User's Manual

An Intel Socket 478 Processor Based Mainboard

Supports FSB400 / DDR266 (PC2100)
FSB533 / DDR266/333 (PC2100/PC2700)
FSB800 / DDR333 (PC2700)
FSB800 / DDR400 (PC3200)

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80 Port Frequently Asked Questions

Below is a list of some basic POST Codes, possible problems, and solutions. For more detailed information about POST Codes, refer to Appendix D 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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Section 1
INTRODUCTION

Package Contents

Contents

A. Mainboard

B. User's manual

C. Floppy drive cable

D. HDD drive cable or round cable

E. CD and diskette (drivers and utilities)

F. Game port cable

G. I/O Shield

H. S-ATA data and power cable

Deluxe Pack Items

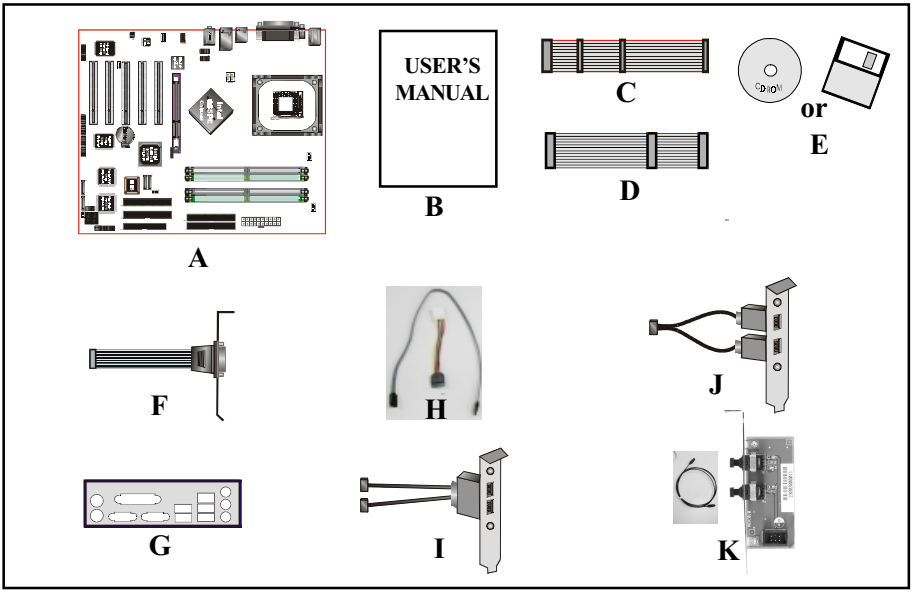
I. IEEE 1394 two port cable

Other Optional Items

J. USB2.0 port cable

K. S/PDIF Module

If you need the other optional item, please contact dealer for assistance.



Intel® Pentium® 4 processors

The Intel Pentium 4 processor, Intel's most advanced, most powerful processor for desktop PCs and entry-level workstations, is based on Intel NetBurst™ microarchitecture. The Pentium 4 processor is designed to deliver performance across applications and usages where end-users can truly appreciate and experience the performance. These applications include Internet audio and streaming video, image processing, video content creation, speech, 3D, CAD, games, multimedia, and multi-tasking user environments. The Pentium 4 processor delivers this world-class performance for consumer enthusiasts and business professional desktop PC users as well as for entry-level workstation users.

Intel adds support for Hyper-Threading Technology to the Pentium 4 processor family. HT Technology allows a single, physical Pentium 4 processor to function as two logical processor for next generation multi threaded application.

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

Chipset Components

This board is designed with Intel® 865PE (Springdale-PE) chipset. The Intel® 865PE chipset consists of the Memory Controller Hub (MCH), the I/O Controller Hub (ICH5/R).

- **Memory Controller Hub (MCH)**

  The MCH provides the interconnect between the AGP, DDR SDRAM and the system logic. It integrates:

  - Supports for single processor with a data transfer rate of 400/533/800MHz.
  - Supports dual channel of 266/333/400 DDR SDRAM up to 4GB.
  - 8X/4X 1.5V AGP interface (Only support 1.5V on AGP interface).
  - Downstream hub link for access to the ICH5/R.

- **I/O Controller Hub (ICH5/R)**

  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:

- Upstream hub link for access to the MCH
- 2-Channel Ultra ATA/100 Bus Master IDE controller
- USB controller
- I/O APIC
- SMBus controller
- LPC / Flash BIOS interface
- PCI 2.3 interface
- Integrated System Management Controller

Accelerated Graphics Port (AGP)

The board provides the AGP 3.0 interface. The AGP interface can support external AGP slot with AGP 8X/4X and Fast Write Transactions. The AGP Interface Specification revision 3.0 enhances the functionality of the original AGP Interface Specification by allowing 8X data transfers (8 data samples per clock) and 1.5 volt (Power supply) operation. Supports Maximum AGP interface bandwidth 2.1GB/s. (**1.5 volt AGP Card supports only**).

Ultra ATA/66/100

The ICH5/R provides an Ultra ATA/66/100 Bus Master IDE controller. This controller supports Ultra ATA/66/100 protocols which are ideal for supporting demanding applications such as real-time video, multimedia, and a high performance operating system. A new IDE cable is required for Ultra ATA/66/100. This cable is an 80-pin conductor cable, which is backwards compatible with ATA/33 connectors.

Hardware Monitoring

Hardware monitoring enables you to monitor various aspects of the system operation and status. The features include CPU temperature, voltage and fan speed in RPMs.

LAN (Optional)

The motherboard mounts the LAN chipset. It allows the mainboard to connect to a local area network by means of a network hub.

Serial ATA

The evolutionary serial ATA interface replaces the standard parallel ATA physical storage interface. The serial ATA specification provides scalability and allows future enhancements to the computing platform. Serial technology overcomes performance limits of parallel interface architecture, meeting the escalating need for faster data throughput in servers and storage devices.

Serial ATA is backward compatible with current software and runs on existing architecture without modification. The serial ATA interface cable requires lower voltages and uses smaller cable connectors, providing ease of installation. You can easily upgrade storage devices that are compatible with the serial ATA interface specification.

Serial ATA is completely software compatible with parallel ATA, requiring no modification to your operating system.

IEEE1394 (Optional)

IEEE 1394 is a high-speed serial bus developed by Apple that allows users to connect up to 63 devices to the serial bus on a PC. IEEE is sometimes called the IEEE 1394 standard, the i.Link connector, FireWire, and the High Performance Serial Bus (HPSB).

IEEE 1394 provides transfer rates up to 400Mbits/sec. IEEE 1394 provides enhanced PC connectivity for consumer electronics audio/video (A/V) appliances, storage peripherals, portable devices such as digital cameras, and inter-PC communications. IEEE 1394 supports hot swapping, multiple speeds on the same bus, and isochronous data transfer providing much needed bandwidth for multimedia operations.

Mainboard Form-Factor

The board is designed with ATX form factor - the latest industry standard of chassis. The 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. 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.

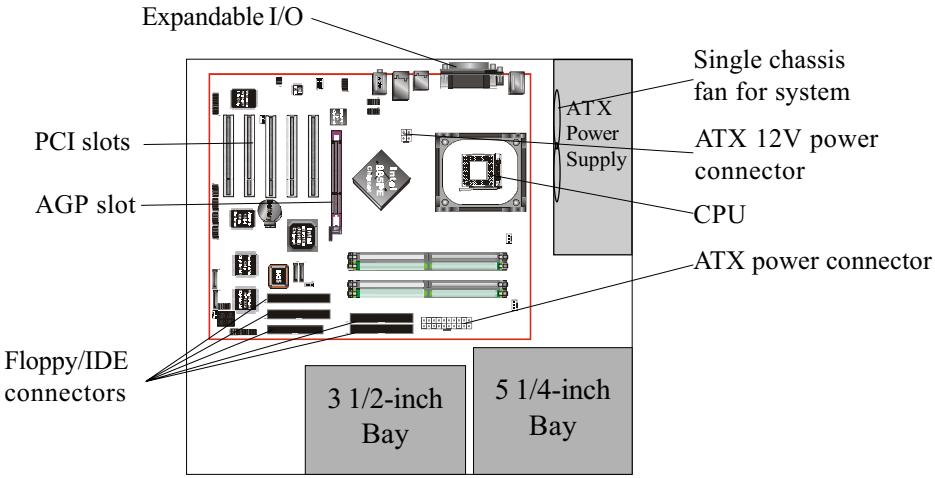


Figure 2: Summary of ATX chassis features

I/O Shield Connector

The board is equipped with an I/O back panel (Figure 3). Ensure that your computer case has the appropriate I/O cutout.

Figure 3: I/O ports

Power-On/Off (Remote)

The board has 20-pin ATX and 4-pin ATX12V connectors 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 (>=) 2A. 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.

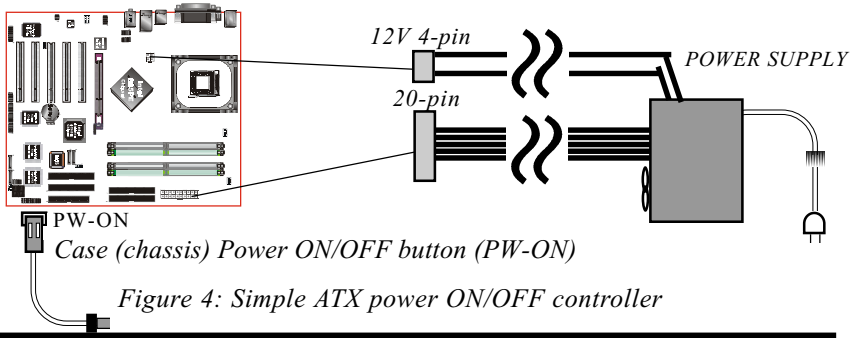


Figure 4: Simple ATX power ON/OFF controller

System Block Diagram

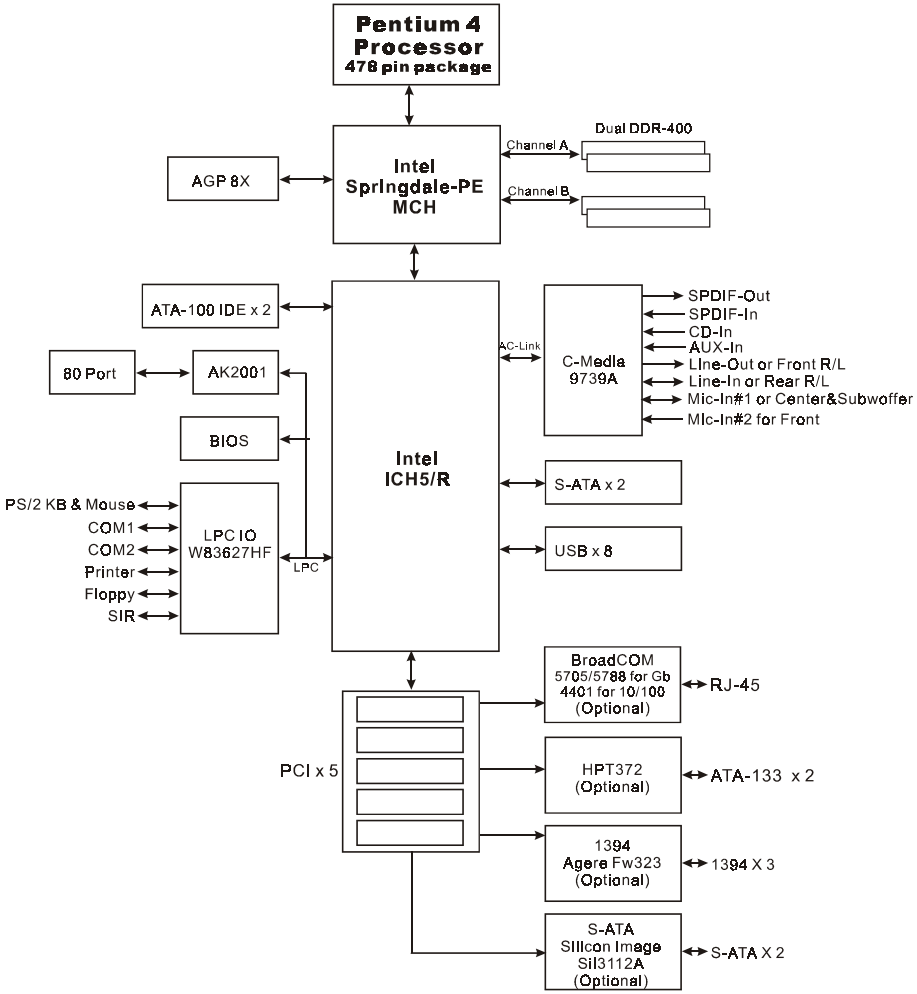


Figure 5: System Block Diagram

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Section 2
FEATURES

Mainboard Features

Processor

- Socket 478 Intel® Pentium® 4 processor.
  Supports Northwood, Prescott or later CPU only, does not support Willamette CPU.
- Supports System Bus and Memory Configurations:
  FSB400 / DDR266 (PC2100)
  FSB533 / DDR266/333 (PC2100/PC2700)
  FSB800 / DDR333 (PC2700)
  FSB800 / DDR400 (PC3200)

  * When configured to FSB800/DDR333, adaptive synchronization aligns to the closest FSB to memory clock ratio, setting memory channel to 320MHz.
- 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 865PE Chipset (865PE + ICH5R or ICH5)

Main Memory

- Four 184-pin DDR DIMM sockets for PC2100/2700/3200 (DDR266/333/400) DIMMs
- Supports 128-bit dual channel memory architecture
- Supports up to 4GB memory size

BIOS

- 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 K/B, PS2 Mouse, Modem Ring-in COM#1…

Onboard PCI Devices

- 1394--> (Optional) Integrate 1394 controller with Agere FW323 for 3 ports solution
  - IEEE-1394a compliant with up to 400Mbps bandwidth
- S-ATA --> Up to four Serial ATA devices (2 for optional by Silicom Image SIL3112A)
  - Suppoers Serial ATA devices with up to 1.5Gbps bandwidth
- LAN--> (Optional) Integrate 10/100Mps Fast Ethernet controller with Broadcom BCM4401 LAN Chipset
  Integrate 1Gbps Fast Ethernet controller with Broadcom BCM5705/5788 LAN Chipset (for high-level model only)
- IDE--> 2 IDE Port with PIO/Ultra DMA-33/66/100 up to 4 devices
  2 Extra IDE Port by HPT372 with Ultra DMA-133 & IDE RAID up to 4 devices (Optional)

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 CMI9739A AC'97 CODEC
  - AC'97 v2.2 compliant

- In 2-CH mode, supports Line-In (Blue), Line-Out (Green) and Mic-In (Pink) at rear panel
- In 6-CH mode, supports Rear speaker out (Blue), Front speaker out (Green) and Center&Subwoofer speaker out (Pink) 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)
- Two Serial ports (1 at rear panel)
- Eight USB2.0 ports (4 at rear panel)
- One RJ45 LAN connector (at rear panel)(Optional)
- One game port
- One floppy drive interface
- Two IDE interfaces
- Two IDE&RAID interfaces (Optional)
- Three 1394 interface (Optional)
- Four Serial ATA interface (2 for Optional)
- Three Fan connectors

Front Panel Controller

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

Expansion Slots

- One AGP slots supporting 1.5v 4X/8X AGP card
  - AGP v3.0 compliant
- Five PCI bus sockets with Bus Master support
  - PCI v2.3 compliant

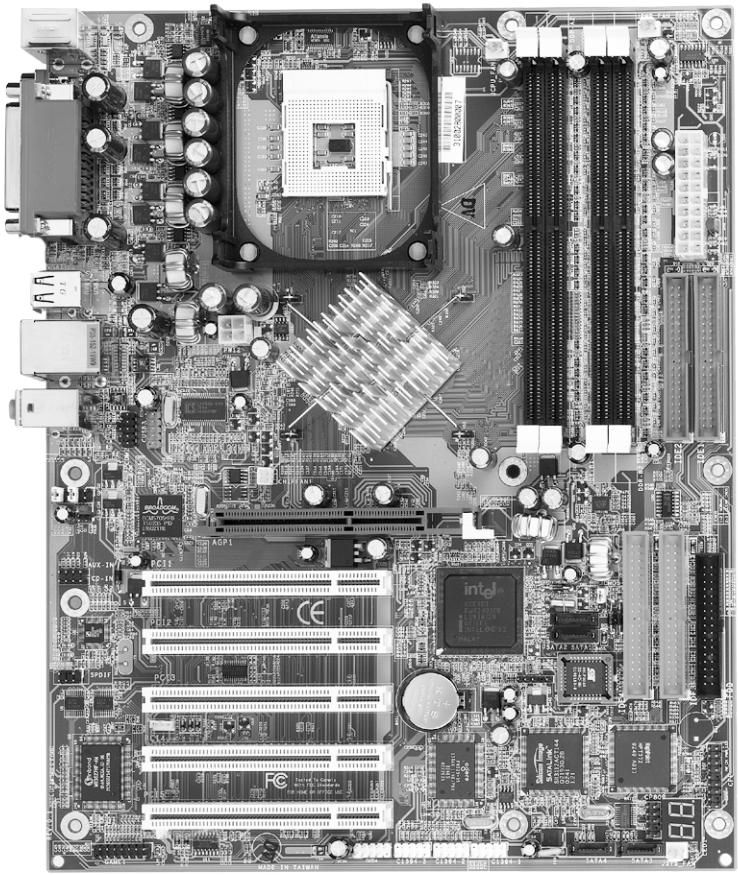
Other Features

- Magic Health – 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, …
- Supports exclusive KBPO (Keyboard Power On) function
- 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

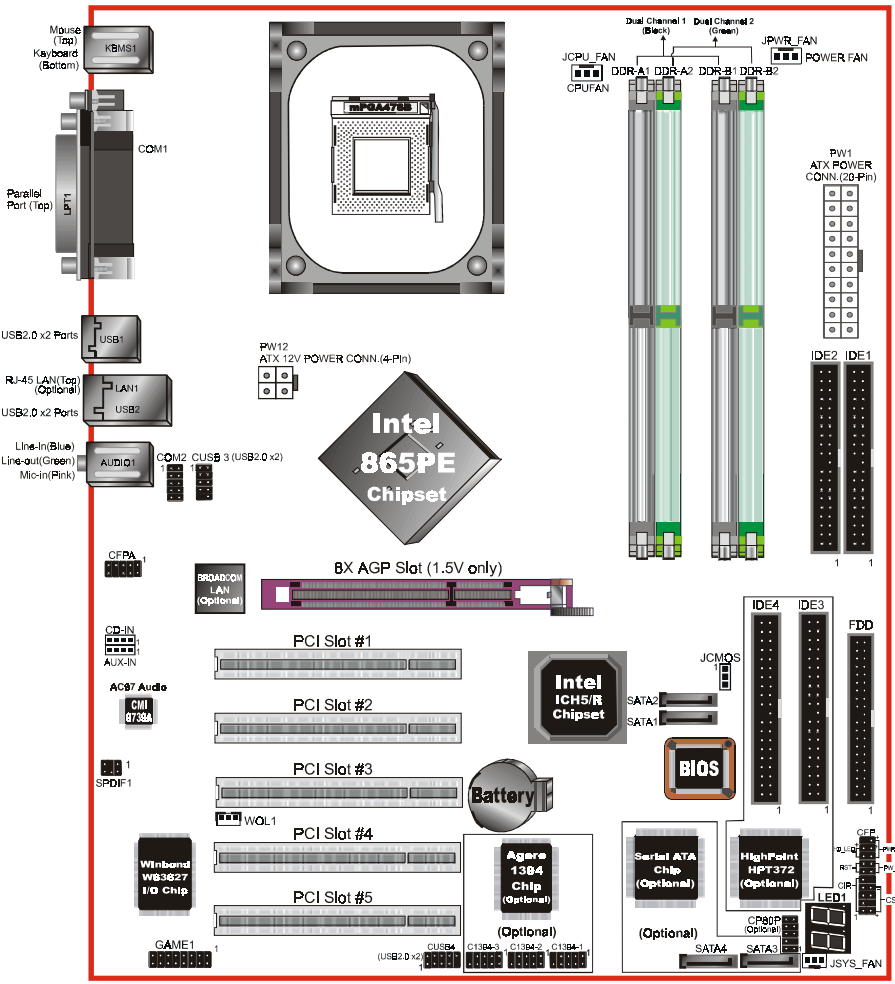
Form Factor

- 305 x 245 mm ATX size

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. Expansion Slots

3-5. Device Connectors

3-1 CPU Installation

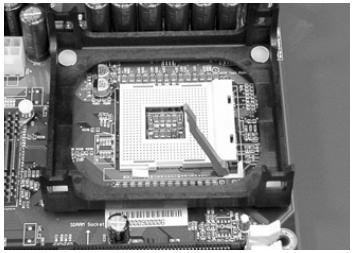


Figure 1

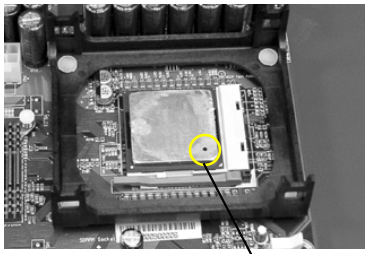


Figure 2

Step 1

Open the socket by raising the actuation lever.

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.

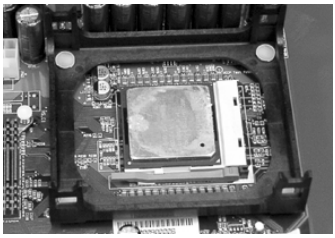


Figure 3

Step 3

Close the socket by lowering and locking the actuation lever.

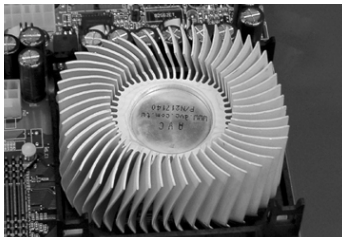


Figure 4

Step 4

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

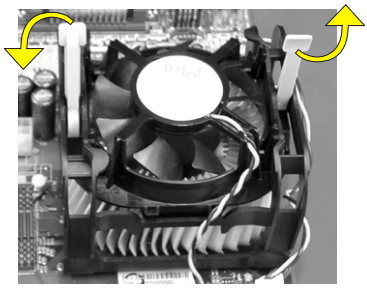


Figure 5

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.

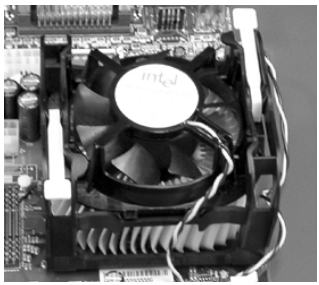


Figure 6

Step 6

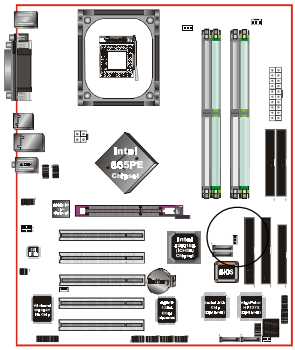
Plug the CPU fan into the CPU fan connector.

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.

3-2 Jumper Settings



JCMOS: Clear CMOS data Jumper

If the CMOS data becomes corrupted or you forgot the supervisor or user password, clear the CMOS data to reconfigure the system back to the default values stored in the ROM BIOS.

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

To CMOS Clear data, please follow the steps below.

1. Turn off the system.
2. Change the jumper from "1-2" to "2-3" position for a few seconds.
3. Replace the jumper on to the "1-2" position.
4. Turn of the system and hold down the <Del> key to enter BIOS setup.

3-3 System Memory Configuration

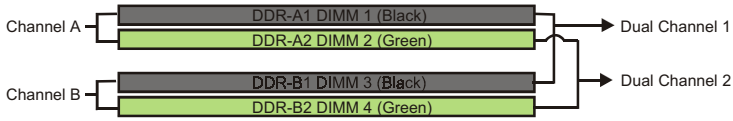
Memory Layout

The mainboard accommodates four PC2100/PC2700/PC3200 184-pin DIMMs (Dual In-line Memory Modules):

- Supports up to 4.0GB of 266/333/400MHz DDR SDRAM.
- Supports two 64-bit wide DDR data channels.
- Available bandwidth up to 3.2GB/s (DDR400) for single-channel mode and 6.4GB/s (DDR400) in dual-channel mode.
- Supports non ECC DIMMs.
- Registered DIMMs not supported.
- Supports 128-Mb, 256-Mb, 512Mb DDR technologies.
- Supports only x8, x16, DDR devices with four banks.
- SPD (Serial Presence Detect) scheme for DIMM detection support.
- Supports configurations defined in the JEDEC DDR1 DIMM specification only.

Figure 6 and Table 1 show several possible memory configurations.

<Figure 6>



<Table 1>

	1 DIMM (64-bit)				2 DIMM (128-bit)		3 DIMM (64-bit)		4 DIMM (128-bit)
DIMM#1 (Black)	SS/DS				SS/DS		SS/DS	SS/DS	SS/DS
DIMM#2 (Green)		SS/DS				SS/DS	SS/DS	SS/DS	SS/DS
DIMM#3 (Black)			SS/DS		SS/DS		SS/DS		SS/DS
DMM#4 (Green)				SS/DS		SS/DS		SS/DS	SS/DS

* SS: Single-Sided DIMM, DS: Double-Sided DIMM

NOTES:

- When FSB is 400MHz, the mainbaod can support DDR266.
- When FSB is 533MHz, the mainbaod can support DDR266/333.
- When FSB is 800MHz, the mainbaod can support DDR333/400 (Uses DDR333, adaptive synchronization aligns to the closest FSB to memory clock ratio, setting memory channel to 320MHz)
- The four DIMM sockets are divided into 2 Channels - Dual Channel 1 (DIMM1 and DIMM3) and Dual Channel 2 (DIMM2 and DIMM4), The same dual channel has same color as show in Figure 6, Only in keeping those DIMMs in same type and same size are preferred. **We recommend you to use the same color DIMM sockets to obtain the best memory performance.**
  - For one DIMM memory configuration, the DIMM can be located on either of DIMM#1 to DIMM#4 in 64-bit mode.
  - For two DIMMs memory configuration, they are prefer to located in same group so the system can perform 128-bit mode.
  - For three DIMMs memory configuration, the DIMMs can be located on all DIMM sockets in 64-bit mode.
  - For four DIMMs memory configuration, the DIMMs can be located on all DIMM sockets in 128-bit mode.
- 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).

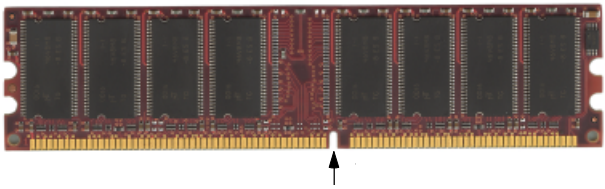


Figure 8 - DIMM notch

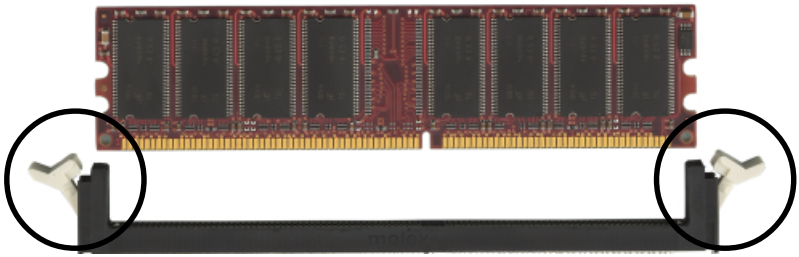


Figure 9 - DIMM module clips before installation

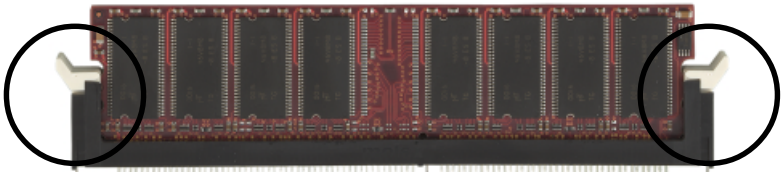
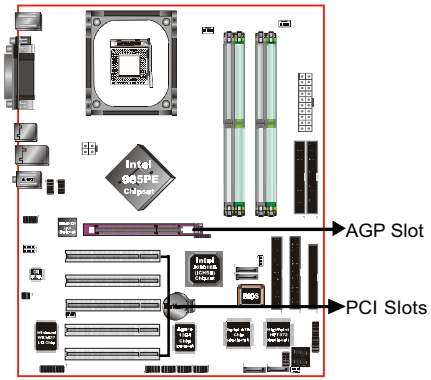


Figure 10 - DIMM module clip after installation

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

3-4 Expansion Slots



AGP Slot

The mainboard is equipped with an AGP slot. Make sure you install a card that supports the 1.5V specification.

PCI Slots

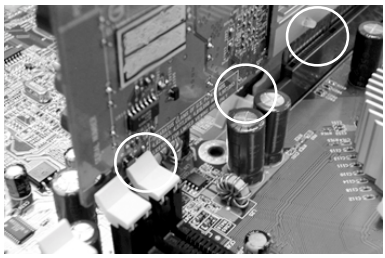
The mainboard is equipped with 5 PCI slots. It supports PCI cards that comply with the PCI specification.

Installing an Expansion Card

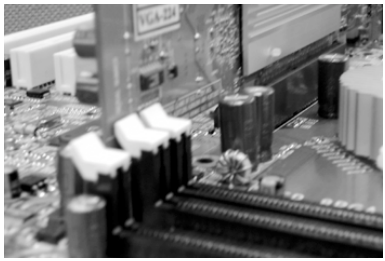
The steps below assume that the mainboard is already installed in the system chassis.

1. Make sure the PC and all other peripheral devices connected to its has been powered down.
2. Disconnect all power cords and cables.
3. Remove the system unit cover.
4. Remove the bracket of the slot that you intend to use. (You need to remove the screw in order to remove the bracket.)
5. Align the card above the slot then press it down firmly until it is completely seated in the slot.
6. Secure the card to the chassis with the screw you removed in step 4.
7. Replace the system unit cover.
8. Power on the PC.
9. Enter the BIOS step program to make the necessary settings.
10. Save the settings and restart the PC.
11. Install the software drivers of the expansion cards, if necessary.

AGP Card Installation Caution

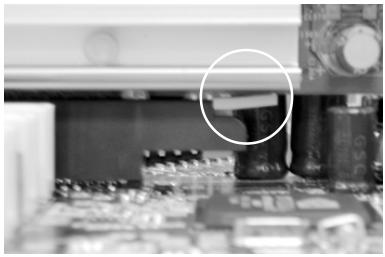


1. AGP card component is blocked by DIMM socket lock.
2. AGP slot lock is not locked.
3. AGP card edge connector is not inserted properly.



1. AGP card component is not blocked by DIMM socket lock.
2. AGP slot lock is locked.
3. AGP card edge connector is inserted properly.

1. AGP slot lock is not locked.
2. AGP card edge connector is not inserted properly.



1. AGP slot lock is locked.
2. AGP card edge connector is inserted properly.

3-5 Connectors

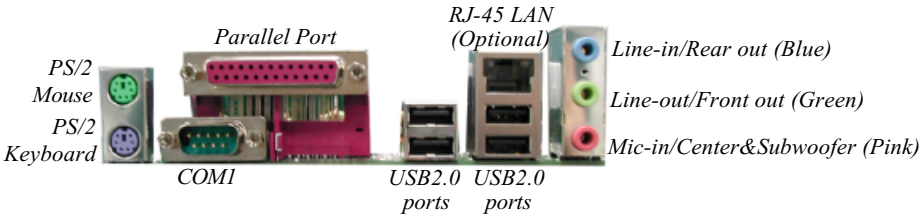
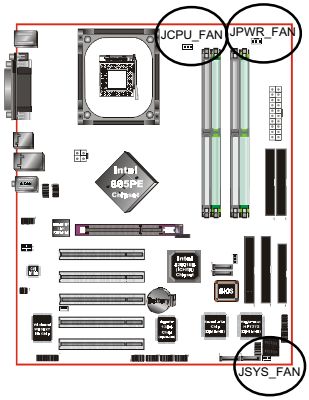


Figure 11 - I/O Ports

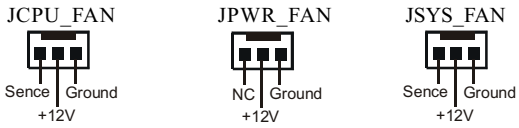


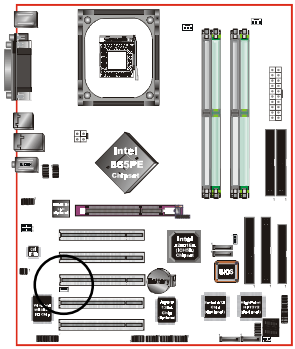
JCPU_FAN / JPWR_FAN / JSYS_FAN:
CPU/Power/Chassis Fan Power Connectors

JCPU_FAN: The CPU must be kept cool by using a fan with heatsink.

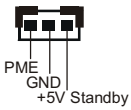
JPWR_FAN: If you are installing an additional fan in the unit, connect the fan's connector.

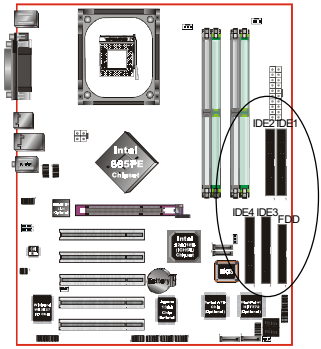
JSYS_FAN: The chassis fan will provide adequate airflow throughout the chassis to prevent overheating the CPU.





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

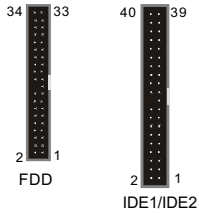


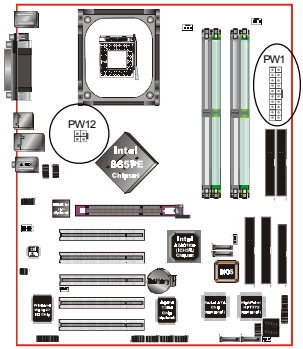


FDD: Floppy Controller Connector (Black)

IDE1/2: Ultra DMA-66/100 Primary/Secondary IDE Connector (Blue)

IDE3/4: (Optional) Ultra DMA-66/100 & RAID Primary/ Secondary IDE Connector (Red) Supported by HPT372 chipset, refer to HPT372 RAID Controller user's manual for detail information.



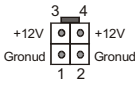


PW1: 20-pin ATX Power Connector

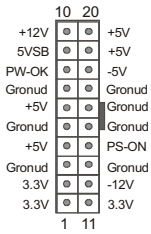
PW12: 4-pin ATX12V Power Connector

The mainboard is equipped with a standard 20-pin ATX main power connector and a 4-pin +12V power connector for connecting an ATX12V power supply. The plugs of the power cables are designed to fit in only one orientation. Find the proper orientation then insert the plugs into the connectors until they fit in place.

Caution:
Be sure that the PW1 and PW12 Power Connector must be used simultaneously or else can not boot-up.

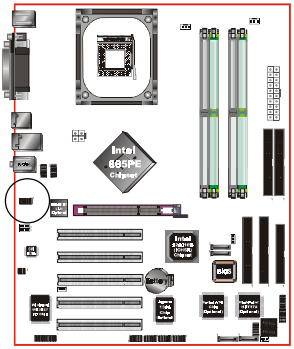


PW12



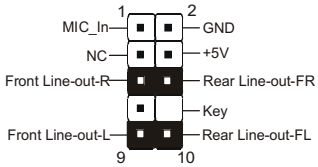
PW1

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.



CFPA: 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.

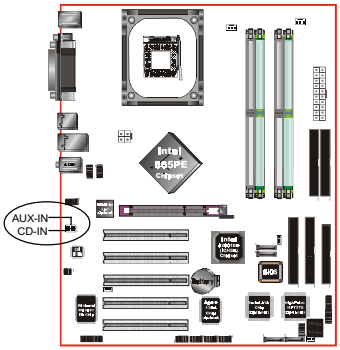


Settings

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

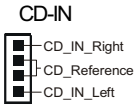
Pins (5-6) & (9-10) Open: Only Front Panel Audio Speaker can be used.

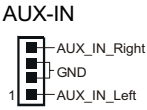
In 2-Channel audio mode, Mic-In is shared for both front panel and rear panel. In 6-Channel audio mode, the Mic-In is dedicated for front panel used, and rear panel Mic-In function will switch to Center and subwoofer support.

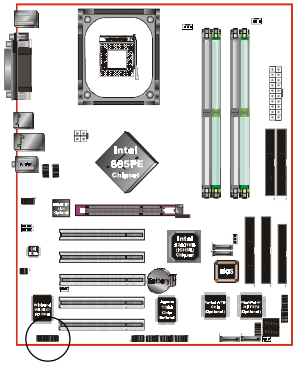


CD-IN/AUX-IN: CD Audio_IN Connector

The CD-IN and AUX-IN connectors are used to receive audio form a CD-ROM drive, TV tuner or MPEG card.

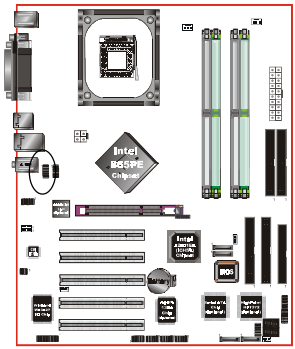






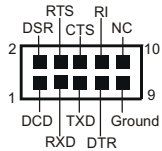
GAME1: Game/MIDI connector

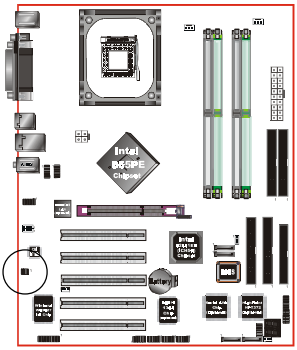
This port works well with any application that is compatible with the standard PC joystick.



COM2: Serial Port Connector

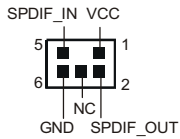
The serial port can be used with modems, serial printers, remote display terminals, and other serial device.

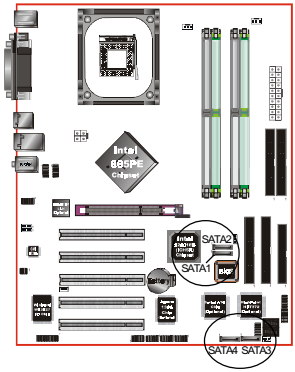




SPDIF: Sony/Philips Digital InterFace connector

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

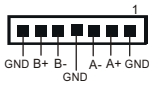


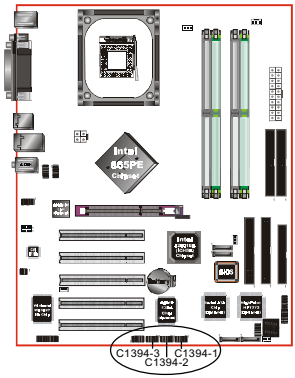


SATA1 / SATA2: Serial ATA Connectors

SATA3 / SATA4 (Optional): Sserial ATA Connectors support by Silicom Image Sil3112A chip.

These connectors enable you to connect Serial ATA devices that conform to the Serial ATA specification.

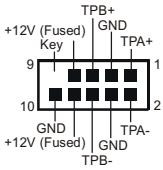


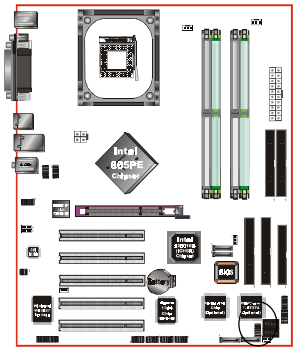


C1394-1 / C1394-2 / C1394-3: (Optional)

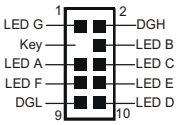
400Mbps 1394a (FireWire) Connectors

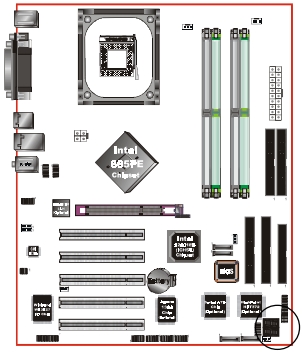
C1394-1, C1394-2 and C1394-3 enable you to connect three IEEE 1394 ports for use with external devices that conform to the IEEE 1394 specification.





CP80P: 80 port debug connector (Optional)

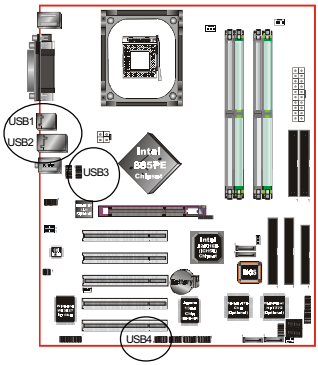




LED1: 80 Port Debug LED

Provides two digits LED light to show why system boots failed for quick and easy optimization.

80 Port Debug 7-segment LED display
(Refer to Appendix E for POST codes)



USB1/USB2/CUSB3/CUSB4: USB 2.0 ports

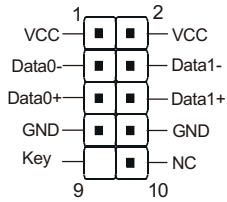
The mainboard is equipped with eight onboard USB2.0/1.1 ports (4 at rear panel).

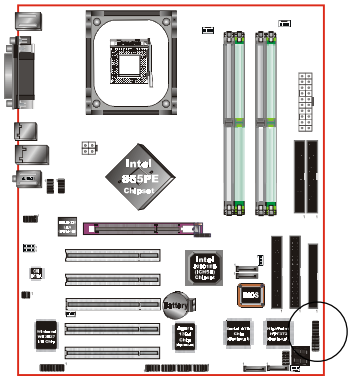
It is equipped with a 10-pin connector for connecting 4 additional external USB 2.0/1.1 ports. If you wish to use the additional USB ports, install the card-edge bracket to the system chassis then insert the connector that is attached to the USB port cables to the 10-pin connector.

It will help your device more efficient for the transfer speed up to 480Mbps.

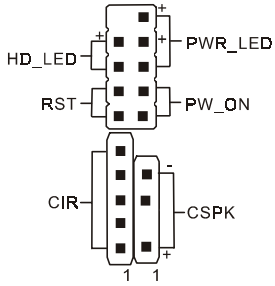
CAUTION!

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.





CFP / CIR / CSPK



CFP: Front Panel Connector

- **HD_LED**
  This will light when the hard drive is being accessed.
- **PWR_LED**
  This connects to the power button of the system chassis
- **RST**
  This switch allows you to reboot without having to power off the system thus prolonginh the life of the power supply or system.
- **PW_ON**
  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.

CIR: IR connector

Connect your IrDA cable to the IR connector.

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

CSPK: Speaker

Connect to the system's speaker for beeping

1. VCC	3. GND
2. NC	4. Speaker

3-6 External Modem Ring-in Power ON and Keyboard Power ON Functions (KBPO)

Modem-Ring 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/ME/2000/98. (refer to Windows online help).

NOTES:

- Intel ATX version 2.0 specification recommends you use a power supply that supplies >=2.0 A in 5.0 VSB. However, this mainboard supports a 5.0 VSB standby power supply > = 2A .
- We recommend you use the power supply with 2.0 A in 5.0 VSB, which supports PCI 2.2 specification for remote power-on and wake-up functions.

3-7 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 Port Wake Up Control" (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 PW-On of CFP pin), click your USB mouse buttons, or press your USB keyboard keys to wake up your system to the last display.

3-8 Supports AGP Card 3.3V Protection

The Intel® 865PE chipset supports 1.5 volt AGP graphics cards only. Using a 3.3 volt AGP card in an Intel® 865PE chipset-based board might damage the chipset on an 865PE-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.

Section 4
BIOS SETUP

Main Menu

The 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)

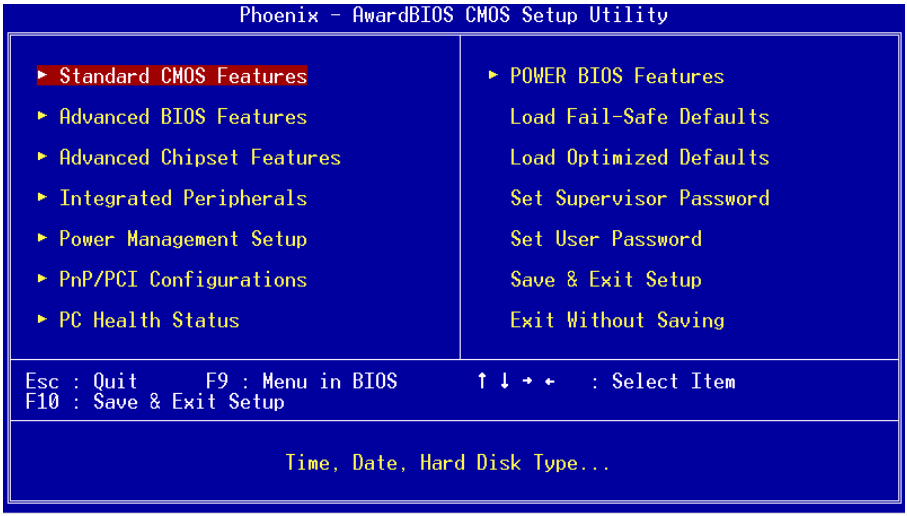


Figure 1: CMOS Setup Utility

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.

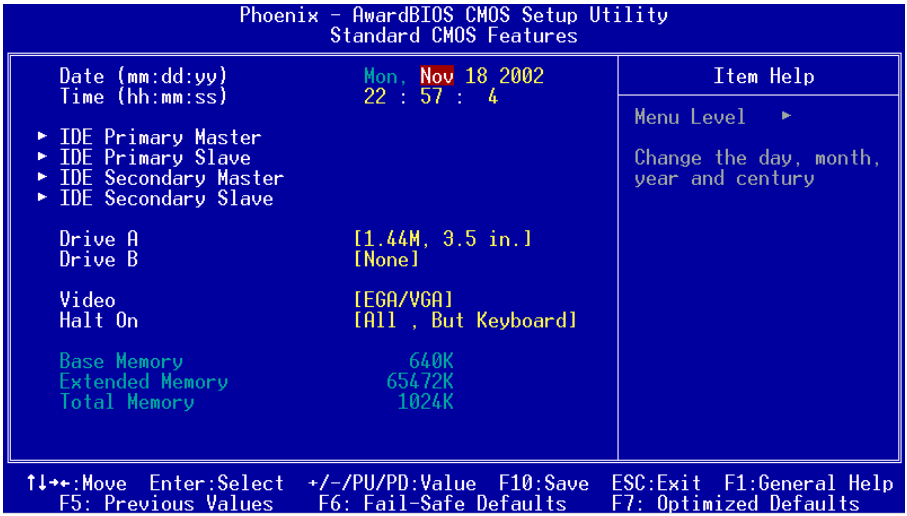


Figure 2: Standard CMOS Setup

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.

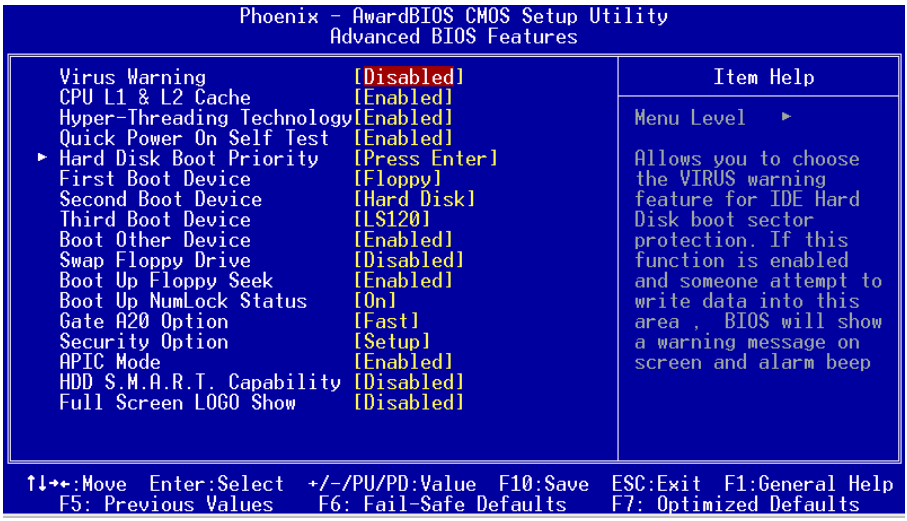


Figure 3: BIOS Features Setup

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.

Hyper-Threading Technology

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.

Hard Disk Boot Priority

This item allows you to select the hard disk boot priority.

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.

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.

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.

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.
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.

Full Screen LOGO Show

This item allows you determine Full Screen LOGO display during POST.
Options: Enabled, Disabled.

4-3 Advanced Chipset Features

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

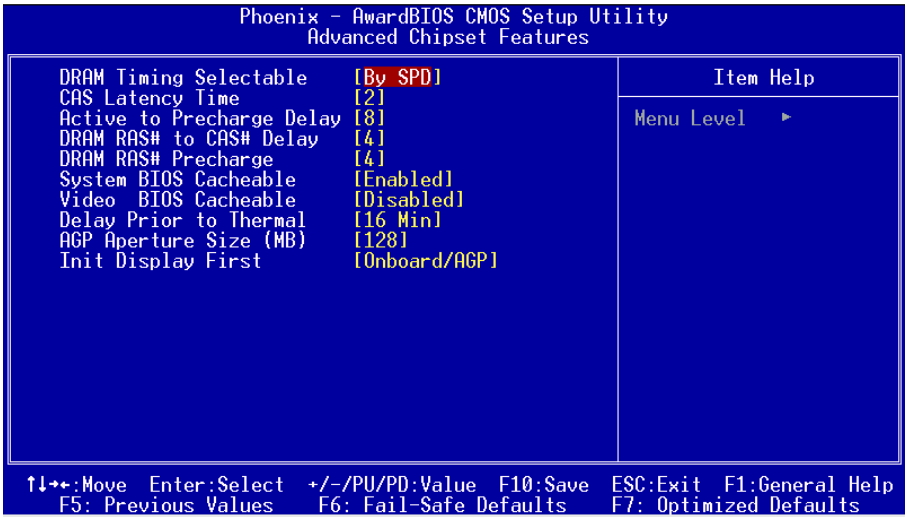


Figure 4: Chipset Features Setup

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: 2, 2.5, 3.

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, 8.

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, 4.

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, 4.

System BIOS Cacheable

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

Video BIOS Cacheable

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

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.
Options: 4, 8, 16, 32, 64, 128, 256 MB.

Init Display First

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

4-4 Integrated Peripherals

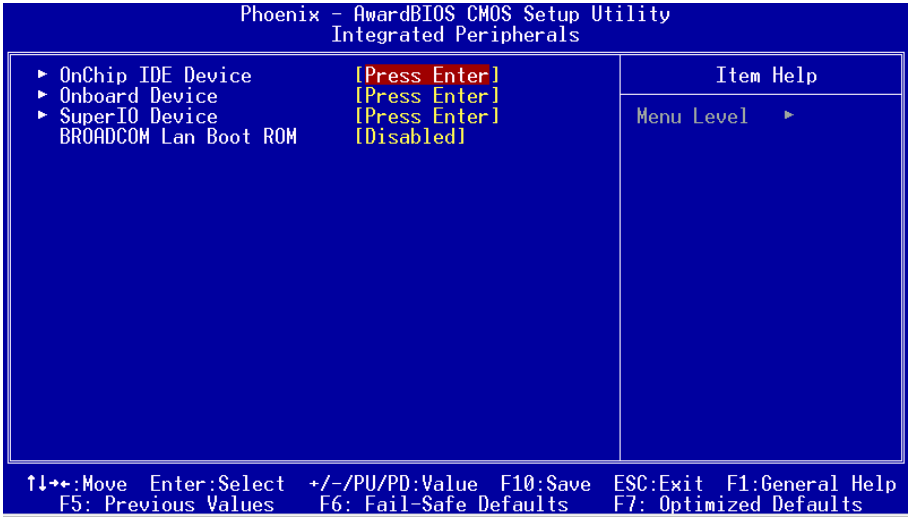


Figure 5: Integrated Peripherals

Notes:

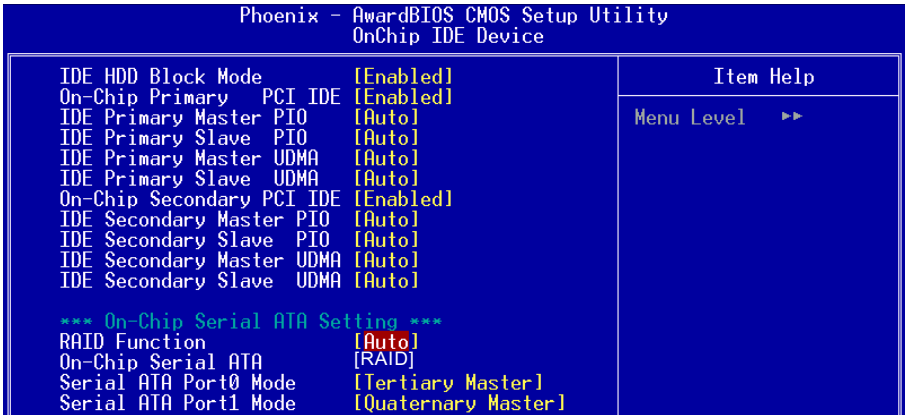
- If you do not use the Onboard IDE connector, then you will need to set that Onboard Primary PCI IDE: Disabled and Onboard Secondary PCI IDE: Disabled
- The Onboard PCI IDE cable should be equal to or less than 18 inches (45 cm.).

BROADCOM Lan Boot ROM (Optional)

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

▸*OnChip IDE Device*

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



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.

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.

Options: Auto, Mode 0 ~ 4.

IDE Primary/Secondary Master/Slave UDMA

This allows you to select the mode of operation for the IDE drive Ultra DMA-33/66/100 implementation is possible only if your IDE hard drive supports it and the operating environment includes a DMA 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 manually disable it.
Options: Auto, Disabled.

*** On-Chip Serial ATA Setting ***

RAID Function

Enables the RAID function. When RAID is enabled ("Auto" or "Enabled") Serial ATA ports 0 and 1 will default to "Tertiary" and "Quartenary".
Options: Auto, Enabled, Disabled.

Note: O/S driver for this feature is available only for Windows XP, please check future updates for other O/S support.

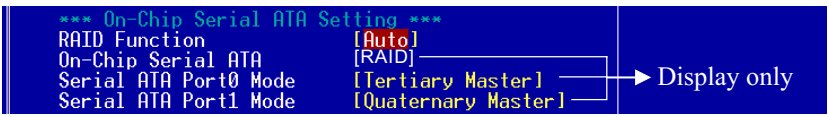
On-Chip Serial ATA

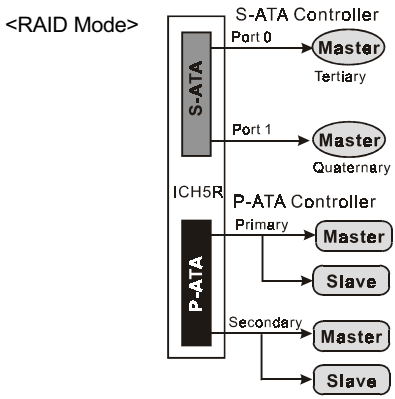
Applicable only when RAID function above is "Disabled". Assigning "Primary" will make Serial ATA IDE the Primary port and in effect disable the Parallel-ATA Primary port. Similarly, assigning "Secondary" will disable the Parallel-ATA Secondary port.
Options: RAID, Disabled, For Primary, For Secondary.

Serial ATA Port 0 /1 Mode

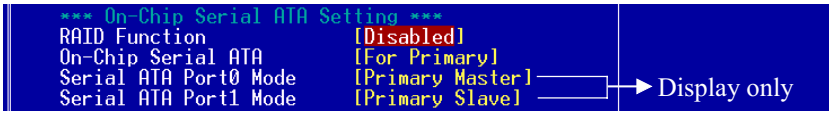
Display Serial ATA Port 0/1 assignment to IDE device.

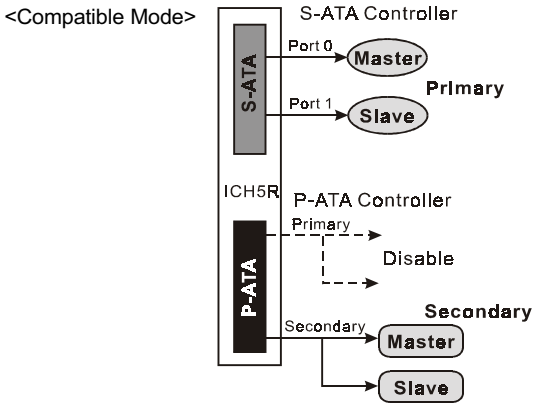
◆ The following screen shows RAID function "Auto" or "Enabled".



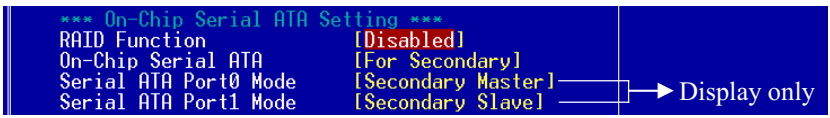


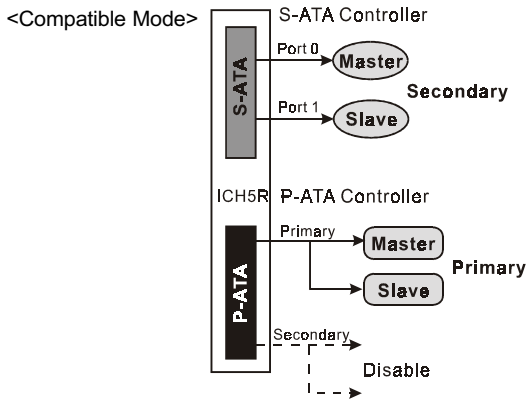
- The following screen shows RAID function "Disabled" and on-chip Serial ATA assigned to "Primary".





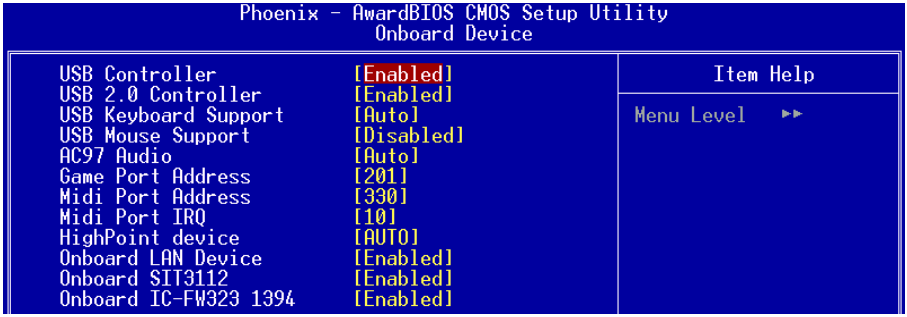
- The following screen shows RAID function "Disabled" and on-chip Serial ATA assigned to "Secondary".





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, 209, Disabled.

Midi Port Address

Select an address for the Midi port.

Options: 290, 300, 330, Disabled.

Midi Port IRQ

Select an interrupt for the Midi port.

Options: 5, 10.

HighPoint Device (Optional)

Enables the onboard HighPoint RAID feature.

Options: Enabled, Disabled, Auto.

Onboard LAN Device (Optional)

Enables the onboard LAN feature.

Options: Enabled, Disabled.

Onboard SIT3112 (Optional)

Enables the onboard Serial ATA feature.

Options: Enabled, Disabled.

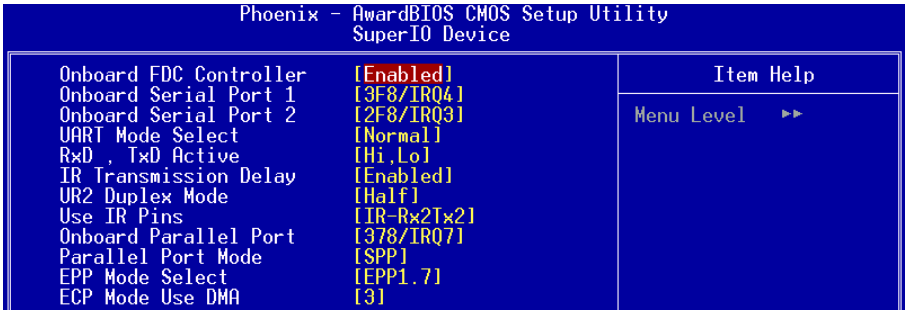
Onboard IC-FW323 1394 (Optional)

Enables the onboard IEEE 1394 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.

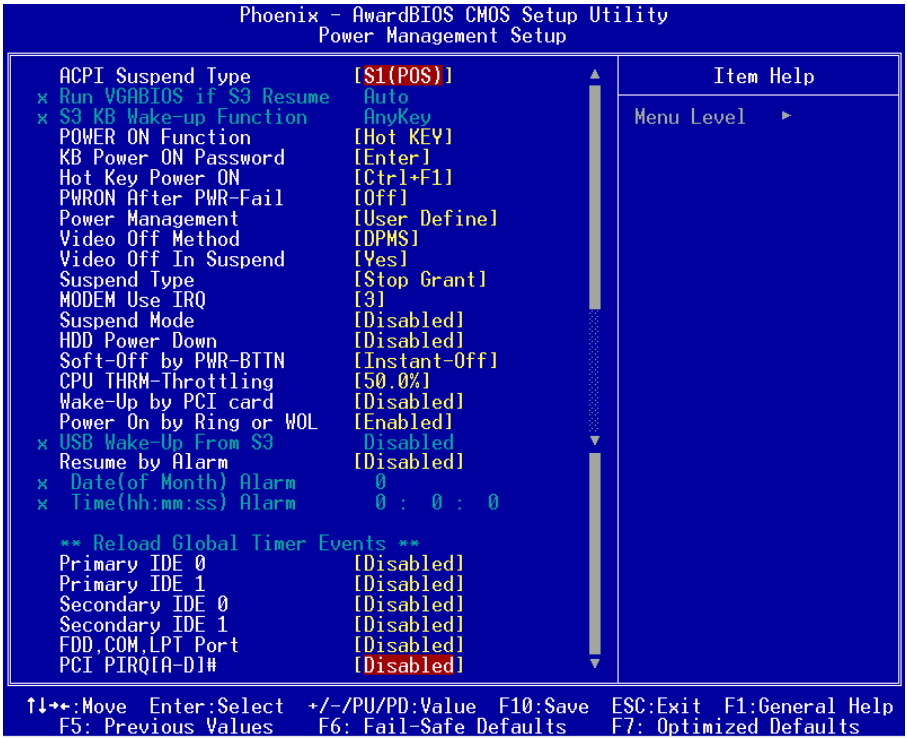


Figure 6: Power Management

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.

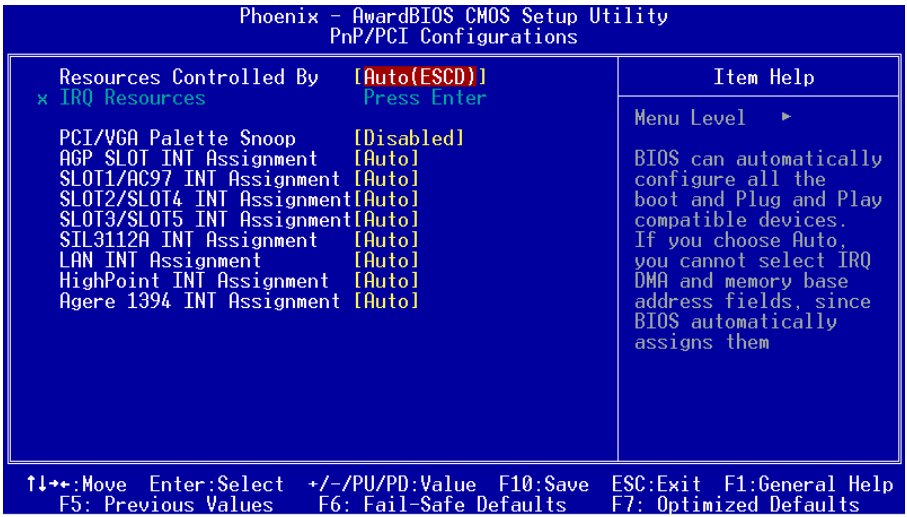


Figure 7: PNP/PCI Configuration Setup

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.

AGP SLOT / AC97 / PCI Slot 1 ~ Slot 5 / SIL3112A / LAN / HighPoint / Agere 1394 INT Assignment

This setting enables the user to specify what IRQ will be assigned to the AGP/ AC97/PCI Slot 1 ~ PCI Slot 5/SIL3112A/LAN/HighPoint/Agere 1394 devices in the chosen slot.

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		V						
Slot 1		V						
Slot 2			V					
Slot 3				V				
Slot 4			V					
Slot 5				V				
Onboard LAN (Optional)						V		
Onboard HighPoint (Optional)							V	
Onboard Serial ATA (Optional)					V			
Onboard IEEE 1394 (Optional)								V
Onboard USB1	V							
Onboard USB2		V						
Onboard USB3			V					
Onboard USB4	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

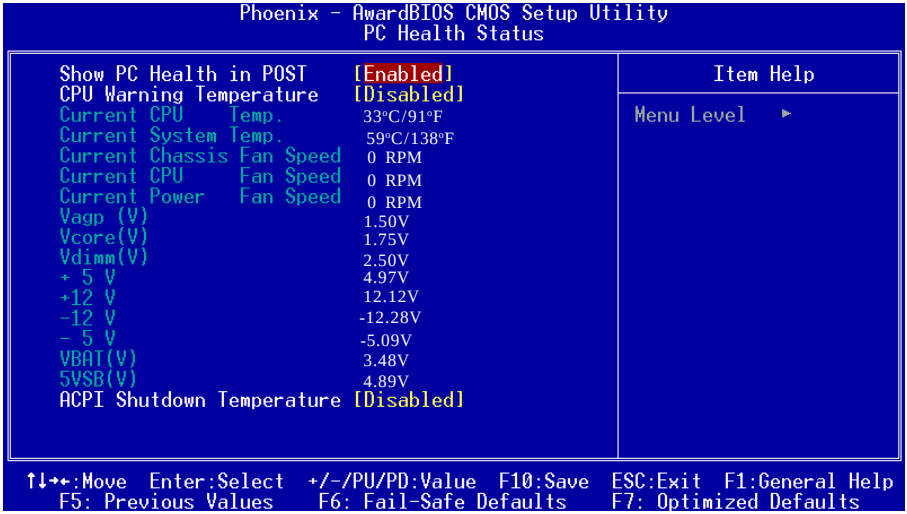


Figure 8: PC Health Status

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.

VBAT(V)

The voltage level of the battery.

± 5V, ± 12V, 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 Power BIOS Features

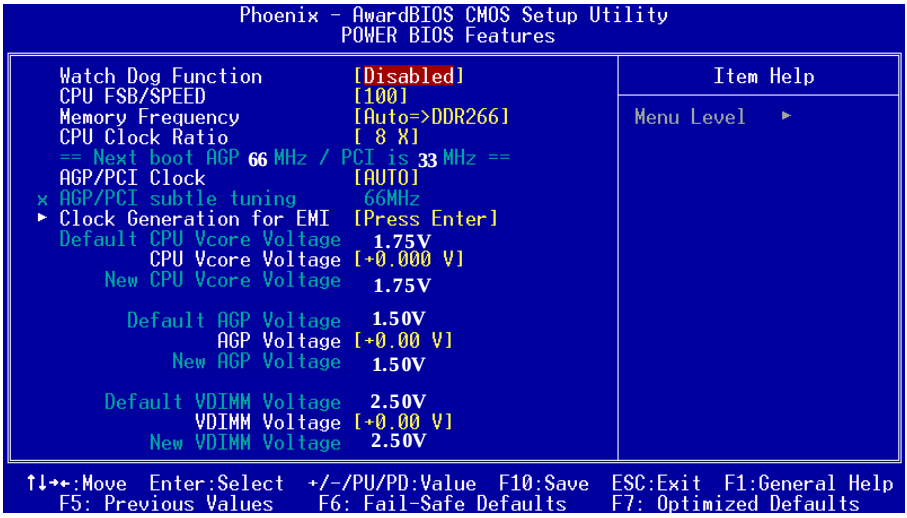


Figure 9: Frequency/Voltage Control

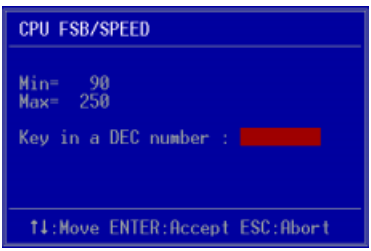
Watching-Dog Function

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 266/333/400MHz. We recommend that you leave this item at the default value.

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

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

When the FSB is 800MHz the options will display 1:1=>DDR400, 5:4=>DDR320 and Auto=>DDR320 (by SPD).

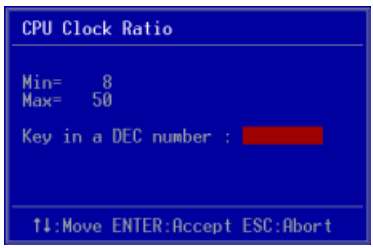
CPU Clock Ratio

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 800 MHz and the system is running a front side bus frequency of 100 MHz, you should select a multiplier of 8 so that:

8 (Multiplier) x 100 MHz (front side bus) = 800 MHz (CPU clock)



Key in the DEC (decimalism) number for the CPU Clock Ratio.

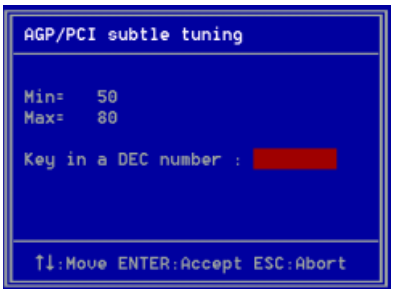
AGP/PCI Clock

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 +0.2875V in 0.0125V increments. We recommend that you leave this at the default value.

AGP Voltage

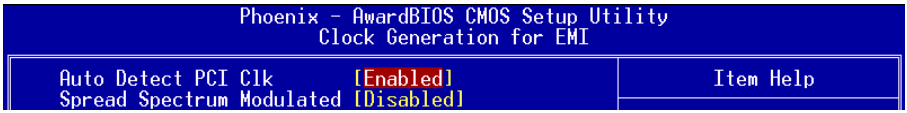
This item allows you to set the AGP slot voltage. The default is +0.00V. Options: +0.00V to +0.70V in 0.10V increments. We recommend that you leave this at the default value.

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

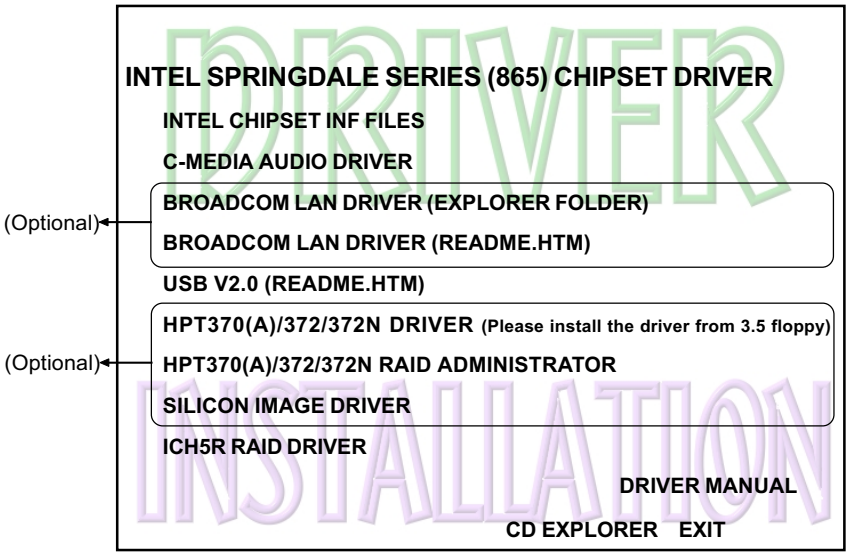
Pressing <Enter> on this item asks for confirmation:

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, the main menu screen will appear. The main menu displays buttons that link you to the supported drivers, utilities and software.

Step 1 : Click **"INTEL CHIPSET INF FILES"** to install chipset driver.

Step 2 : Click **"C-MEDIA AUDIO DRIVER"** to install audio driver.

Step 3 : Click **"BROADCOM LAN DRIVER (README.HTM)"** to read the installation instructions for LAN driver. (Optional)

Step 4 : Click **"USB V2.0 DRIVER (README.HTM)"** for installation introduction to install USB V2.0 driver.

Step 5 : If your board equipped with a HPT370(A)/372/372N device, please install the driver from 3.5 floppy. (Optional)
The "HPT370(A)/372/372N RAID ADMINISTRATOR" item is for install Raid Administrator. (Optional)

Step 6 : Click **"SILICON IMAGE DRIVER"** to install serial ATA driver. (Optional)

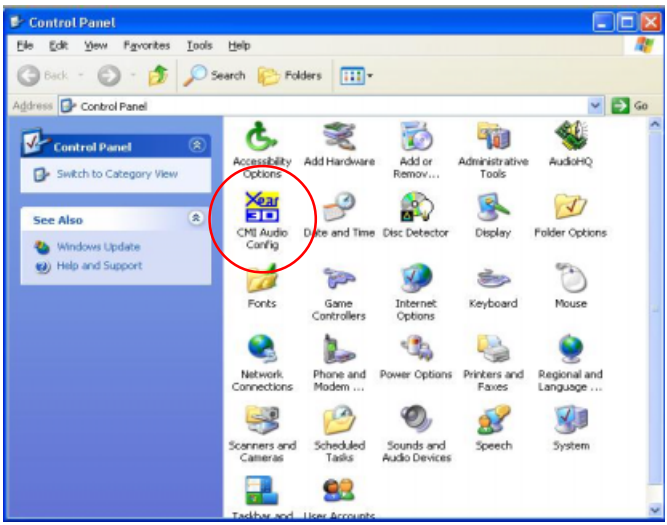
Step 7 : Click **"ICH5R RAID DRIVER"** to install ICH5R RAID driver.

C-Media Audio Configuation Brief Guide

Below is list brief guide of C-Media Audio Configuration. For more detailed information, please refer to user's manual in the attached CD.
You are able to access the control panel from two places:

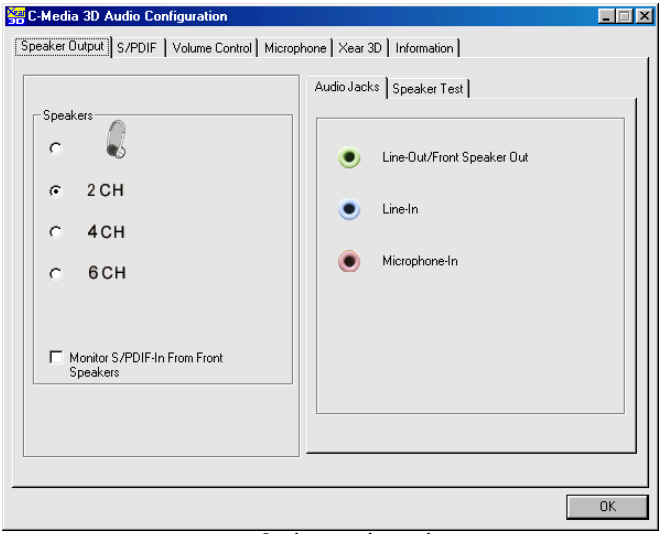
a) The system tray in the right-bottom of your screen. You can click right button of the mouse on it to get an audio-related pop-up menu as follows

b) In the "Control Panel" (Start=>Setting=>Control Panel), double-click "CMI Audio Config" to open it.

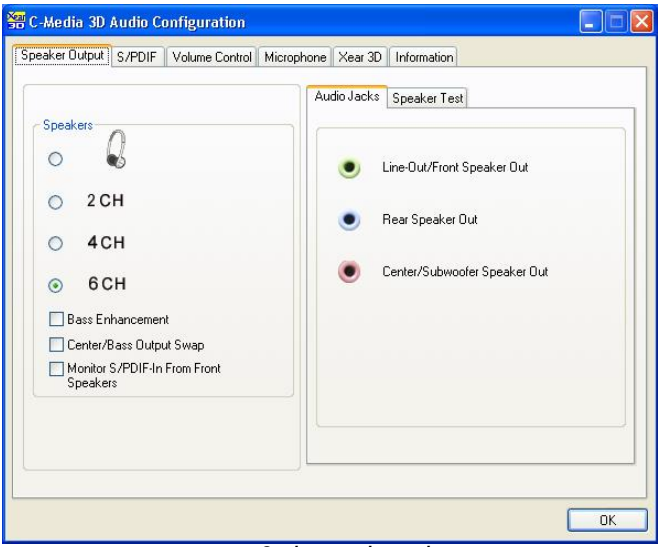


1. Speaker output:

When you open the “3D Audio Configuration”, you will see the default Output tab as the figure below. “Speaker Output” tab collects main setting/options for analog output to speakers.



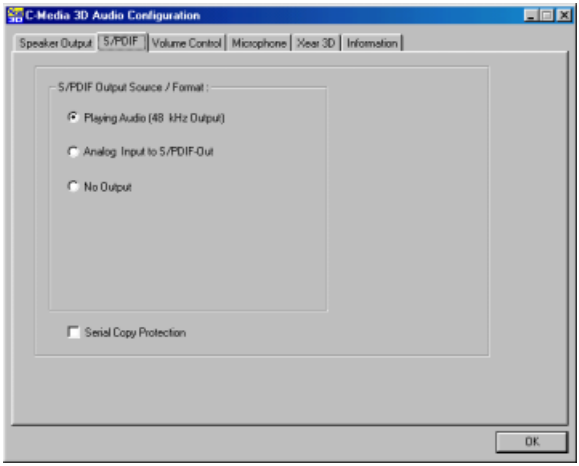
<2 channel mode>



<6 channel mode>

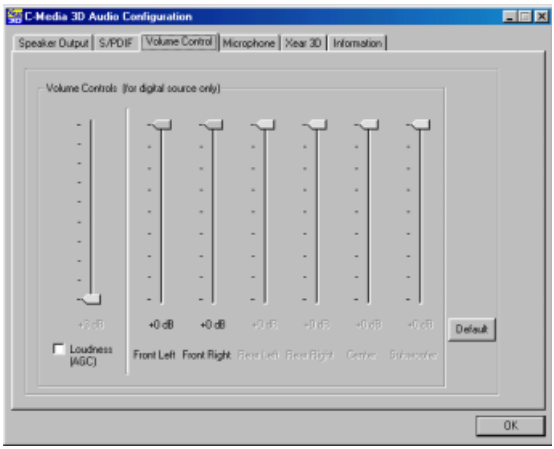
2. S/PDIF:

C-Media driver supports digital S/PDIF output (Sony/Philips Digital InterFace, developed by SONY/PHILIPS to provide a low-distortion digital data transfer between audio devices). There may be an optical or coaxial connector for S/PDIF on your system. When you select S/PDIF tab, you will see the setting page as the figure below.



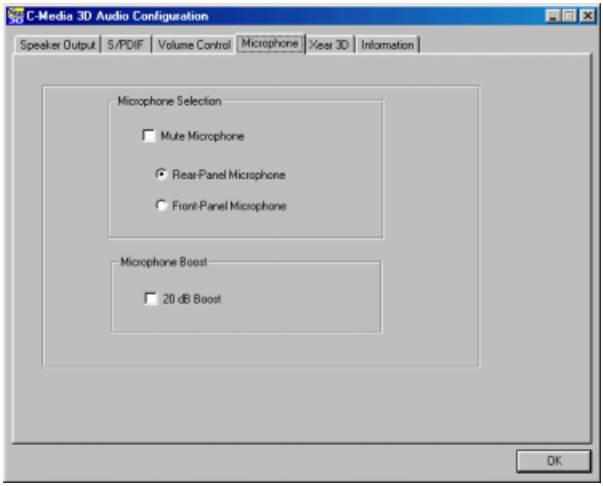
3. Volume Control:

C-Media driver provides the digital volume control for all 6 channels in 3D Audio Configuration. You can regulate each volume to the speaker for current playing digital sound sources. It's not effective for analog input sources.



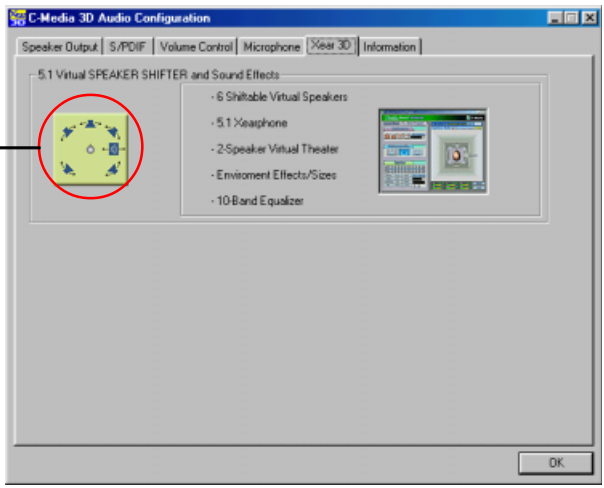
4. Microphone:

C-Media driver provides microphone setting in 3D Audio Configuration directly for more convenience. You can control microphone options in the tab though you can also reach them in Microsoft volume control.



5. Xear 3D:

C-Media driver now supports Xear 3D- 5.1 Virtual SPEAKER SHIFTER and sound effects. Just click the left button in Xear 3D tab and then the new friendly/fancy graphic user interface will pop up.



Click this

- **Xear 3D - 5.1 Virtual SPEAKER SFIFTER:**
  The SPEAKER SHIFTER block provides an advanced, amazing and considerate feature- dynamically adjustable multi-channel sound system no matter what listening appliance you use and what application you are running. You do NOT have to endure unbalanced speaker placement due to spatial limitation. You can enjoy multi-channel surround sound with even an earphone or usual 2 speakers.

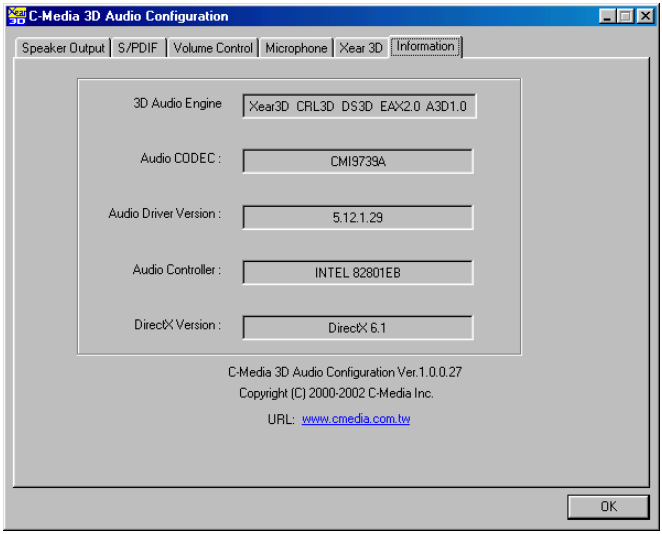
- **Xear 3D - Sound Effect:**
  Xear 3D Advanced Program provides another functional block- Sound Effect. You can create a different feeling for your music including 27 Environment Effects, Environment Size & 10-Band Equalizer with 12 pre-set models.

- **Xear 3D - Multi-channel Music Demo:**
  This demo program provides each speaker testing and three 5.1-channel music. You can get feeling about 5.1-channel surround music and use it to test SPEAKER SHIFTER, too. All demo music/sound here will repeat playing if you don't press "Stop" button.

- **Xear 3D - Play3D Demo:**
  Xear 3D Advanced Program also provides interesting Play3D demo programs as below. After installing the program with setup program, you will find the program from the path: "Start->Programs->C-Media 3D Audio->Play3D Demo".

6. Information :

There is a C-Media audio-related Information tab in 3D Audio Configuration. You can get a whole picture about the audio chip, driver version, 3D Audio Engine, Microsoft DirectX Version, and Configuration Version itself.



Appendix A

A-1 Update Your System BIOS

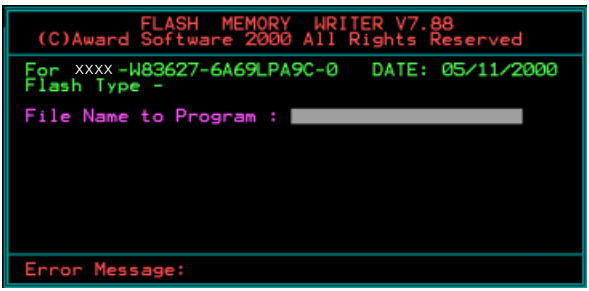
Download the xxxxx.EXE file corresponding to your model form the our website to an empty directory on your hard disk or floppy. Run the downloaded xxxxx.EXE file and it will self extract. Copy these extracted files to a bootable DOS floppy disk.

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

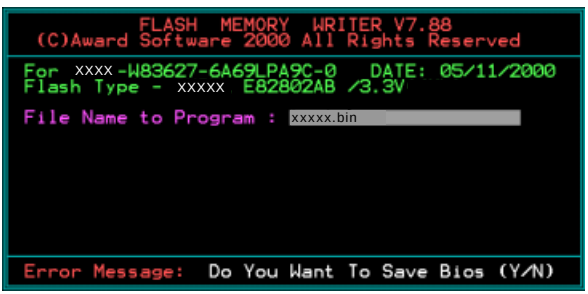
1. Type "A:\AWDFLASH and press <Enter> Key.

2. You will see the following setup on screen.

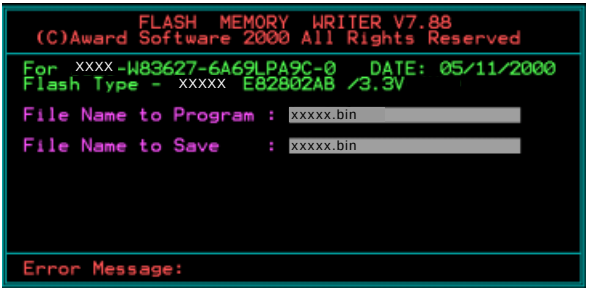
3. Please key in the xxxxx.bin BIOS file name.



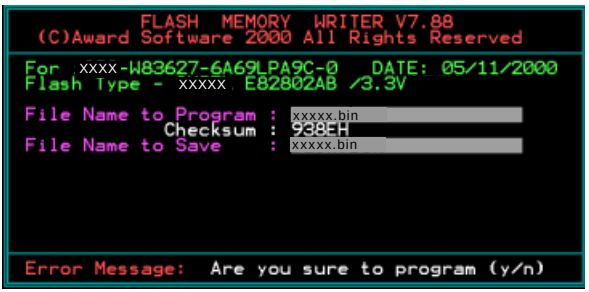
4. If you want to save the previous BIOS data to the diskette, please key in [Y], otherwise please key in [N].



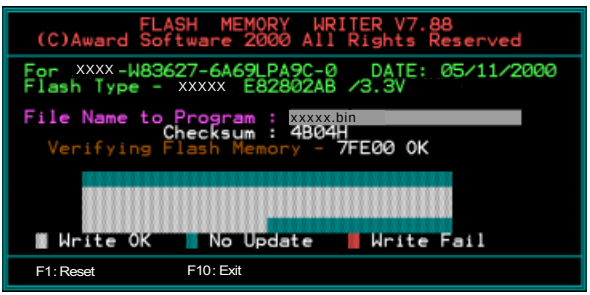
5. Key in File Name to save previous BIOS to file.



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



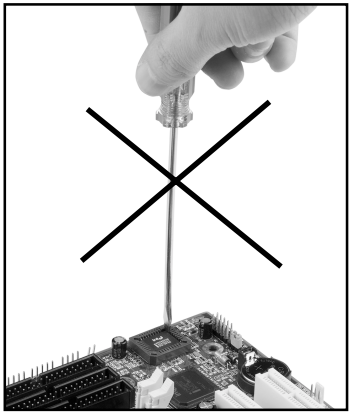
7. The programming is finished.

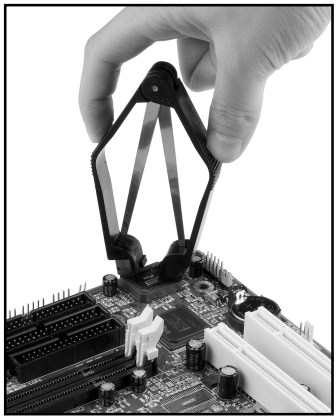


Appendix B

B-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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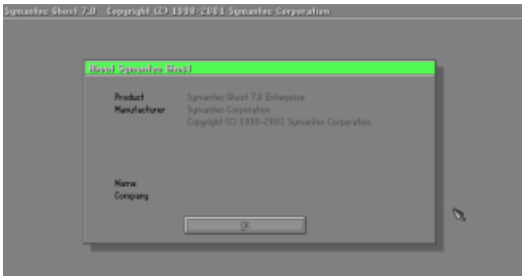
Appendix C

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

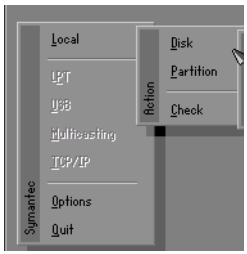
Installation is very easy. You only need to copy the **Ghost7** folder or **Ghost.exe** to your hard disk.

Main Menu



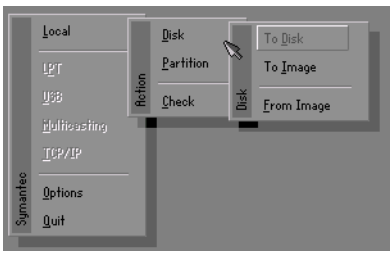
Description of Menu

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:

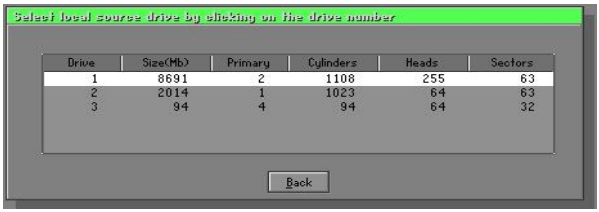
1. Disk To Disk (disk cloning)
2. Disk To Image (disk backup)
3. Disk From Image (restore backup)

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**.**

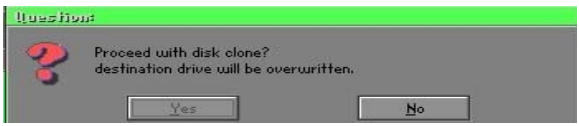
Disk To Disk (Disk Cloning)

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



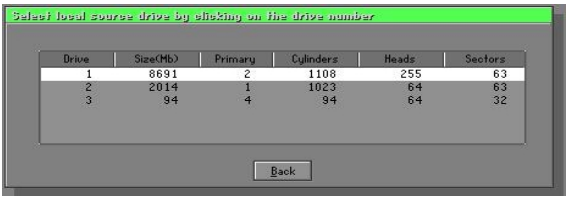
3. When cloning a disk or restoring the backup, set the required partition size as shown in the following figure.

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

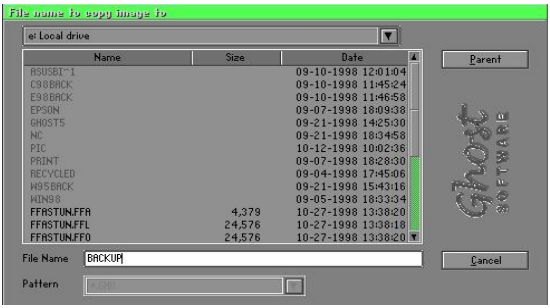


Disk To Image (Disk Backup)

1. Select the location of the Source drive.



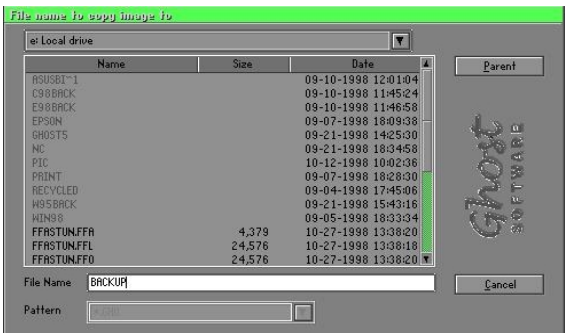
2. Select the location for storing the backup file.



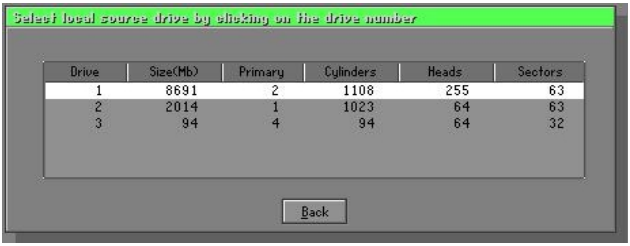
3. Click **OK** to display the following confirmation screen. Select **Yes** to start.

Disk From Image (Restore Backup)

1. Select the Restoring file.

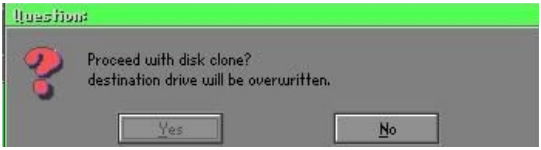


2. Select the **Destination drive** of the disk to be restored.

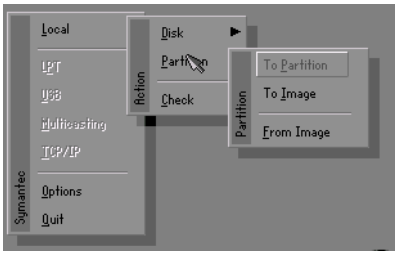


3. When restoring disk backup, set the required partition size as shown in the following figure.

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



Partition



There are 3 partition functions:

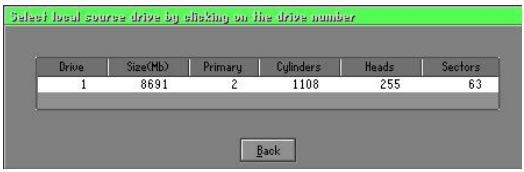
1. **Partition To Partition** (partition cloning)
2. **Partition To Image** (partition backup)
3. **Partition From Image** (restore partition)

Partition To Partition (Partition Cloning)

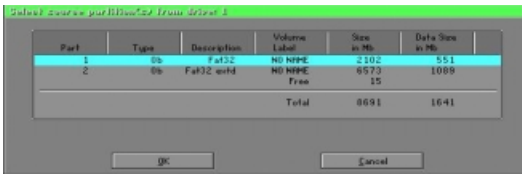
The basic unit for partition cloning is a “partition”. Refer to “disk cloning” for the operating method.

Partition To Image (Partition Backup)

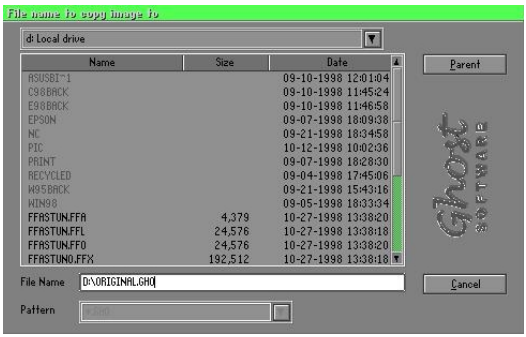
1. Select the disk to be backed up.



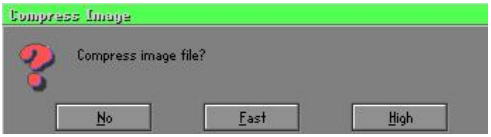
2. Select the first partition to be backed up. This is usually where the operating system and programs are stored.



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



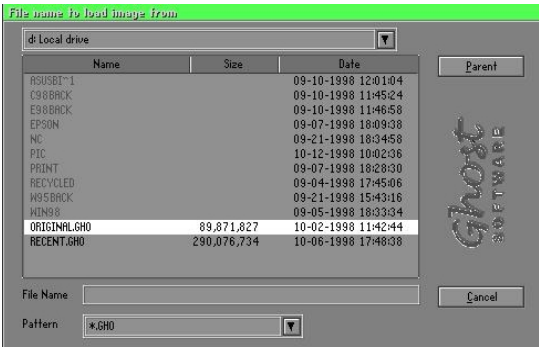
4. Is the file compressed? There are 3 options:
   (1) No: do not compress data during backup
   (2) Fast: Small volume compression
   (3) High: high ratio compression. File can be compressed to its minimum, but requiring longer execution time.



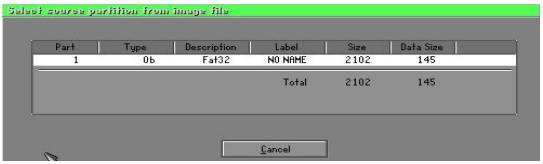
5. Select Yes to start performing backup.

Partition From Image (Restore Partition)

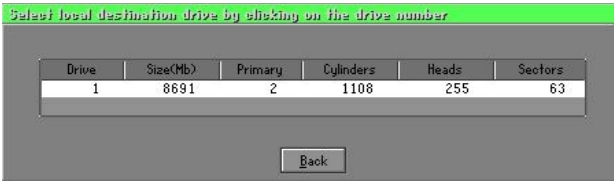
1. Select the backup file to be restored.



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 D

D-1 POST CODES

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)