User password: authorized to enter, but not authorized to change the options of the setup menus.

When you select Set User/Supervisor Password, the following message appears prompting you to type a password:

ENTER PASSWORD:

Type the password, up to eight characters in length, and press <Enter>. The password typed now clears any previously entered password from CMOS memory. You will be prompted to confirm the password. Type the password and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.
To disable a password, press <Enter> when you are prompted to enter the password. A message will confirm the password is disabled:

PASSWORD DISABLED.

Once the password is disabled, the system will boot and you can enter Setup freely. When a password has been enabled, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.
Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is rebooted. This prevents unauthorized use of your computer.
You determine when the password is required within the BIOS Features Setup menu "Security" option. If the Security option is set to "System", the password will be required both at boot and at entry to Setup. If set to "Setup", prompting only occurs when trying to enter Setup.

4-11 Exiting BIOS

Save & Exit Setup

Pressing <Enter> on this item asks for confirmation:

Save to CMOS and EXIT (Y/N)? Y

Pressing "Y" stores the selections made in the menus in CMOS – a special section of memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS. After saving the values the system is restarted again.

Exit Without Saving

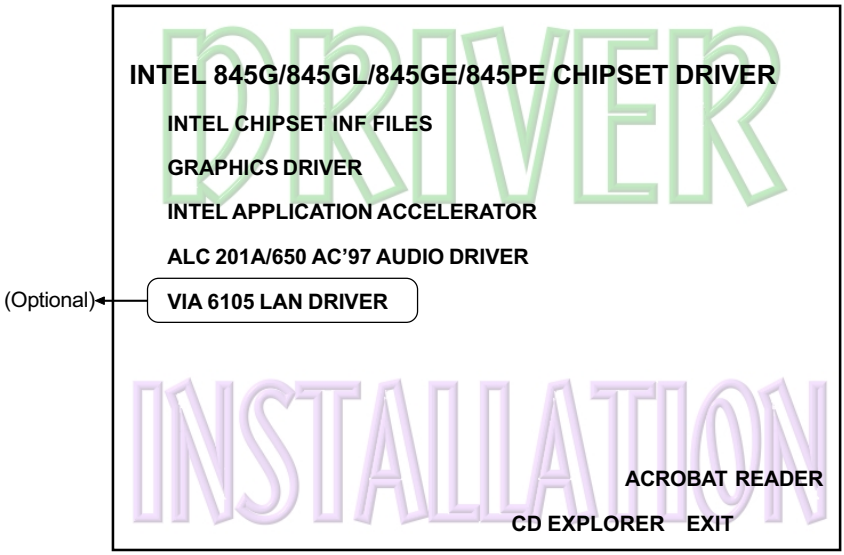
Pressing <Enter> on this item asks for confirmation:

Quit without saving (Y/N)? Y

This allows you to exit Setup without storing in CMOS any change. The previous selections remain in effect. This exits the Setup utility and restarts your computer.

Section 5
Driver Installation

Easy Driver Installation



Insert the bundled CD-disk.

Step 1 : Click **"INTEL CHIPSET INF FILES"** to install all components recommended.

Step 2 : Click **"GRAPHICS DRIVER"** to install graphical driver.

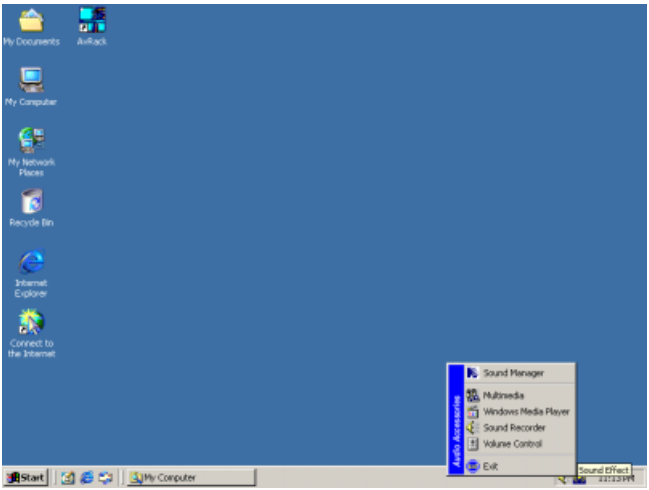
Step 3 : Click **"INTEL APPLICATION ACCELERATOR"**. to install ultra storage driver.

Step 4 : Click **"ALC 201A/650 AC'97 AUDIO DRIVER"** to install Audio driver.

Step 5 : Click **"VIA 6105 LAN DRIVER"** to install LAN driver. (Optional)

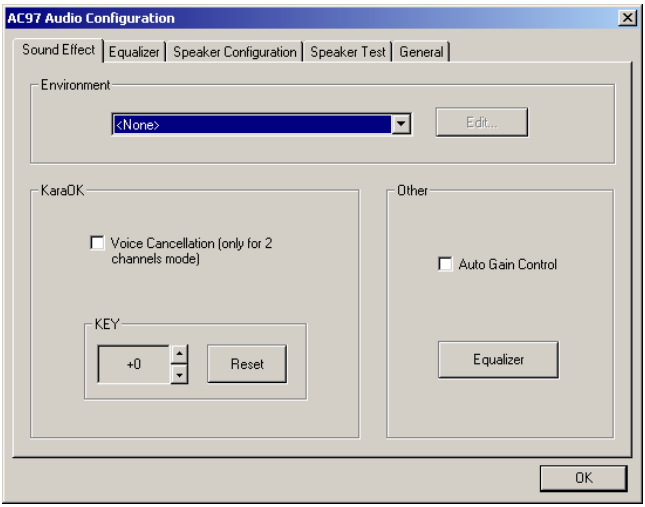
ALC650 Configuration Setup (6 Channel)

◆ To enable ALC650 Function



<*Figure 1*>

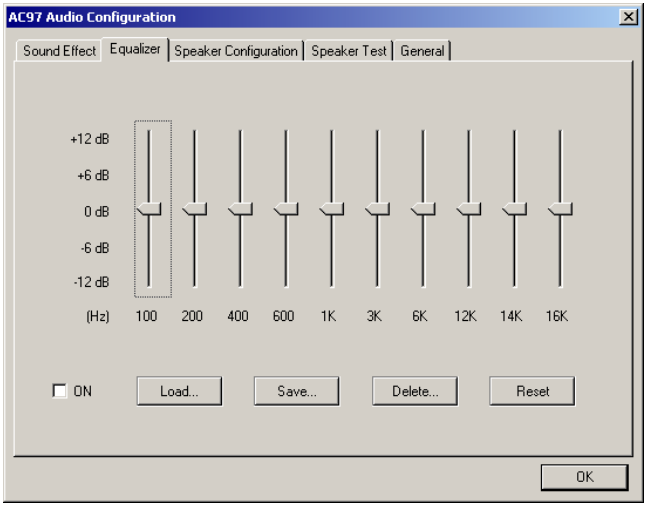
1. Right-click **Sound Effect** button in the tool bar display currently selected Titles. Select **Sound Manager**.



Sound Effect:

<*Figure 2*>

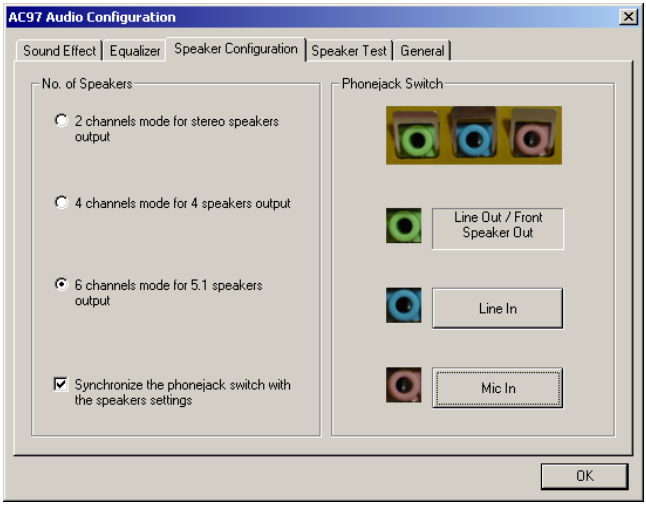
2. Click **Sound Effect** button and select **Environment** from the drop-down menu.



Equalizer:

<Figure 3>

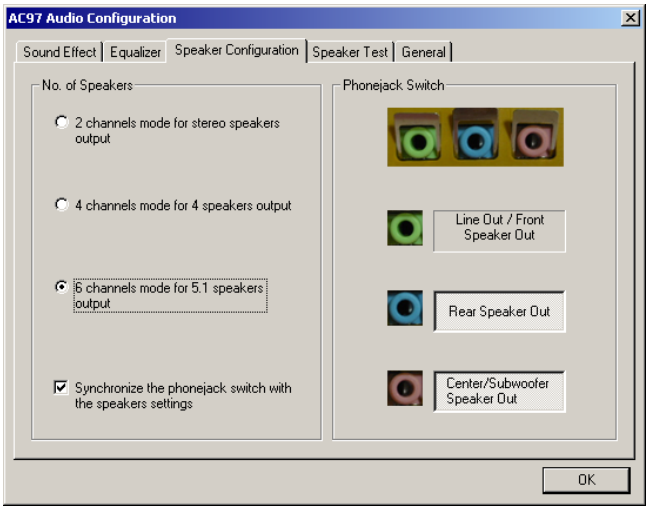
3. Click **Equalizer** and setup the value of dB.



Speak Configutation:

<Figure 4>

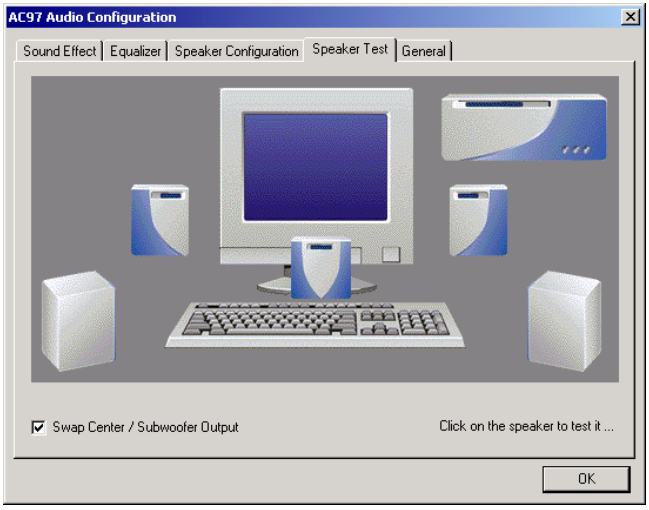
4. Click **Line in** and **Mic in** buttons to enable 6 channel function as this is required for the ALC650.



Speak Configutation:

<Figure 5>

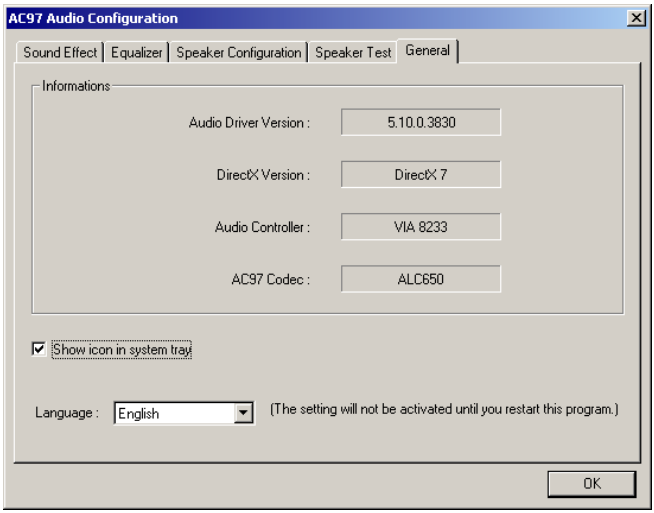
5. The selected screen appears.



Speaker Test:

<Figure 6>

6. Click **Speaker Test** button and click on the speakers directly which show on the screen to test it.



General:

<Figure 7>

7. General Information for user reference.

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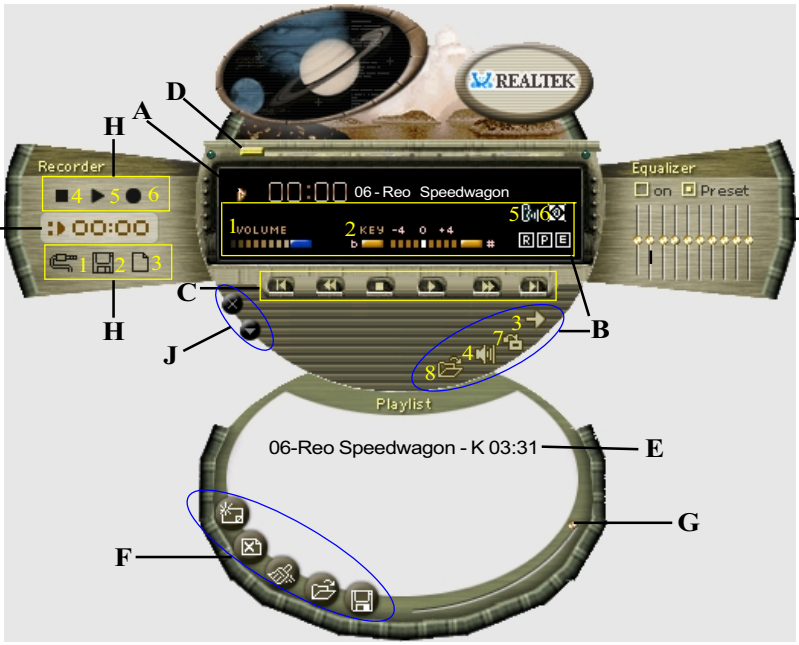
Appendix A

A-1 Realtek Media Player User's Guide

Realtek Media Player Platform



Functional Descriptions

A. Playback Windows Display

Playback windows displays the following mode information:

1. Playback Time Display
2. Voice Cancellation Mode Display
3. Pitch Mode Display
4. Surround Sound Mode Display

B. Playback Function Controls

There are 8 selectable functions for the playback:

1. Volume control — High/Low Adjustment Bar.
2. Pitch control — 4-step High/Low Adjustment Bar.
3. Repeat mode — Choice of Repeat, All Repeat, Random or No Repeat Mode.
4. Mute — Mute On/Off Mode select.
5. Voice cancellation — Voice Cancellation On/Off Mode select for Karaoke.
6. Surround mode — A total of 26 Surround Sound mode select as shown in the table below.

Surround mode	Surround mode
Generic	Stone corridor
Padded	Alley
Room	Forrest
Bathroom	City
Living room	Mountain
Stone	Quarry
Auditorium	Plain
Concert	Parking lot
Cave	Sewer pipe
Arena	Under water
Hangar	Drug
Carpet	Dizzy
Hallway	Psychological

7. Skin change — Media Player Skin Type select.
8. Open — Open file formats including MP3, CDA, MDI, WAV & WMA support.

C. Playback Controls

The playback controls include “Play”, “Pause”, “Stop”, “Previous”, “Backward”, “Forward”, & “Next”.

D. Seeking bar

Display Animated Playback Status

E. Title/Play List Windows

Display Currently Selected Title(s)

F. Title/Play List Edit Controls

There title/play list controls include “Add”, “Del”, “Clear”, “Load”, & “Store”.

1. Add	Add to the Title/Play List.
2. Del	Remove form the Title/Play List.
3. Clear	Clear the Title/Play List.
4. Load	Load Title/Play List.
5. Store	Save Title/Play List.

G. Title/Play List Scroll bar

Scroll Up/Down the Title/Play List.

H. Recording Function Controls

The recording function controls include “Input”, “Save, “New”, “Rec”, “Stop”, & “Play”.

1. Input	Input soruce select.
2. Save	Save to file.
3. New	Open new file & select format includes Sampling Rate, Sampling bit, Mono or Stereo.
4. Rec	Start Rec.
5. Stop	Stop Rec.
6. Play	Playback Rec file.

I. REC/Playback Time Display

Displays REC/Playback Time.

J. Platform Display Panel Controls

The platform display panel control include “Minimize” & “Close”.

1. Minimize — Minimize Platform Display Panel.
2. Close — Close/Exit Platform Display Panel.

K. Equalizer Control Panel

The Equalizer Control Panel include “On/Off” & “Preset”.

1. On/Off — Enable/Disable Equalizer.
2. Preset — Clear Equalizer setting to default value.

Appendix B

B-1 Update Your System BIOS

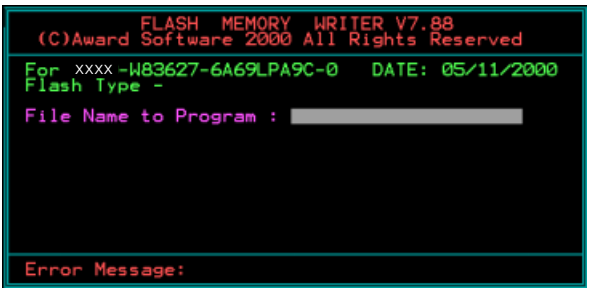
Download the xxxxx.EXE file corresponding to your model form the our website to an empty directory on your hard disk or floppy. Run the downloaded xxxxx.EXE file and it will self extract. Copy these extracted files to a bootable DOS floppy disk.

Note: The DOS floppy disk should contain NO device drivers or other programs.

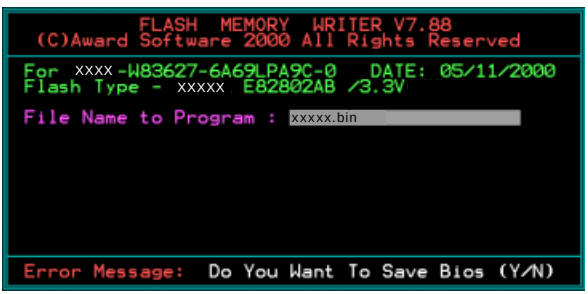
1. Type "A:\AWDFLASH and press <Enter> Key.

2. You will see the following setup on screen.

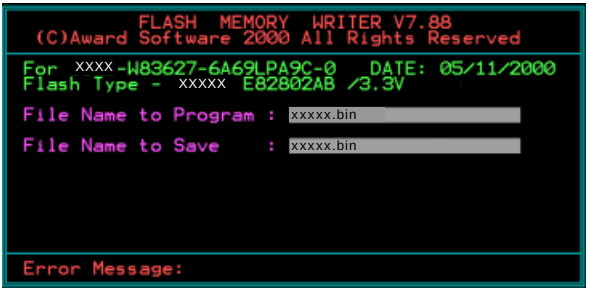
3. Please key in the xxxxx.bin BIOS file name.



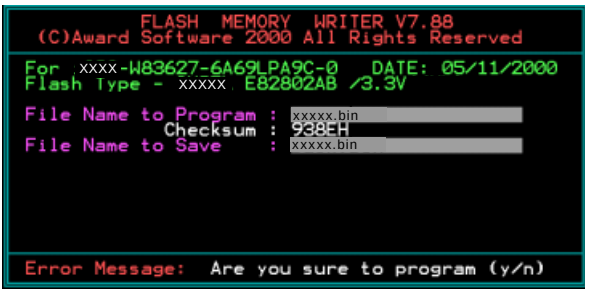
4. If you want to save the previous BIOS data to the diskette, please key in [Y], otherwise please key in [N].



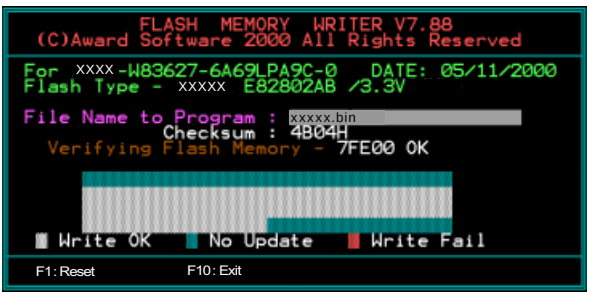
5. Key in File Name to save previous BIOS to file.



6. Are you sure to program (y/n), please key in [Y] to start the programming.



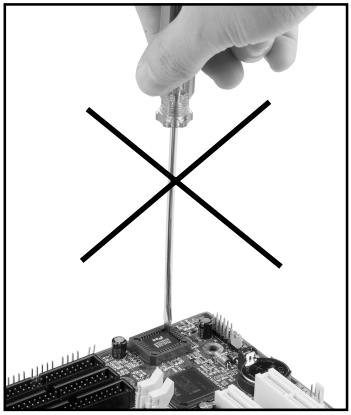
7. The programming is finished.

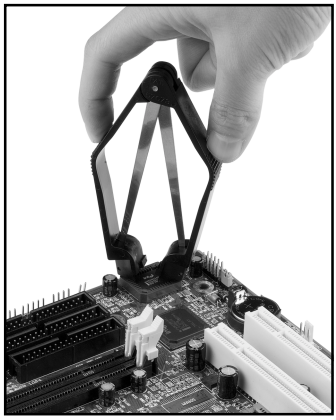


Appendix C

C-1 EEPROM BIOS Remover

Do not remove the BIOS chip, unless instructed by a technician and only with a PLCC IC extractor tool.





The BIOS socket may be damaged if using an improper method to replace the BIOS chip.

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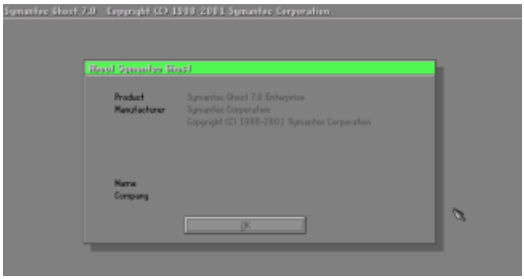
Appendix D

D-1 GHOST 7 Quick User's Guide (Optional)

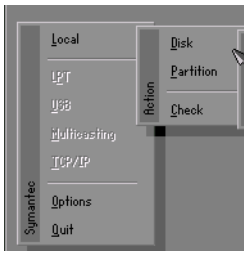
Installation is very easy. You only need to copy the **Ghost7** folder or **Ghost.exe** to your hard disk.

Main Menu



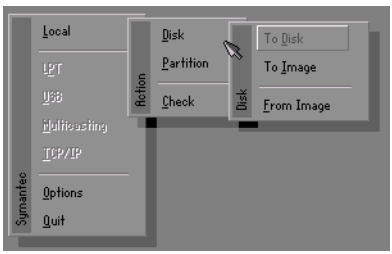
Description of Menu

Ghost clones and backs up **Disk** and **Partition.**



In which **Disk** indicates hard disk options
Partition indicates partition options
Check indicates check options

Disk



There are 3 hard disk functions:

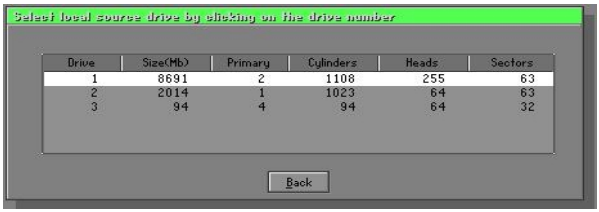
1. Disk To Disk (disk cloning)
2. Disk To Image (disk backup)
3. Disk From Image (restore backup)

Important!

1. To use this function, the system must have at least 2 disks. Press the **Tab** key to move the cursor.
2. When restoring to a destination disk, all data in that disk will be completely destroyed**.**

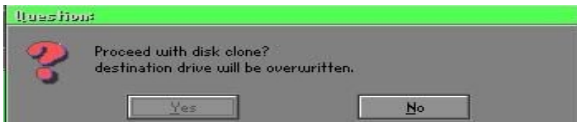
Disk To Disk (Disk Cloning)

1. Select the location of the **Source drive**.
2. Select the location of the **Destination drive**.



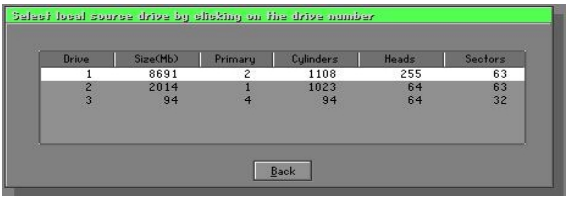
3. When cloning a disk or restoring the backup, set the required partition size as shown in the following figure.

4. Click OK to display the following confirmation screen. Select **Yes** to start.

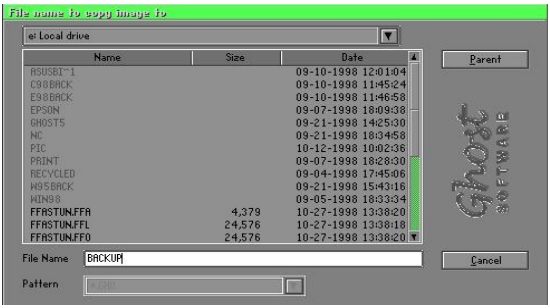


Disk To Image (Disk Backup)

1. Select the location of the Source drive.



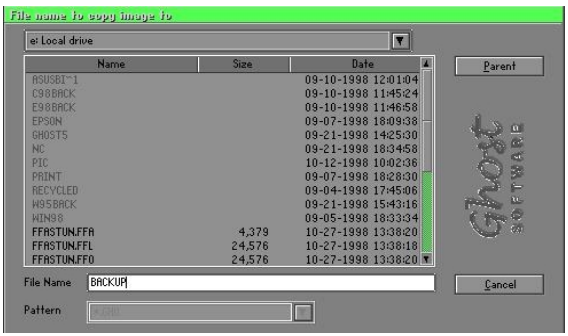
2. Select the location for storing the backup file.



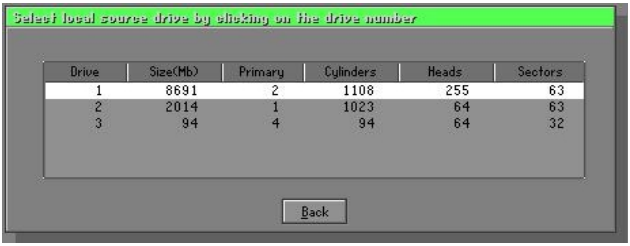
3. Click **OK** to display the following confirmation screen. Select **Yes** to start.

Disk From Image (Restore Backup)

1. Select the Restoring file.

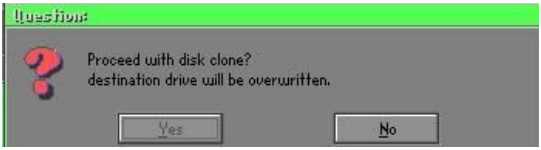


2. Select the **Destination drive** of the disk to be restored.

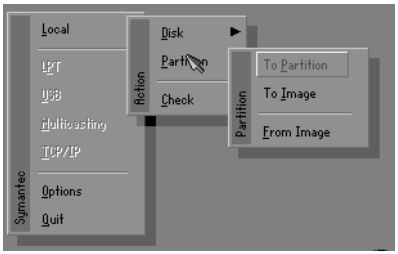


3. When restoring disk backup, set the required partition size as shown in the following figure.

4. Click **OK** to display the following confirmation screen. Select **Yes** to start.



Partition



There are 3 partition functions:

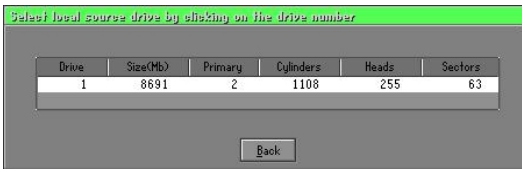
1. **Partition To Partition** (partition cloning)
2. **Partition To Image** (partition backup)
3. **Partition From Image** (restore partition)

Partition To Partition (Partition Cloning)

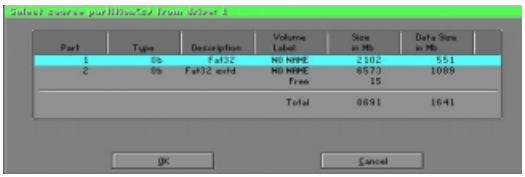
The basic unit for partition cloning is a “partition”. Refer to “disk cloning” for the operating method.

Partition To Image (Partition Backup)

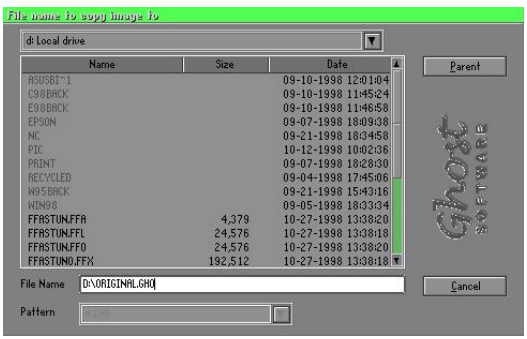
1. Select the disk to be backed up.



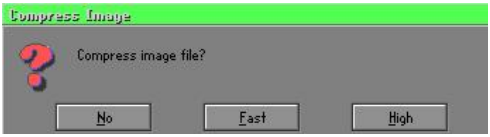
2. Select the first partition to be backed up. This is usually where the operating system and programs are stored.



3. Select the path and file name to store the backup file.



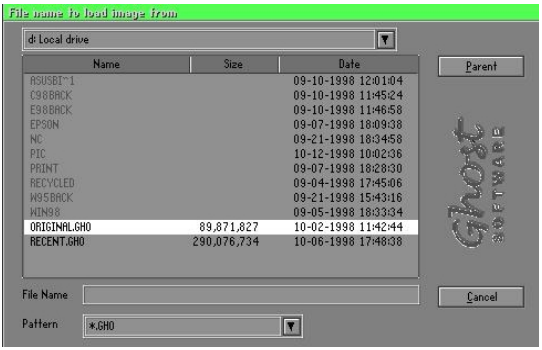
4. Is the file compressed? There are 3 options:
   (1) No: do not compress data during backup
   (2) Fast: Small volume compression
   (3) High: high ratio compression. File can be compressed to its minimum, but requiring longer execution time.



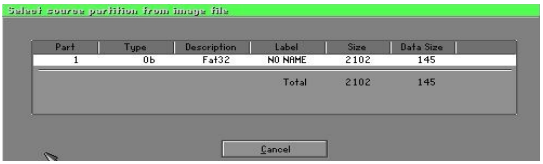
5. Select Yes to start performing backup.

Partition From Image (Restore Partition)

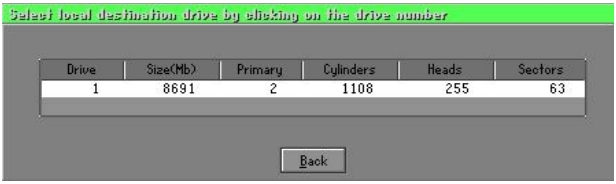
1. Select the backup file to be restored.



2. Select the source partition.



3. Select the disk to be restored.



4. Select the partition to be restored.

5. Select Yes to start restoring.

Check

This function is to check possible error caused by defective FAT or track during backup or restoring.

How to Reinstall Windows in 2 Minutes

This chapter guides you how to setup your computer properly and, if necessary, reinstall Windows in 2 minutes. **Ghost** provides different methods to complete this task. The following two sections explain how to create an emergency **Recover Floppy** and **Recover CD**:

Emergency Recover Floppy

Divide a hard disk into two partitions. The first partition is to store the operating system and application programs. The second partition is to back up the operating system and data. The size of the partition can be determined according to the backup requirements. For example, the **Windows** operating system needs 200MB of hard disk space, Plus complete **Office** programs require 360MB. The remaining space can be used to store data.

After installing **Windows,** use **Ghost** to create a backup area for the system and to store the file (Image file) in drive D. The file is named **Original.gho**. Then, create a recover floppy disk containing:

- Bootable files (Command.com, Io.sys, and MSDOS.SYS)
- Config.sys (configuration setup file)
- Autoexec.bat (auto-execution batch file)
- Ghost.exe (Ghost execution file)

There are two ways to create the content of the recover floppy for restoring:

(1) To load **Windows** automatically after booting, store the **Autoexec. bat** file with a command line:

Ghost.exe clone, mode=pload, src=d:\original.gho:2,dst=1:1 -fx -sure -rb

Command Description: Runs the restore function automatically with the Image File. Stored in drive D. After execution, it will exit Ghost and boots the system.

Refer to the [Introducing Ghosts Functions] for details.

(2) After booting, the screen displays the Menu. Select Backup or Restore: Since the user may install other applications in the future, he/she may alter **Autoexec.bat** file to back up or restore the user-defined Image file as follows:

☞ **Backup**

Back up Windows and application programs as a file (Recent. gho). Command is:

Ghost –clone,mode=pdump,src=1:1,dst=d:\Recent.gho -fx -sure -rb

☞ **Restore**

Restore types include **[General Windows]** and **[Windows and Application Programs].** If you select **[General Windows],** the system is restored to the general **Windows** operation condition. The command is:

Ghost.exe -clone,mode=pload,src=d:\Original.gho,dst=1:1 -fx -sure -rb

If you select **[Windows and Application Programs],** the latest backup file (Recent.gho) is restored, skipping the installation and setup of application programs.

For description of related parameters, refer to **[Introducing Ghosts Functions]**.

For more information about menu design, refer to Config.sys and Autoexec.bat under /Menu in the CD. You can also create a backup CD containing Ghost.exe and these two files.

Recover CD

The following is a simple guide to create a recover CD:

1. First, create a recover floppy disk contains the following with any copy program such as “Easy CD Create” (Note 2) :

   Bootable files (Command.com and Io.sys and MSDOS.SYS)

   Config.sys (Configuration setup file)

   Autoexec.bat (Auto-execution batch file)

   Mscdex.exe (CD-Rom execution file)

   Ghost.exe (Ghost execution file)

   Oakcdrom.sys (ATAPI CD-ROM compatible driver)

   The content of Config.sys is:

   ```
   DEVICE=Oakcdrom.sys /d:idecd001
   ```

   The content of Autoexec.bat includes:

   ```
   MSCDEX.EXE /D:IDECD001 /L:Z
   Ghost.exe clone,mode=load,src=z:\original.gho,dst=1 -sure -rb
   ```

2. Write the backup image file (original.gho) of the entire hard disk or partition into the recover CD. Use the Recover CD to boot up the system and restore the backup files automatically.

For description of related parameters, refer to **[Introducing Ghosts Functions]**.

Note: For more details about copy the creation program and method to create a recover CD, please refer to the releated software and its associated operating manual.

Note: Ghost may be executed in interactive or in batch mode. Most of the Ghost switches are used to assist in batch mode operation. To list switches, type ghost.exe -h.

Appendix E

E-1 POST CODES (Optional)

POST (hex)	DESCRIPTION
CFh	Test CMOS R/W functionality.
C0h	Early chipset initialization: - Disable shadow RAM - Disable L2 cache (socket 7 or below) - Program basic chipset registers
C1h	Detect memory - Auto-detection of DRAM size, type and ECC. - Auto-detection of L2 cache (socket 7 or below)
C3h	Expand compressed BIOS code to DRAM
C5h	Call chipset hook to copy BIOS back to E000 & F000 shadow RAM.
01h	Expand the Xgroup codes locating in physical address 1000:0
02h	Reserved
03h	Initial Superio_Early_Init switch.
04h	Reserved
05h	1. Blank out screen 2. Clear CMOS error flag
06h	Reserved
07h	1. Clear 8042 interface 2. Initialize 8042 self-test
08h	1. Test special keyboard controller for Winbond 977 series Super I/O chips. 2. Enable keyboard interface.
09h	Reserved
0Ah	1. Disable PS/2 mouse interface (optional). 2. Auto detect ports for keyboard & mouse followed by a port & interface swap (optional). 3. Reset keyboard for Winbond 977 series Super I/O chips.
0B-0Dh	Reserved
0Eh	Test F000h segment shadow to see whether it is R/W-able or not. If test fails, keep beeping the speaker.
0Fh	Reserved
10h	Auto detect flash type to load appropriate flash R/W codes into the run time area in F000 for ESCD & DMI support.
11h	Reserved
12h	Use walking 1's algorithm to check out interface in CMOS circuitry. Also set real-time clock power status, and then check for override.
13h	Reserved
14h	Program chipset default values into chipset. Chipset default values are MODBINable by OEM customers.
15h	Reserved
16h	Initial Early_Init_Onboard_Generator switch.
17h	Reserved

18h	Detect CPU information including brand, SMI type (Cyrix or Intel) and CPU level (586 or 686).
19-1Ah	Reserved
1Bh	Initial interrupts vector table. If no special specified, all H/W interrupts are directed to SPURIOUS_INT_HDLR & S/W interrupts to SPURIOUS_soft_HDLR.
1Ch	Reserved
1Dh	Initial EARLY_PM_INIT switch.
1Eh	Reserved
1Fh	Load keyboard matrix (notebook platform)
20h	Reserved
21h	HPM initialization (notebook platform)
22h	Reserved
23h	1. Check validity of RTC value: e.g. a value of 5Ah is an invalid value for RTC minute. 2. Load CMOS settings into BIOS stack. If CMOS checksum fails, use default value instead. 3. Prepare BIOS resource map for PCI & PnP use. If ESCD is valid, take into consideration of the ESCD's legacy information. 4. Onboard clock generator initialization. Disable respective clock resource to empty PCI & DIMM slots. 5. Early PCI initialization: -Enumerate PCI bus number -Assign memory & I/O resource -Search for a valid VGA device & VGA BIOS, and put it into C000:0.
24-26h	Reserved
27h	Initialize INT 09 buffer
28h	Reserved
29h	1. Program CPU internal MTRR (P6 & PII) for 0-640K memory address. 2. Initialize the APIC for Pentium class CPU. 3. Program early chipset according to CMOS setup. Example: onboard IDE controller. 4. Measure CPU speed. 5. Invoke video BIOS.
2A-2Ch	Reserved
2Dh	1. Initialize multi-language 2. Put information on screen display, including Award title, CPU type, CPU speed ….
2E-32h	Reserved
33h	Reset keyboard except Winbond 977 series Super I/O chips.
34-3Bh	Reserved
3Ch	Test 8254
3Dh	Reserved
3Eh	Test 8259 interrupt mask bits for channel 1.
3Fh	Reserved
40h	Test 8259 interrupt mask bits for channel 2.
41h	Reserved
42h	Reserved

43h	Test 8259 functionality.
44h	Reserved
45-46h	Reserved
47h	Initialize EISA slot
48h	Reserved
49h	1. Calculate total memory by testing the last double word of each 64K page. 2. Program writes allocation for AMD K5 CPU.
4A-4Dh	Reserved
4Eh	1. Program MTRR of M1 CPU 2. Initialize L2 cache for P6 class CPU & program CPU with proper cacheable range. 3. Initialize the APIC for P6 class CPU. 4. On MP platform, adjust the cacheable range to smaller one in case the cacheable ranges between each CPU are not identical.
4Fh	Reserved
50h	Initialize USB
51h	Reserved
52h	Test all memory (clear all extended memory to 0)
53-54h	Reserved
55h	Display number of processors (multi-processor platform)
56h	Reserved
57h	1. Display PnP logo 2. Early ISA PnP initialization -Assign CSN to every ISA PnP device.
58h	Reserved
59h	Initialize the combined Trend Anti-Virus code.
5Ah	Reserved
5Bh	(Optional Feature) Show message for entering AWDFLASH.EXE from FDD (optional)
5Ch	Reserved
5Dh	1. Initialize Init_Onboard_Super_IO switch. 2. Initialize Init_Onbaord_AUDIO switch.
5E-5Fh	Reserved
60h	Okay to enter Setup utility; i.e. not until this POST stage can users enter the CMOS setup utility.
61-64h	Reserved
65h	Initialize PS/2 Mouse
66h	Reserved
67h	Prepare memory size information for function call: INT 15h ax=E820h
68h	Reserved
69h	Turn on L2 cache
6Ah	Reserved
6Bh	Program chipset registers according to items described in Setup & Auto-configuration table.
6Ch	Reserved
6Dh	1. Assign resources to all ISA PnP devices. 2. Auto assign ports to onboard COM ports if the corresponding item in Setup is set to “AUTO”.

6Eh	Reserved
6Fh	1. Initialize floppy controller 2. Set up floppy related fields in 40:hardware.
70-72h	Reserved
73h	(Optional Feature) Enter AWDFLASH.EXE if : -AWDFLASH is found in floppy drive. -ALT+F2 is pressed
74h	Reserved
75h	Detect & install all IDE devices: HDD, LS120, ZIP, CDROM…..
76h	Reserved
77h	Detect serial ports & parallel ports.
78h-79h	Reserved
7Ah	Detect & install co-processor
7B-7Eh	Reserved
7Fh	1. Switch back to text mode if full screen logo is supported. -If errors occur, report errors & wait for keys -If no errors occur or F1 key is pressed to continue: ◆ Clear EPA or customization logo.
80h-81h	Reserved
82h	1. Call chipset power management hook. 2. Recover the text fond used by EPA logo (not for full screen logo) 3. If password is set, ask for password.
83h	Save all data in stack back to CMOS
84h	Initialize ISA PnP boot devices
85h	1. USB final Initialization 2. NET PC: Build SYSID structure 3. Switch screen back to text mode 4. Set up ACPI table at top of memory. 5. Invoke ISA adapter ROMs 6. Assign IRQs to PCI devices 7. Initialize APM 8. Clear noise of IRQs.
86-92h	Reserved
93h	Read HDD boot sector information for Trend Anti-Virus code
94h	1. Enable L2 cache 2. Program boot up speed 3. Chipset final initialization. 4. Power management final initialization 5. Clear screen & display summary table 6. Program K6 write allocation 7. Program P6 class write combining
95h	1. Program daylight saving 2. Update keyboard LED & typematic rate
96h	1. Build MP table 2. Build & update ESCD 3. Set CMOS century to 20h or 19h 4. Load CMOS time into DOS timer tick 5. Build MSIRQ routing table.
FFh	Boot attempt (INT 19h)