User's Manual

Intel *i865PE* mainboard
for Intel Socket 478 processor

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Manual Revision 1.0
January 30, 2004

60000024P5+10

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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 E in this manual.

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

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Section 1
INTRODUCTION

Package Contents

Contents

A. Mainboard

B. User's manual

C. Floppy drive cable

D. HDD drive cable

E. CD (drivers and utilities)

F. I/O Shield

G. Game & COM bracket cable

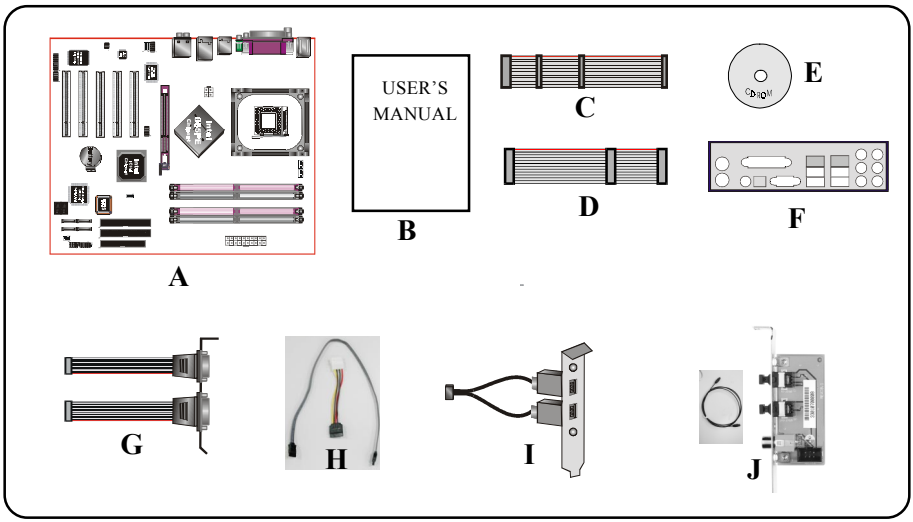
H. S-ATA data and power cable

I. Extra USB2.0 port cable

Optional Items

J. S/PDIF Module

If you need the optional item, please contact your 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) and the I/O Controller Hub (ICH4).

- **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 ICH4.

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

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

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

Accelerated Graphics Port (AGP)

The AGP slot on the board is compliant with the new AGP 3.0 specification. This new specification enhances the functionality of the original AGP specification by allowing 8X data transfers (8 data samples per clock) resulting in maximum bandwidth of 2.1GB/s. In addition, it defines 1.5 volt power supply operation. Complying with this specification, this board supports external AGP-8X/4X cards with Fast Write Transactions. Only 1.5V AGP cards are supported.

Ultra ATA/66/100

The ICH5 provides an Ultra ATA/66/100 Bus Master IDE controller. This controller supports Ultra ATA/66/100 protocols which are ideal to support 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 backward 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

This mainboard is optionally mounted with a Gigabit ethernet LAN chipset. It allows the mainboard to connect to a local area network by means of a network hub. The new Gigabit Ethernet LAN allows data transmission at 1,000 megabits per second (Mbps), which runs 10 times faster than conventional 10/100BASE-T Ethernet LANs.

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

I/O Shield Connector

The I/O back panel for this mainboard is shown below (Figure 1). When installing the mainboard into the computer case, use the bundled I/O shield to protect this back panel.

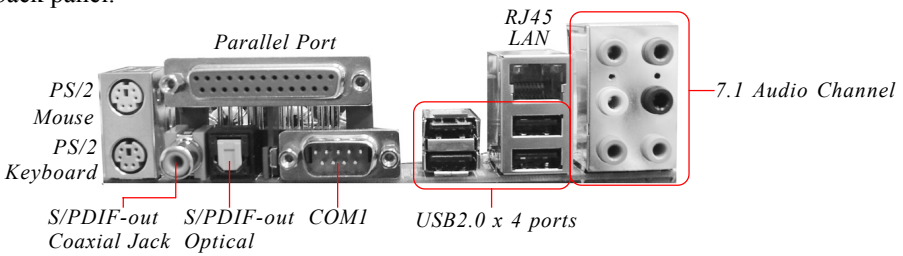


Figure 1: I/O ports

Power-On/Off (Remote)

This board has a 20-pin ATX and a 4-pin ATX12V power supply connector to support power supplies with **Remote On/Off** feature. The chassis power button should be connected to the mainboard front panel PW_ON header (Figure 2).

You can turn off the system in two ways: by pressing the front panel power On/Off button or using the "Soft Off" function that can be controlled by an operating system such as Windows®XP/ME/2000/98.

Note: **For maintaining the DDR SDRAM power during STR (ACPI S3) function, it is strongly recommended to use power supplies that have a +5VSB current of (>=) 2A. Please check the 5VSB's specification 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 this minimum power requirement. To ensure that adequate power, use a 300 Watt (or higher) power supply.**

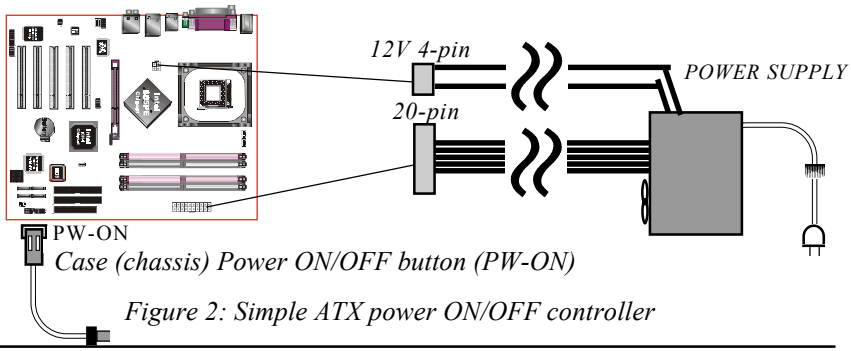


Figure 2: Simple ATX power ON/OFF controller

System Block Diagram

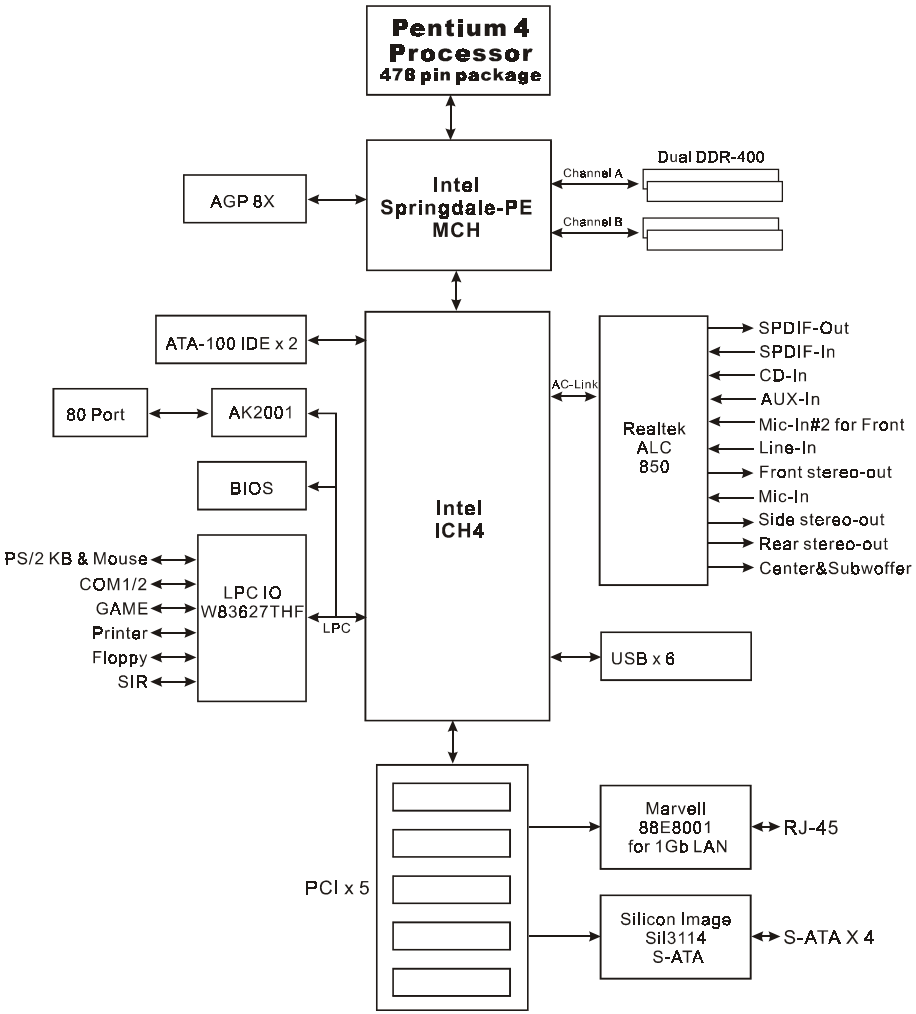


Figure 3: System Block Diagram

Section 2
FEATURES

Mainboard Features

Processor

- Socket 478 Intel® Pentium® 4 processors up to 3.2+ GHz
- Supports the following System Bus and Memory combination:

  FSB400 / DDR266 (PC2100)

  FSB533 / DDR266 and DDR333 (PC2100/PC2700)

  FSB800 / DDR333 and DDR400 (PC2700/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

  To enable the Hyper-Threading Technology function on 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.

  Performance will vary depending on the specific hardware and software you use. See <http://www.intel.com/info/hyperthreading> for information including details on which processor support HT Technology.

Chipset

- Intel 865PE Chipset (865PE + ICH4)

Main Memory

- Four 184-pin DDR DIMM sockets for PC2100/PC2700/PC3200 (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
  - Able to wake the computer from specific states by LAN, Power switch, PME#, RTC alarm, USB, PS2 K/B, PS2 Mouse, Modem Ring-in COM#1…

Onboard PCI Devices

- LAN --> Integrates 1Gbps Fast Ethernet controller with onboard Marvell 88E8001 LAN Chipset
- S-ATA --> Integrated Serial ATA controller from Silicon Image SiI3114 for 4 ports solution with RAID 0, 1 ,10, 5 and support up to 150MB/sec transfer rate

  For more detailed information about SiI3114, refer to user's manual in the bundled CD.

Legacy IO Controller

- Winbond W83627THF LPC IO controller with keyboard, mouse, floppy, printer, game, serial and SIR interface
- Supports Hardware Monitoring function
- Intelligent CPU fan speed control to lower system noise

Audio

- Eight channel audio with analog and digital output using Realtek ALC850 AC'97CODEC
  - AC'97 v2.3 compliant
  - Supports CD-In, Aux-In and S/PDIF-in/out interface
  - Supports Line-out and Mic-In for front panel
  - Supports automatic "jack-sensing"

- Rear panel audio jacks configuration:

Phone Jack Color	2 channel	6 channel	8 channel
Light Blue	Line-in	Rear stereo-out	Line-in
Lime	Line-out	Front stereo-out	Front stereo-out
Pink	Mic-in	Center&Subwoofer	Mic-in
Gray			Side stereo-out
Black			Rear stereo-out
Orange			Center&Subwoofer

Peripheral Interfaces

At Rear Panel

- PS/2 keyboard and mouse ports
- One Parallel (printer) port
- One S/PDIF-Out Coaxial jack
- One S/PDIF-Out Optical
- One Serial port
- One RJ45 LAN connector
- Four USB2.0 ports
- Six Audio jacks

Onboard connector and pin-header

- One floppy drive connector
- Two IDE connectors supporting ATA-100
- Two extra USB2.0 ports
- One CD-IN and One AUX-IN connector
- One Front Panel Audio connector
- One S/PDIF in/out connector
- One IR connector
- One Game port connector
- One COM2 connector
- Four S-ATA connectors
- Three Fan connectors

Front Panel Controller

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

Expansion Slots

- One AGP slot supporting 1.5v 4X/8X AGP card
  - AGP v3.0 compliant
- Five PCI slots with Bus Master support
  - PCI v2.2 compliant

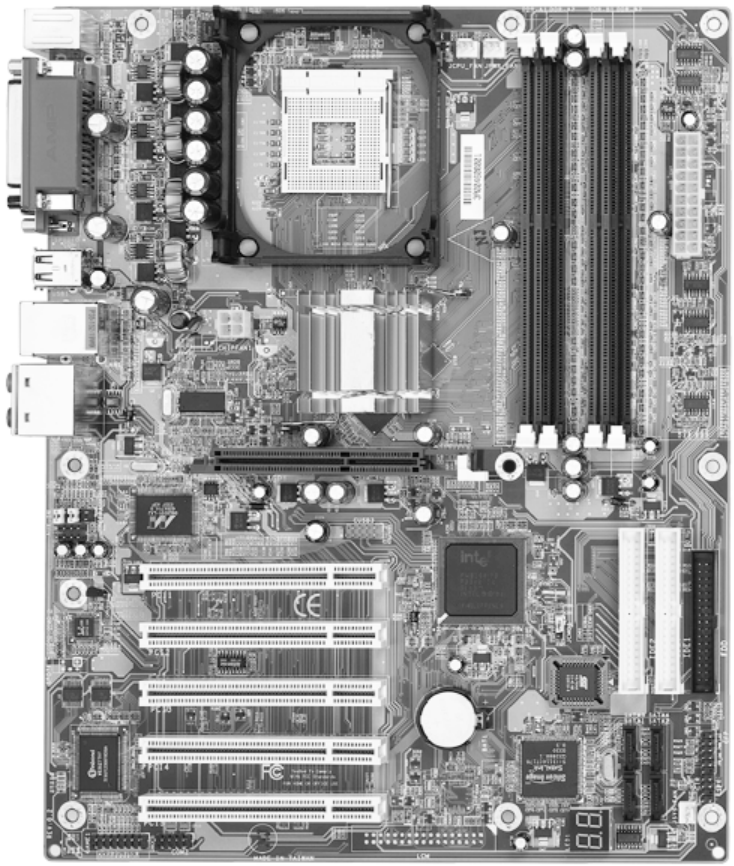
Other Features

- 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, …
- KBPO – Keyboard power on, turn on the computer from keyboard
- Excellent Overclocking capabilities through
  - subtle voltage tuning for CPU, Memory, AGP
  - subtle frequency tuning on FSB with 1MHz
  - Supports complete Asynchronous FSB/Memory and Asynchronous FSB/AGP, PCI scheme for overclocking
- P80P for system debugging

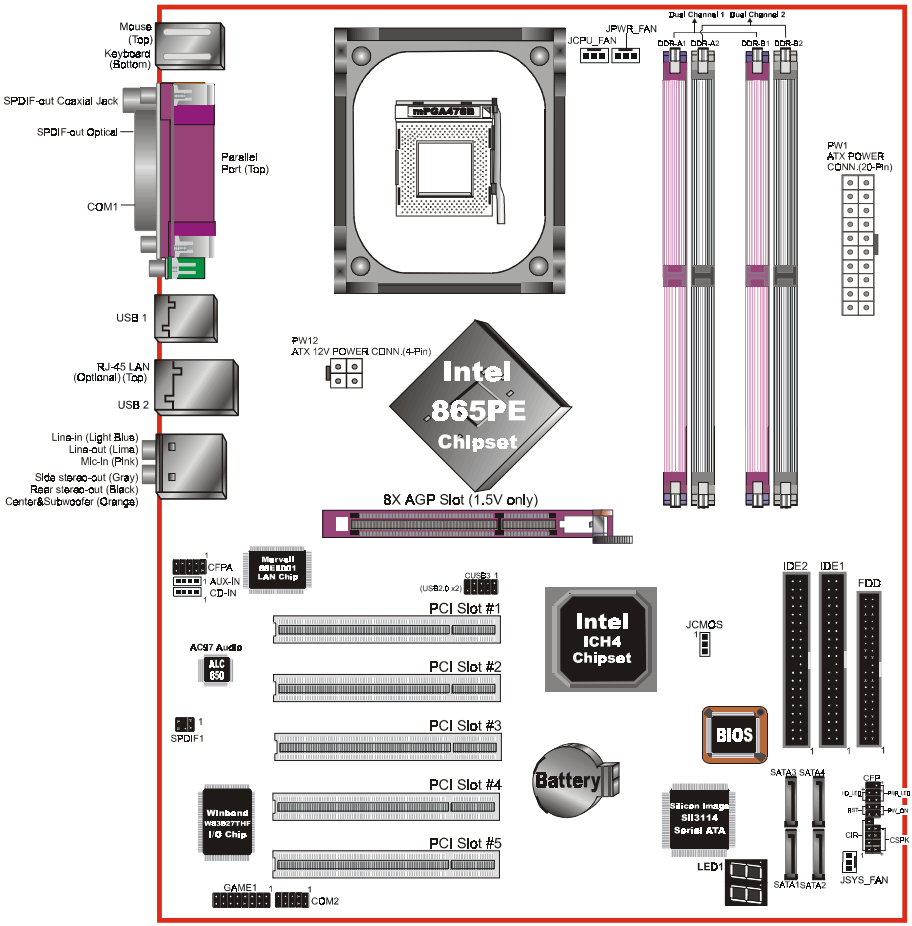
Form Factor

- 305mm 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

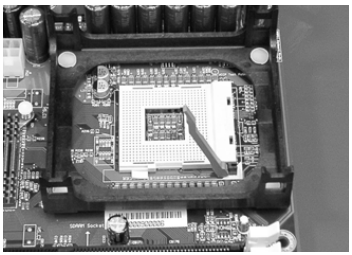
3-2. Jumper Settings

3-3. System Memory Configuration

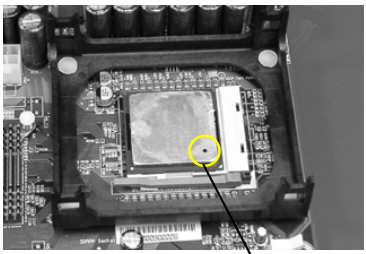
3-4. Expansion Slots

3-5. Device Connectors

3-1 CPU Installation



<Figure 1>



<Figure 2>

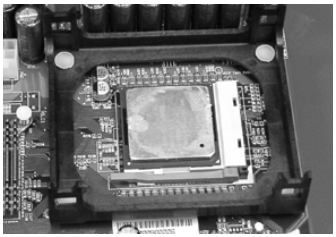
Pin 1

Step 1

Open the socket by raising the actuation lever.

Step 2

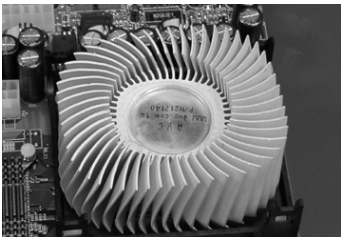
Align pin 1 on the CPU with pin 1 on the CPU socket as shown in the illustration above. The CPU is keyed to prevent incorrect insertion. Don't force the processor into the socket. If it does not go in easily, check for mis-orientation and reinsert the CPU.
Make sure the processor is fully inserted into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



<Figure 3>

Step 3

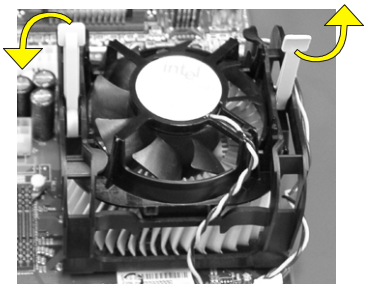
Close the socket by lowering and locking the actuation lever.



<Figure 4>

Step 4

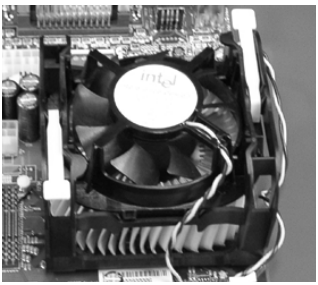
Apply thermal compound to the top of the CPU and install the heatsink as shown.



<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

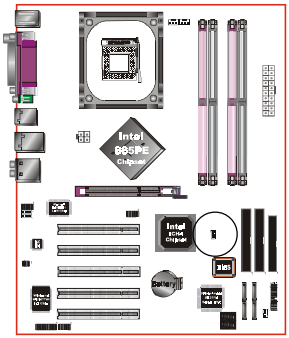
Plug the CPU fan power into the mainboard's CPU fan connector.

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 of 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 on the system and hold down the <Del> key to enter BIOS setup.

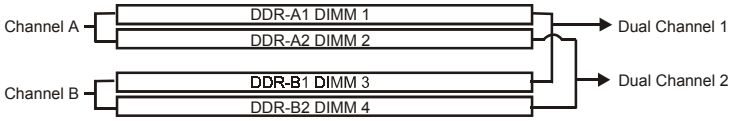
3-3 System Memory Configuration

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

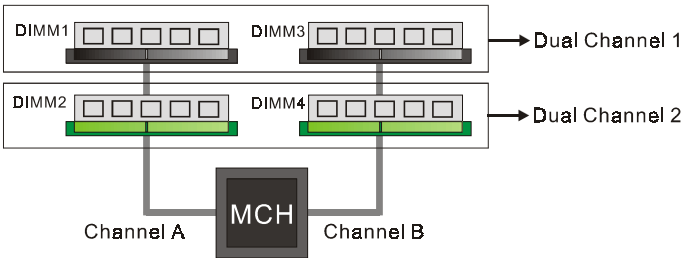
- Supports up to 4.0GB of 266/333/400MHz DDR SDRAM.
- Supports two 64-bit wide DDR data channels.
- Available bandwidth up to 3.2GB/s (DDR400) for single-channel mode and 6.4GB/s (DDR400) in dual-channel mode.
- Registered DIMMs not supported.
- Supports 128-Mb, 256-Mb, 512Mb DDR technologies.
- Supports 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.

Memory configurations :

- When FSB is 400MHz, DDR266 is supported.
- When FSB is 533MHz, DDR266 and DDR333 are supported.
- When FSB is 800MHz, DDR333 and DDR400 are supported. (With DDR333, adaptive synchronization aligns to the closest FSB to memory clock ratio, setting the memory channel to 320MHz).
- The four DIMM sockets are divided into two Dual Channel pairs according to the color <Figure 7>. Each dual channel pair has the same color, e.g. DIMM1 and DIMM3. <Figure 8> shows the logical memory layout. **We recommend you to use DIMM sockets of the same color to obtain the best memory performance.** It is preferable to use DRAM DIMM of the same type and size.
- Using non-compliant memory with higher bus speeds (overclocking) may severely compromise the integrity of the system.



<Figure 7>



<Figure 8>

- For one DIMM memory configuration, the DIMM can be located on any of DIMM#1 to DIMM#4 in 64-bit mode.
- For two DIMMs memory configuration, it is recommended to mount the DIMMs on slots of the same color to enable 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.

This is summarized in <Table 1> below.

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

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

<Table 1>

DIMM Module Installation

Figure 9 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 10 until the white clips close and the module fits tightly into the DIMM socket (figure 11).

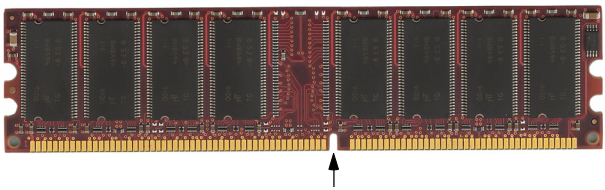


Figure 9 - DIMM notch

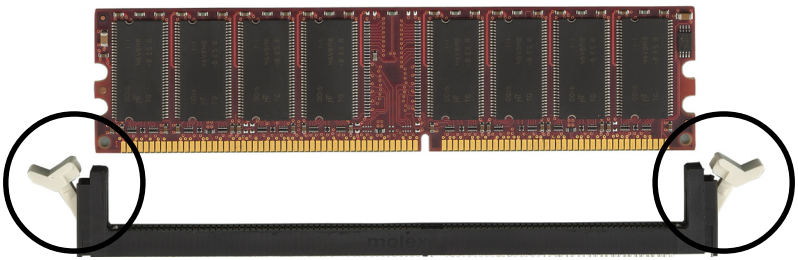


Figure 10 - DIMM module clips before installation

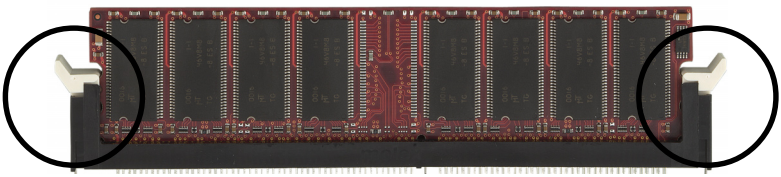
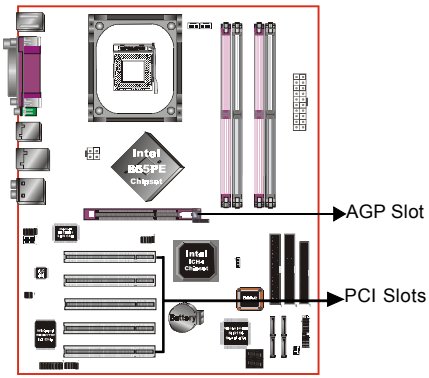


Figure 11 - DIMM module clip after installation

To remove the DIMM module press down the white clips and the module will be ejected 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

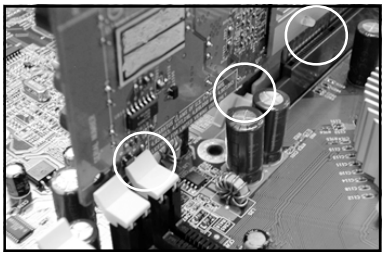
The mainboard is equipped with 5 PCI slots.

Installing an Expansion Card

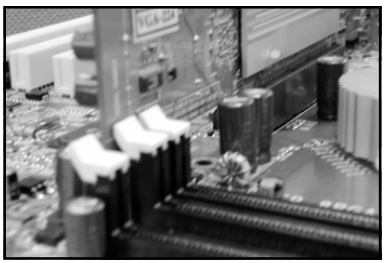
The steps below assume that the mainboard is already installed in the system chassis.

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.

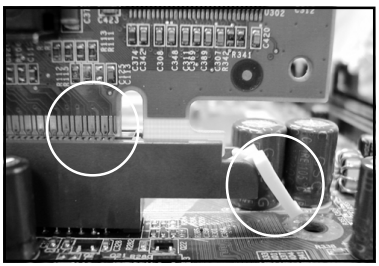
AGP Card Installation Caution



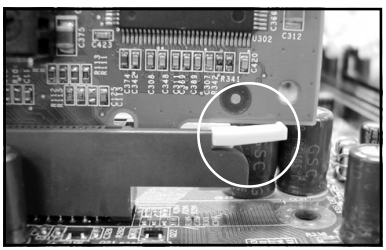
1. AGP card component is blocked by DIMM socket lock.
2. AGP slot clicker is not locked.
3. AGP card edge connector is not inserted properly.



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



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



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

3-5 Connectors

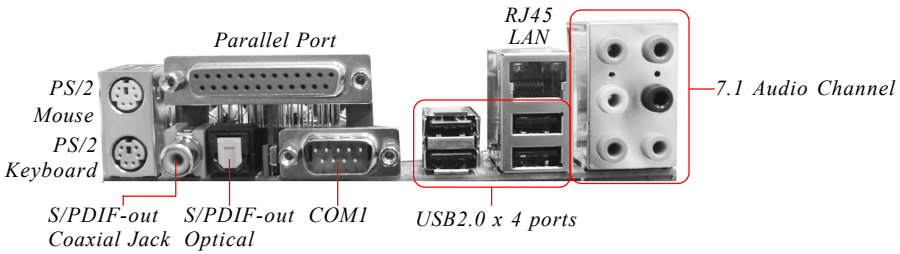
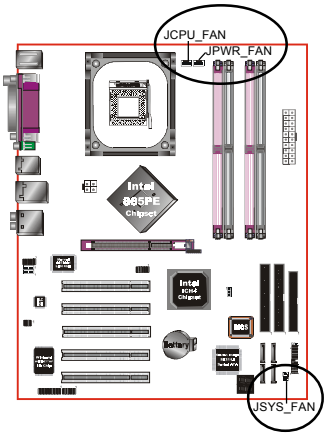


Figure 12 - I/O Ports



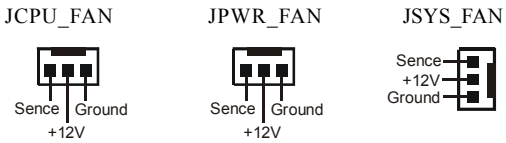
JCPU_FAN / JPWR_FAN / JSYS_FAN:

CPU/Power/Chassis Fan Power Connectors

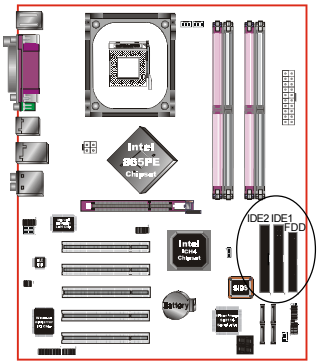
JCPU_FAN: The CPU must be kept cool by using a heatsink with fan assembly.

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

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



The system is capable of monitoring the fan speed in RPM (Revolutions Per Minute). Refer to the PC Health Status submenu of the BIOS for the current speed of the CPU fan , power fan and chassis fan.



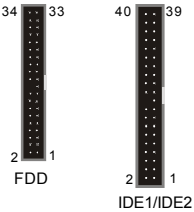
FDD: Floppy Controller Connector

This mainboard connects floppy disk drive.

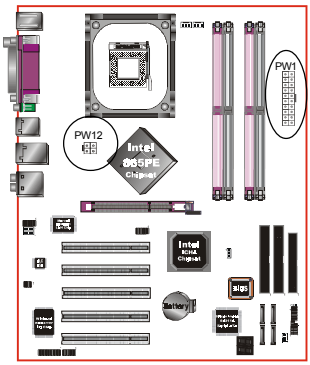
IDE1/IDE2: Ultra DMA-66/100 Primary/Secondary IDE Connector

This mainboard is equipped with 2 IDE connectors to support up to 4 ATA-100 IDE drives.

It supports PIO and DMA mode operations for maximum data transfer rate of 100MB/sec per channel.



When using two IDE drives, one must be set to Master mode and the other to Slave mode. Refer to your disk drive user's manual for information about selecting the proper drive switch settings.

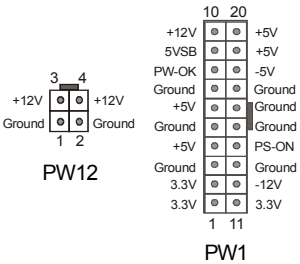


PW1: 20-pin ATX Power Connector

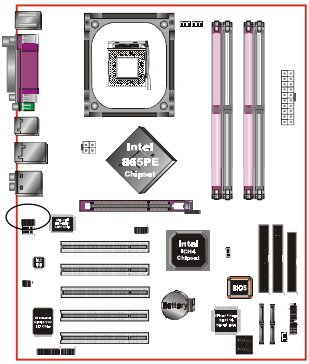
PW12: 4-pin ATX12V Power Connector

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. Insert the plugs into the connectors until they fit in place.

Caution:
The PW1 and PW12 Power Connector must be used simultaneously or else this system will not boot-up.

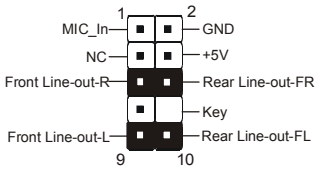


The board requires a minimum of 250 Watt power supply to operate. Your system configuration (amount of memory, add-in cards, peripherals, etc.) may exceed this minimum power requirement. To ensure that adequate power, use a 300 Watt or greater power supply.



CFPA: Front Panel Audio Connector

When the jumpers are removed this connector can be used for front panel audio. The front panel phone jack should have “normal close” switch. Without phone plug inserted, the rear panel audio is enabled. With phone plug inserted, the rear panel audio will be disabled.

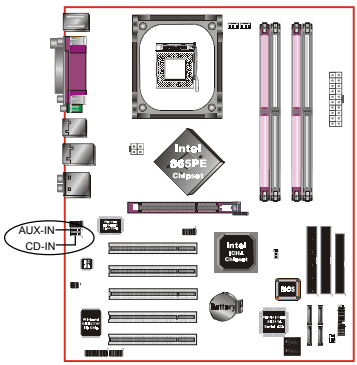


Settings:

Pins (5-6) & (9-10) Short (default): Only the onboard rear panel audio jack can be used.

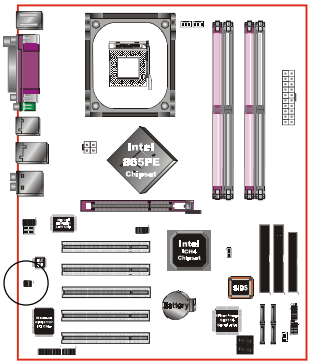
Pins (5-6) & (9-10) Open: Only front panel audio jack can be used.

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 use, and rear panel Mic-In function will switch to Center and Subwoofer support.



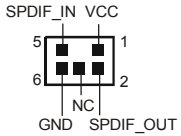
CD-IN/AUX-IN: CD Audio_IN Connector

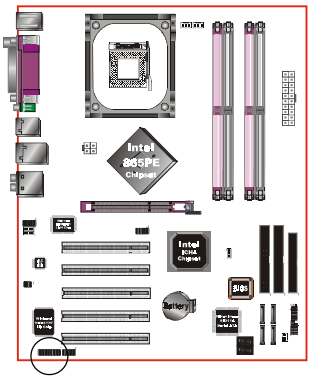
The CD-IN and AUX-IN connectors are used to receive audio form a CD-ROM drive, TV tuner or MPEG card.



SPDIF: Sony/Philips Digital InterFace connector

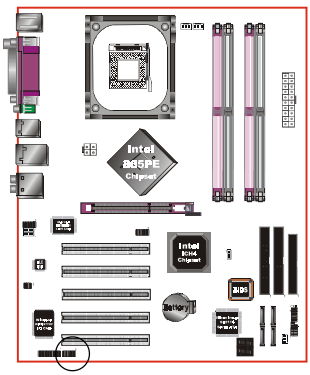
This connector is the digital link between the mainboard and your audio devices, such as CD player, sampler or DAT recorder. It allows the digital transmission of audio data in S/PDIF format.





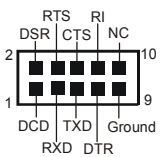
GAME1: Game/MIDI connector

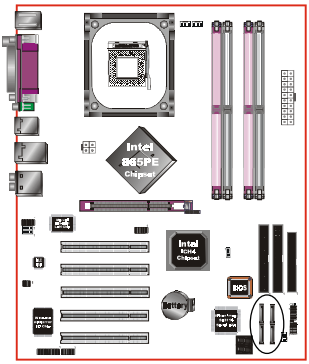
This port works well with any application that is compatible with the standard PC joystick.



COM2: Serial Port Connector

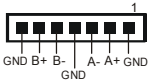
The serial port can be used with modems, serial printers, remote display terminals, and other serial device.

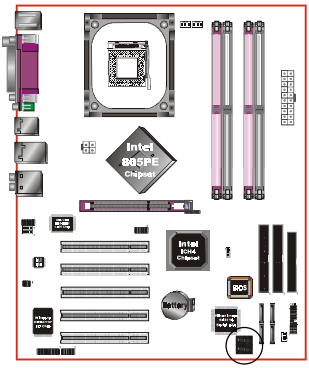




SATA1 / SATA2 / SATA3 / SATA4: Serial ATA Connectors

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

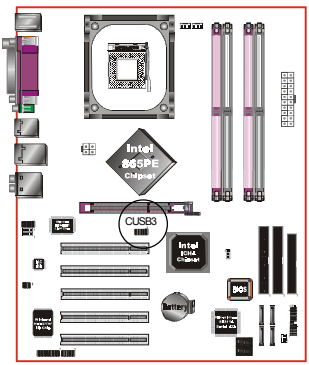




LED1: 80 Port Debug LED

Provides two-digit POST code to show why the system fail to boot. Allows quick and easy optimization.

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

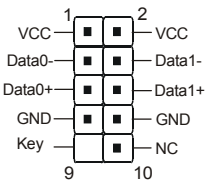


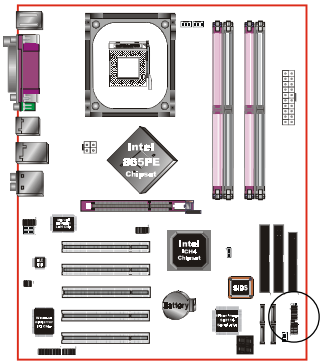
CUSB3: Two USB 2.0 ports

USB2.0 allows data transfer speed up to 480Mbps.

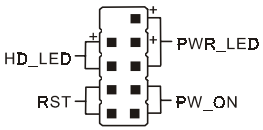
This mainboard includes 2 additional onboard USB2.0 ports, identified by two 10-pin connector.

If you wish to use the additional USB ports, install the card-edge bracket to the system chassis then insert its cables to this 10-pin connector.

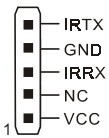




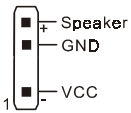
CFP



CIR



CSPK



CFP: Front Panel Connector

- **HD_LED**
  This LED will light up whenever 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 prolonging the life of the power supply or system.

- **PW_ON**
  This is connected to the power button on the case. To use the Soft-Off by PWR-BTTN feature, refer to the Power Management Setup in the BIOS setup section of this manual.

CIR: IR connector
Connect your IrDA cable to this IR connector.

CSPK: Speaker
Connect to the system's speaker for beeping

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. Refer to the Power Management Setup in the BIOS setup section for details. To enable this feature, 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:

- We recommend you use a power supply with 2.0 A in 5.0 VSB, which supports PCI 2.3 specification for remote power-on and wake-up functions.

3-7 ACPI S3 (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 is 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. To enable STR functionality to save system power :
   a. Install ACPI certified 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)". If you have a USB mouse or keyboard, set "USB Resume from S3" to "Enabled".
   c. Install Windows® XP/2000/ME/98SE.
   d. Restart the system.
   e. When in Windows, 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 activate the STR function:
   a. Click the START button and choose Shut Down.
   b. In the Shut Down Windows dialog box, select the Stand By option to enter STR mode.

The following are the differences between STR power saving mode and Suspend (Power On 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.

Section 4
BIOS SETUP

Main Menu

The ROM BIOS contains 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.

> The BIOS setup screen and description are for reference only, and may not exactly match what you see on your screen. The contents of BIOS are subject to change without notice. Please visit our website for updates.

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)

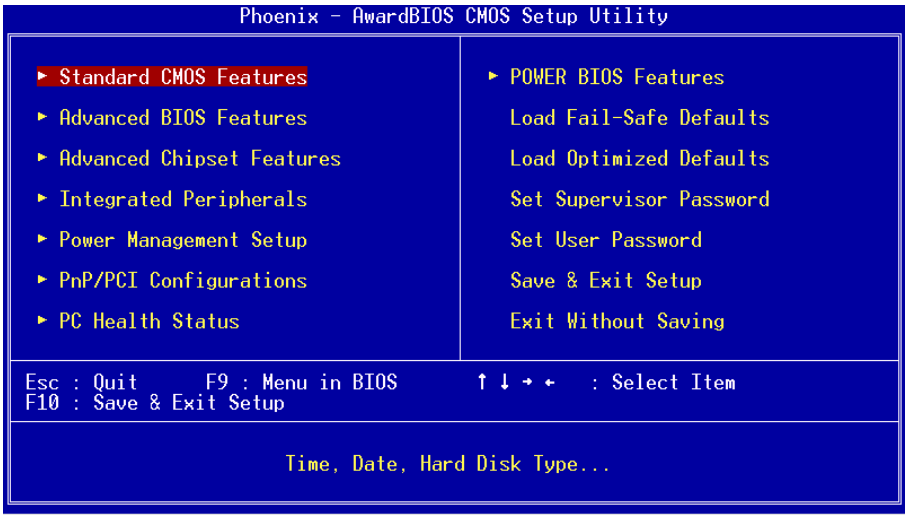


Figure 1: CMOS Setup Utility

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.

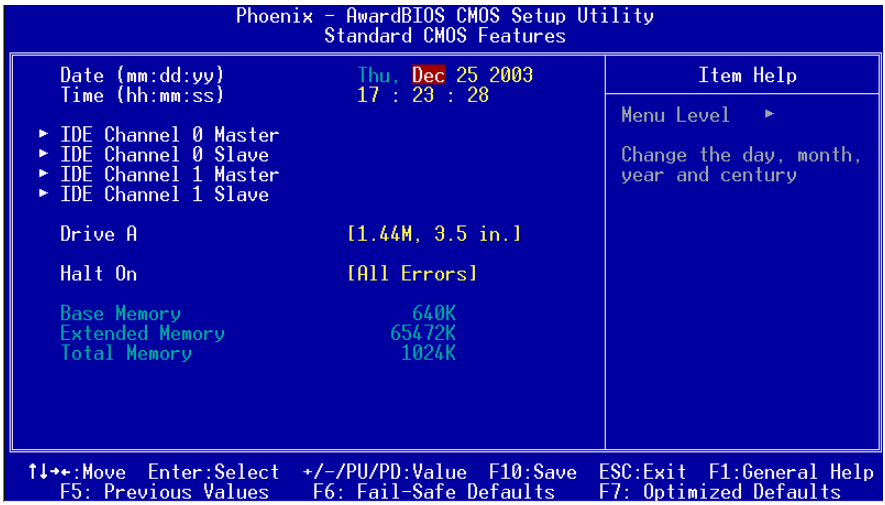


Figure 2: Standard CMOS Setup

Notes:

- If the hard disk Primary Master/Slave and Secondary Master/Slave are set to Auto, the hard disk size and model will be auto-detected.
- The "Halt On:" field is used to determine when the BIOS will halt the system if an error occurs.

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.

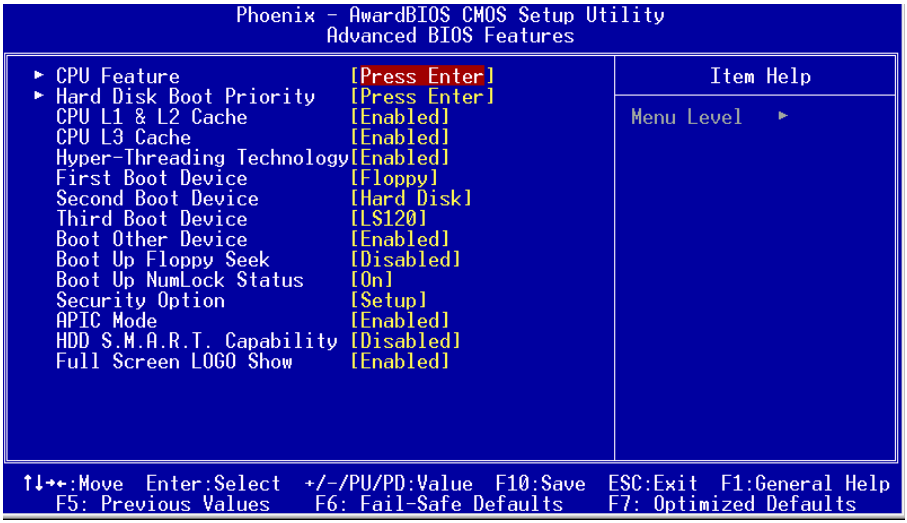


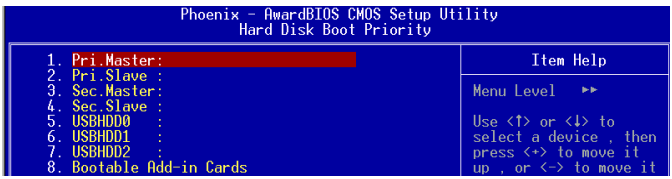
Figure 3: BIOS Features Setup

▸CPU Feature

This field is available only for Prescott CPU.

▸Hard Disk Boot Priority

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



CPU L1 & L2 Cache

This controls the status of the processor's internal Level One and Level Two cache. Options: Enables, Disabled.

CPU L3

This controls the status of the processor's internal Level Three cache.
Options: Enables, Disabled.

Hyper-Threading Technology

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

Note: It is recommend to enable Hyper-Threading Technology on system with Windows XP and Linux 2.4 and disabling it for legacy OS.

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, Hard Disk, CDROM, ZIP100, USB-FDD, USB-CDROM, 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.
Options: Enabled, Disabled.

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.
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.

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.

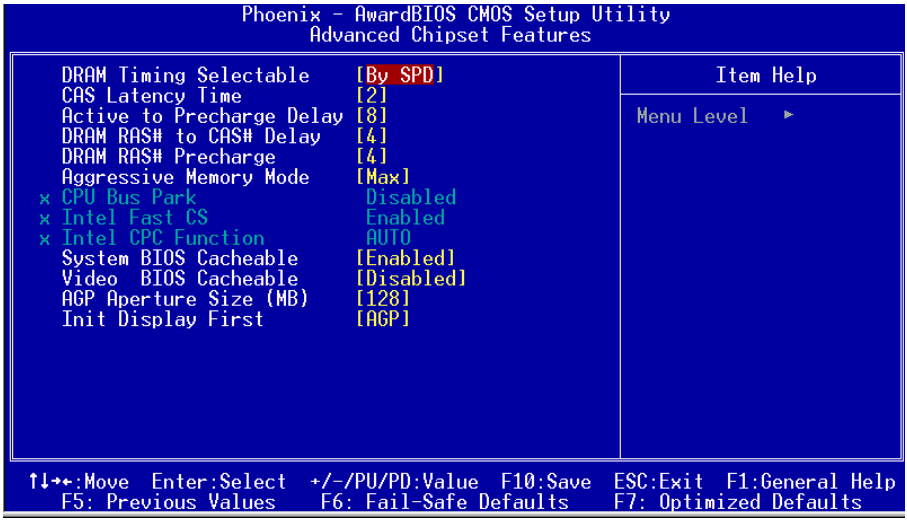


Figure 4: Chipset Features Setup

DRAM Timing Selectable

For setting DRAM Timing, select By SPD to 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.

Aggressive Memory Mode (AMM)

Aggressive Memory Mode reduces delays within the chipset to improve DDR DRAM usage efficiency.
Options: Max, Turbo, Expert, Standard.

> Performance upgrade using AMM will largely depend on hardware availability within the chipset.

CPU Bus Park

Options: Disabled, Enabled.

Intel Fast CS

Options: Auto, Disabled, Enabled.

Intel CPC Function

Options: Auto, Disabled, Enabled.

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.

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

This item is used to select whether to initialize the AGP or PCI first when the system boots.

Options: PCI Slot, AGP.

4-4 Integrated Peripherals

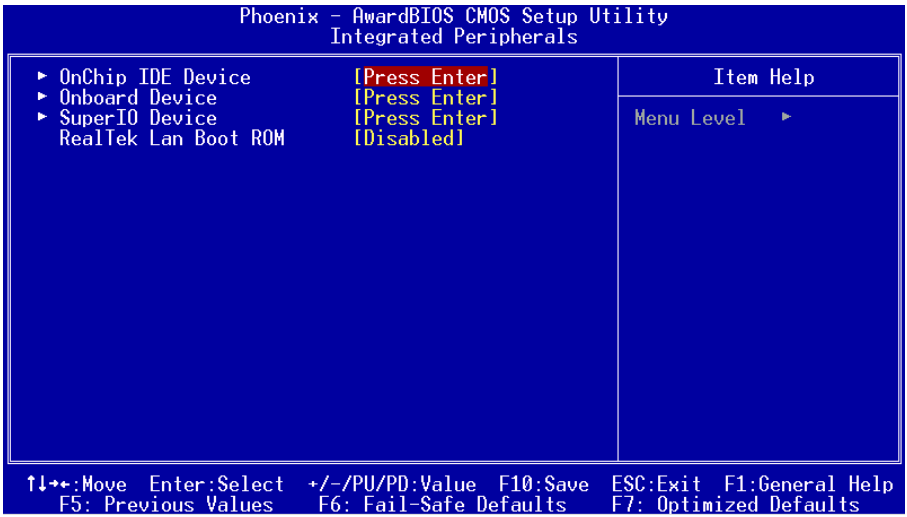


Figure 5: Integrated Peripherals

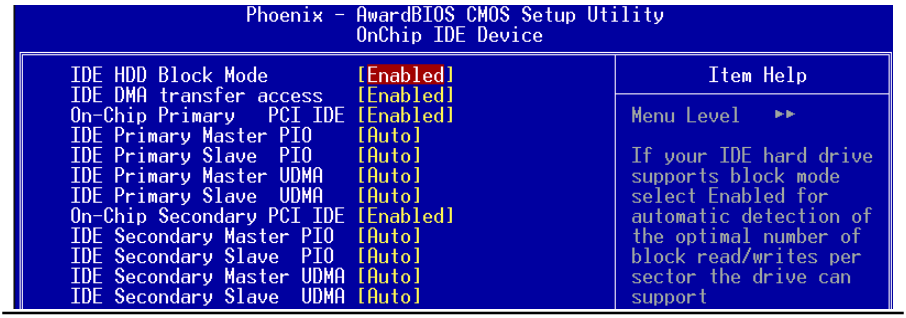
RealTek Lan Boot ROM (Optional)

Enable/disable 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.

IDE DMA transfer access

Automatic data transfer between system memory and IDE device with minimum CPU intervention. This improves data throughput and frees CPU to perform other tasks.

Options: Enabled, Disabled.

On-Chip Primary PCI IDE

The mainboard supports two channel of ordinary IDE interface. Select "Enabled" to activate each channel separately.

Note: If you do not use the onboard IDE connector, then you will need to set the Onboard Primary PCI IDE and Onboard Secondary PCI IDE to "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. 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.

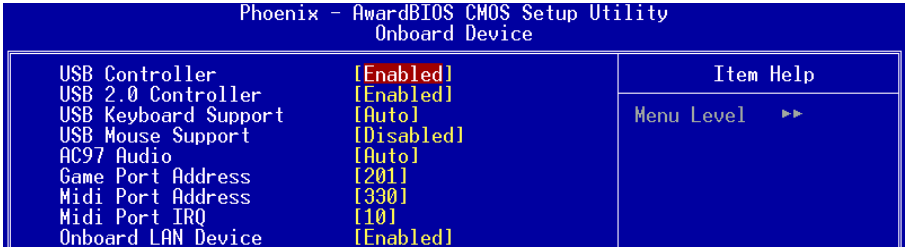
IDE Primary/Secondary Master/Slave UDMA

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.

Options: Auto, Disabled.

Onboard PCI Device Setup

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



USB Controller

Enables the USB controller.

Options: Disabled, Enabled.

USB 2.0 Controller

Enables the EHCI (USB2.0) controller.

Options: Disabled, Enabled.

USB Keyboard Support

Enable/Disable support for USB keyboard under DOS.

Options: Auto, Enabled, Disabled.

USB Mouse Support

Enable/Disable support for USB mouse under DOS.

Options: Enabled, Disabled.

AC97 Audio

This item allows you disable the chipset on-chip AC97 Audio. 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.

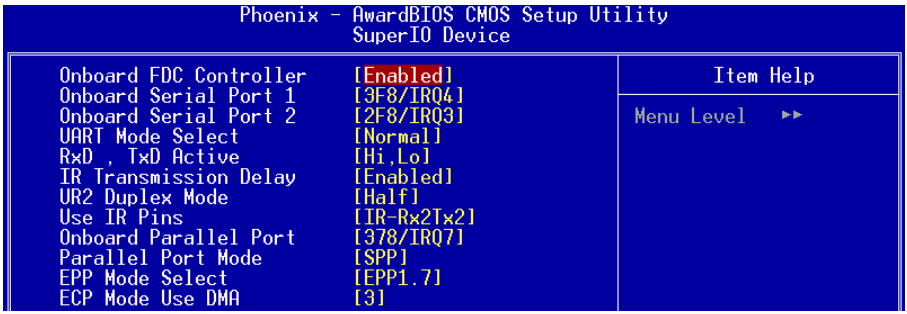
Onboard LAN Device (Optional)

Enables the onboard LAN feature.

Options: Enabled, Disabled.

▸ *SuperIO Device*

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



Onboard FDC Controller

Select "Enabled" if you wish to use onboard floppy disk controller (FDC). If you install an external 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 field configures the 2nd serial port for IR application. Select the required IR protocol or select "Normal" to disable IR mode.

Options: Normal, IrDA and ASKIR.

RxD, TxD Active

When the above UART Mode Select is in IR mode, this field configures the receive and transmit signals generated from the IR port.

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 field allows the user to select the EPP mode for parallel port mode.
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.

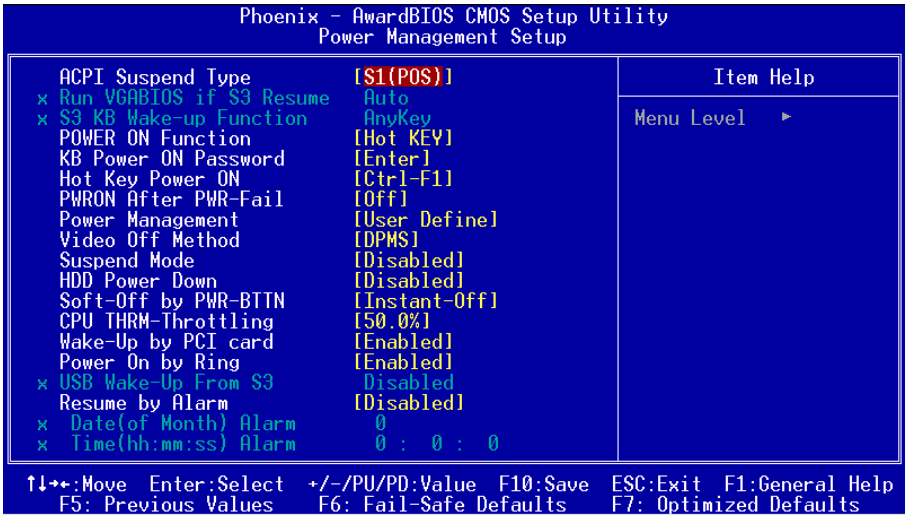


Figure 6: Power Management

ACPI Suspend Type

This item allows you to select S1(Power-On-Suspend) or S3(Suspend-To-RAM) 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.

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."

Hot KEY: (default) 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.

BUTTON ONLY: 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.

Suspend Mode

Automatically, shuts off all devices except the CPU after a preset period of system inactivity.
Options: Disabled, 1 , 2, 4 ,6, 8, 10, 20, 30, 40 min and 1 hour .

HDD Power Down

Powers down the hard disk drive after a preset period of system inactivity.
Options: Disabled, 1 ~ 15 Min.

Soft-Off by PWR-BTTN

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 soft-off state.
Options: Enabled, Disabled.

Power On by Ring

When enabled, any modem activity awakens the system from soft-off state.
Options: Enabled, Disabled.

USB Wake-Up From S3

This item allows a USB device to wake-up the system from S3 suspend state.
Options: Enabled, Disabled.

Resume By Alarm

When set to Enable alarm resume, you can set the date (of month) and time (hh:mm: ss), that will awaken a system which has been powered down.
Options: Enabled, Disabled.

4-6 PNP/PCI Configuration

This page lets the user to modify the PCI IRQ signals when various PCI cards are inserted.

WARNING: Conflicting IRQ's may cause system unable to locate certain devices.

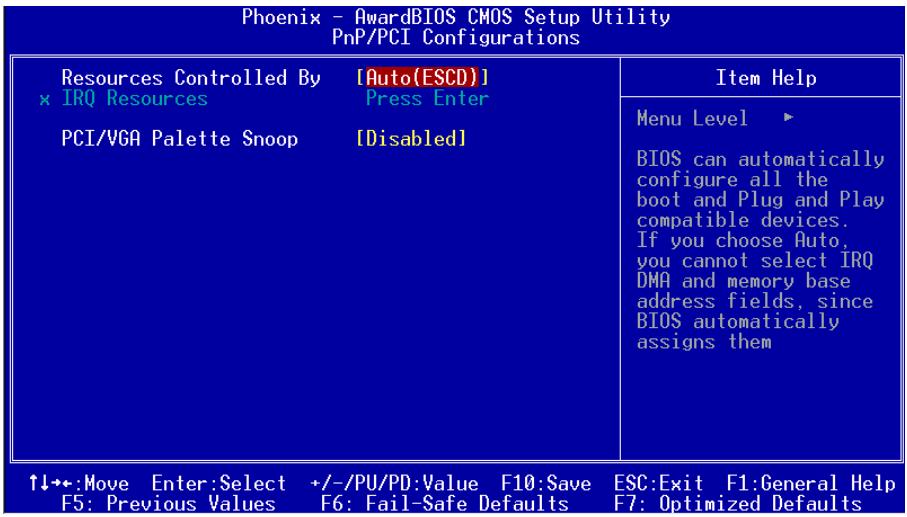


Figure 7: PNP/PCI Configuration Setup

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 and onboard devices.

Auto: BIOS assigns the interrupt resource automatically.

PCI/VGA Palette Snoop

This item is designed to overcome problems that may be caused by some nonstandard VGA cards.

Options: Enabled, Disabled.

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							V	
Onboard S-ATA								
Onboard USB1	V							
Onboard USB2		V						
Onboard USB3			V					
USB 2.0				V				
SM BUS		V						

IMPORTANT!
When using PCI cards on shared IRQ slots, make sure its drivers support "Shared IRQ", or that the cards do not need IRQ assignments. IRQ conflicts between the two PCI groups will make the system unstable or cards inoperable.

4-7 PC Health Status

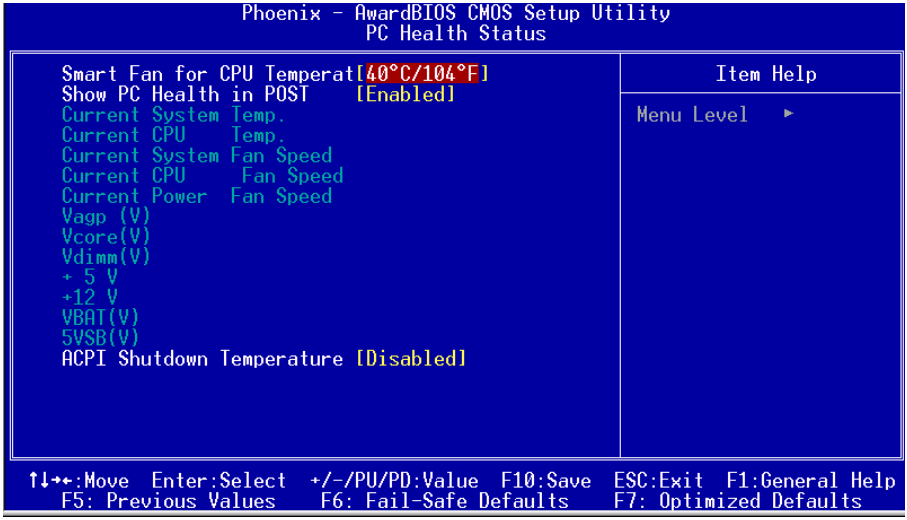


Figure 8: PC Health Status

Smart Fan for CPU Temperature

This item allows you set CPU fan temperature to smartly adjust the fan speeds for more efficient system operation.

Options: Disabled, 35°C/95°F, 40°C/104°F, 45°C/113°F, 50°C/113°F, 55°C/113°F.

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.

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

This page lets you adjust various parameters to obtain improved performance for overclocking.

> **Warning**:
> Overclocking requires expert knowledge and risks permanent damage to system components. We recommend you leave these parameters at their default values for proper operation.

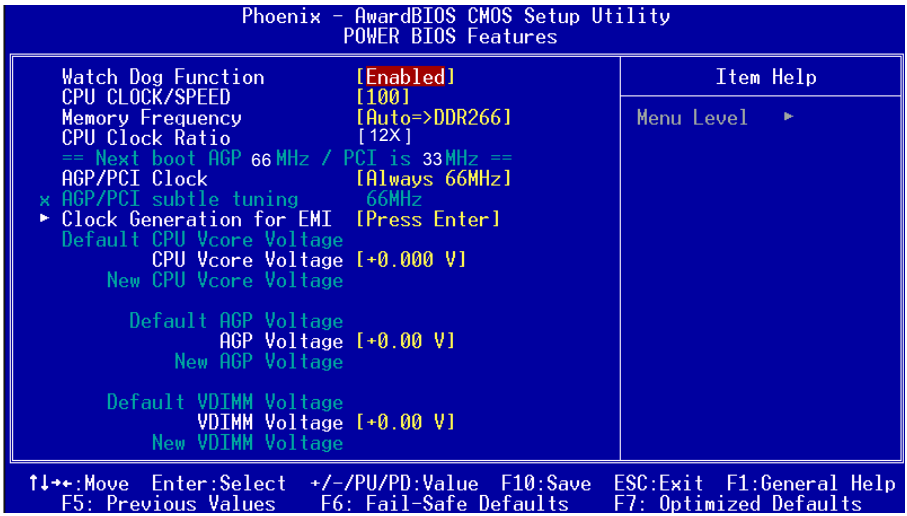


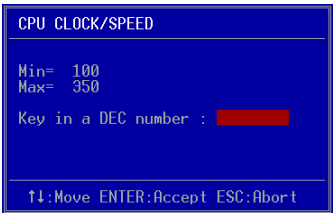
Figure 9: Frequency/Voltage Control

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 CLOCK/SPEED

Enables you to set the CPU clock at increments of 1MHz step. Press <Enter> to display the following screen:



Key in the DEC (decimal) number for the CPU CLOCK/SPEED.

Note: Overclocking failure will cause no display on monitor. At this instant, press <*Insert*> key to revert back to the initial or default setting to boot up your system.

Memory Frequency

Enables you to select a ratio of the DDR DRAM to match the installed DRAM frequency 266/333/400MHz. We recommend that you leave this item at the default value. Options available depend on system FSB.

CPU FSB	DDR frequency options		
400MHz	3:4 => DDR266		
533MHz	1:1 => DDR266	4:5 => DDR333	Auto => DDR333 (by SPD)
800MHz	1:1 => DDR400	5:4 => DDR320	Auto => DDR400 (by SPD)

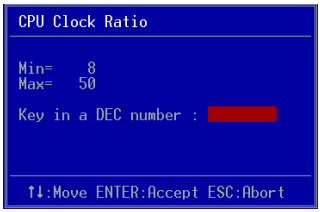
CPU Clock Ratio

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 2.4GHz and the system is running a front side bus frequency of 200 MHz, you should select a multiplier of 12 so that:

12 (Multiplier) x 200 MHz (front side bus) = 2.4 GHz (CPU clock)



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

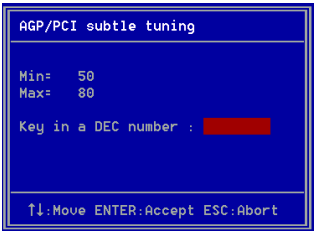
AGP/PCI Clock

Enables you to set the host clock to work concurrently with the PCI bus or the AGP bus.

Options: Always 66/33MHz, By subtle turning item.

AGP/PCI subtle tuning

Enables you to subtle tune the AGP/PCI frequency at increments of 1MHz step. The default is 66 MHz. Press <Enter> to display the following screen:



Key in the DEC (decimal) 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 adjust the CPU Vcore voltage.

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 adjust the AGP slot voltage.

Options: +0.00V to +0.40V in 0.10V increments. We recommend that you leave this at the default value.

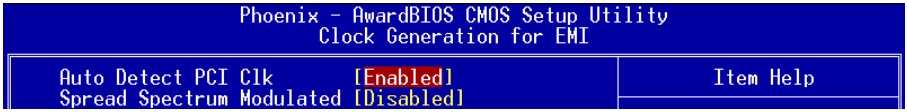
DIMM Voltage

This item allows you to adjust the DIMM slot voltage. .

Options: +0.00V to +0.40V 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).

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

This function lets you set either Supervisor or User Password, or both, to prevent unauthorized changes to BIOS menus.

supervisor password: full rights to enter and change options of the setup menus.

user password: only enter but no rights to change options of the setup menus.

When you select this function, the following message will appear at the center of the screen to assist you in creating a password.

ENTER PASSWORD:

Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.
To disable a password, just press <Enter> when you are prompted to enter the password. A message will confirm the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

PASSWORD DISABLED.

When a password has been enabled, you will be prompted to key in each time you 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 would prevent unauthorized use of your computer.
You can determine when the password is required within the Advanced BIOS Features Menu and its 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
S-ATA RAID CONFIGURATION

Introduction

This section gives a brief introduction on the RAID-related background knowledge and a brief introduction on S-ATA RAID Host Controller.

RAID Basics

RAID (Redundant Array of Independent Disks) is a method of combining two hard disk drives into one logical unit. The advantage of an Array is to provide better performance or data fault tolerance. Fault tolerance is achieved through data redundant operation, where if one drives fails, a mirrored copy of the data can be found on another drive. This can prevent data loss if the operating system fails or hangs. The individual disk drives in an array are called “members”. The configuration information of each member is recorded in the “reserved sector” that identifies the drive as a member. All disk members in a formed disk array are recognized as a single physical drive to the operating system.

Hard disk drives can be combined together through a few different methods. The different methods are referred to as different RAID levels. Different RAID levels represent different performance levels, security levels and implementation costs. The table below briefly introduced these RAID levels.

RAID Level	No. of Drives	Capacity	Benefits
RAID 0 (Striping)	2	Number drivers *Smallest size	Highest performance without data protection
RAID 1 (Mirroring)	2	Smallest size	Data protection
JBOD (Spanning)	2	Sum of All drivers	No data protection and performance improving, but disk capacity fully used.

RAID 0 (Striping)

RAID 0 reads and writes sectors of data interleaved between multiple drives. If any disk member fails, it affects the entire array. The disk array data capacity is equal to the number of drive members times the capacity of the smallest member. The striping block size can be set from 4KB to 64KB. RAID 0 does not support fault tolerance.

RAID 1 (Mirroring)

RAID 1 writes duplicate data onto a pair of drives and reads both sets of data in parallel. If one of the mirrored drives suffers a mechanical failure or does not respond, the remaining drive will continue to function. Due to redundancy, the drive capacity of the array is the capacity of the smallest drive. Under a RAID 1 setup, an extra drive called the "spare drive" can be attached. Such a drive will be activated to replace a failed drive that is part of a mirrored array. Due to the fault tolerance, if any RAID 1 drive fails, data access will not be affected as long as there are other working drives in the array.

JBOD (Spanning)

A spanning disk array is equal to the sum of the all drives when the drives used are having different capacities. Spanning stores data onto a drive until it is full, then proceeds to store files onto the next drive in the array. When any disk member fails, the failure affects the entire array. JBOD is not really a RAID and does not support fault tolerance.

Others

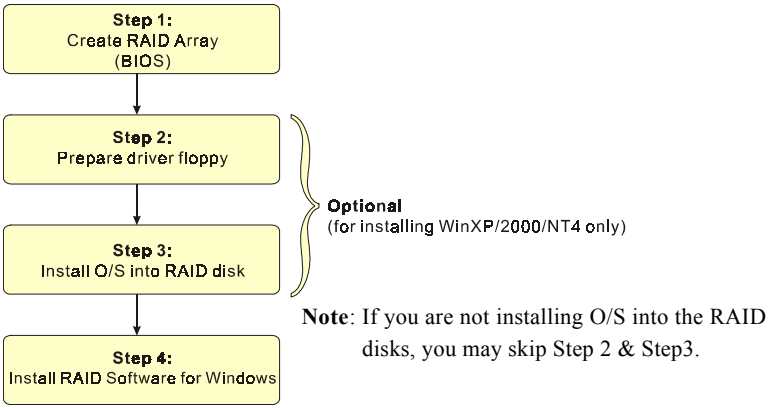
Other RAID derivatives are RAID 10 and RAID 5. These RAID levels require more than 2 drives to operate, combining the benefits of RAID 0 and RAID 1.

Silicon Image Sil3114 S-ATA RAID Features

- RAID 0, 1, 5, 10
- Hot Spare and On-line Mirror Rebuilding
- System GUI Monitoring Utility:
  - Displays/Logs/Alerts Users to Vital RAID Set Information
  - Manages RAID Set Functions (configures, rebuilds, etc.)
- RAID Set Accommodates Multiple Size HDDs
- HDDs function normally when not in RAID Sets
- Adjustable Stripe Size for RAID 0
- Automatically Selects Highest Available Transfer Speed for All ATA and ATAPI Devices
- Supports:
  - UDMA up to 150MB/Sec.
  - All UDMA and PIO Modes
  - Up to 4 SATA devices
  - ACPI and ATA/ATAPI6

Enable RAID Function

For any RAID controller, the general procedure to enable RAID function are shown below:



Note: If you are not installing O/S into the RAID disks, you may skip Step 2 & Step3.

☞ Step 1: Create RAID Array

RAID arrays are created using the RAID controller's BIOS utility.

Silicon Image Sil3114

Wait for the following message to appear during boot-up:

Press <CTRL-S> or F4 to enter RAID utility.

An easy-to-use screen will appear with the following choices in the top left:

- Create RAID Set
- Delete RAID Set
- Rebuild RAID Set
- Resolve Conflicts
- Low Level Format
- Logical Drive Info

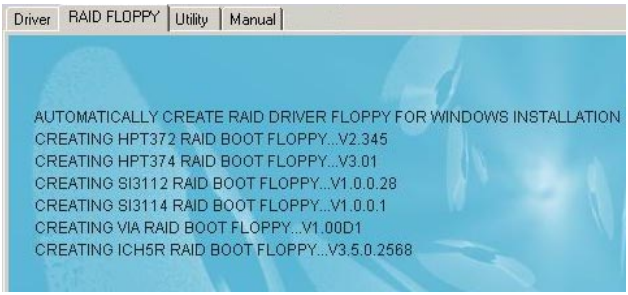
Refer to Appendix D for details about creating RAID array using this utility.

☞ Step 2: Prepare driver floppy

When installing Windows XP/2000/NT4.0 into any RAID disk, the O/S setup will require a floppy disk containing the RAID driver. This step will show you how to prepare this driver floppy. There are 2 methods to prepare this floppy:

▶ *Method 1*

1. Locate another computer and insert the bundled CD into its CD-ROM drive.
2. A main menu screen will appear (Autorun feature)
3. Select the page "RAID floppy"



4. Insert a blank floppy into the A:drive
5. Click on the required driver to begin copy into the floppy

▶ *Method 2*

1. Locate another computer and insert the bundled CD into its CD-ROM drive.
2. Enter DOS mode and change directory to D:\DRIVER
3. Insert a blank floppy into the A:drive
4. Run the batch file "cbf_dos.bat" located in D:\DRIVER
5. Select the appropriate RAID controller to begin copy into the floppy

☞ Step 3: Install O/S into RAID disk

Continue to install Windows XP/2000/NT4.0 as normal. When requested by Windows Setup for RAID driver, insert the floppy created earlier in Step 2.

☞ Step 4: Install RAID software for Windows

After the O/S has been installed, you may install the RAID driver and software. The RAID software is a Windows-based utility with graphical user interface that provides an easy operating tool to configure and manage RAID arrays.

1) Insert the bundled CD into the CD-ROM drive.

2) When the main menu appears, click on the SATA RAID driver corresponding to the SATA controller you have configured in Step 1. See driver installation in section 6 for more details.

Note: For information on using the software utility, refer to the user guide in the bundled CD.

Section 6
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 **"AC'97 AUDIO DRIVER"** to install audio driver.

Step 3 : Click **"MARVELL LAN DRIVER"** to install LAN driver.

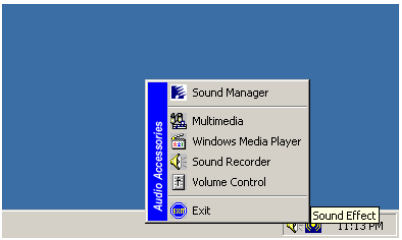
Step 4 : Click **"USB 2.0 DRIVER (README.HTM)"** for installation introduction to install USB 2.0 driver.

Step 5 : Click **"SILICON IMAGE RAID DRIVER"** to install Serial ATA driver. Make sure to follow the instructions to install "JAVA 2 RUNTIME ENVIRONMENT INSTALLATION" and "SILICON IMAGE SATARaid GUI INSTALLATION" item for Raid Administrator.

Realtek Sound Manager Quick User-guide

◆ Introduction

To obtain the best performance from your audio system, run the "Sound Manager" utility to adjust the settings to suit your needs. This section of the manual is intended to provide a quick user-guide to setup "Sound Manager". For more detailed information, refer to "Sound Manager manual" in the CD.



<Figure 1>

1. Right-click “Sound Effect” button on the task bar and select “Sound Manager”.

Sound Effect :

<Figure 2>

2. Select "Sound Effect" page to set the desired audio environment from the pull-down menu.

Speaker Configuration:

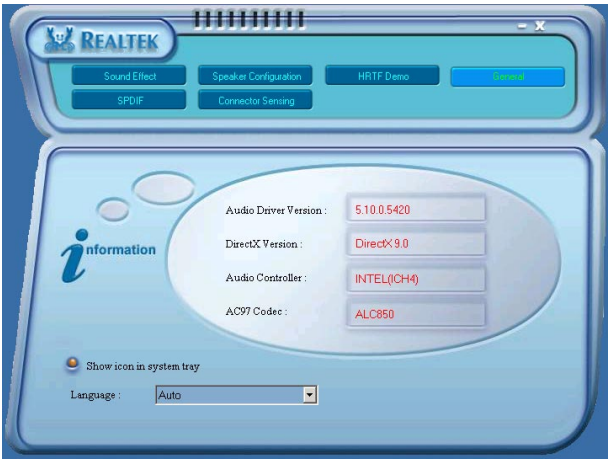
<Figure 3>

3. This page displays the mainboards's phone jack function when a corresponding audio mode is selected.
   Figure 3 above shows the phone jack setup for 8 channel mode.

HRTF Demo:

<Figure 4>

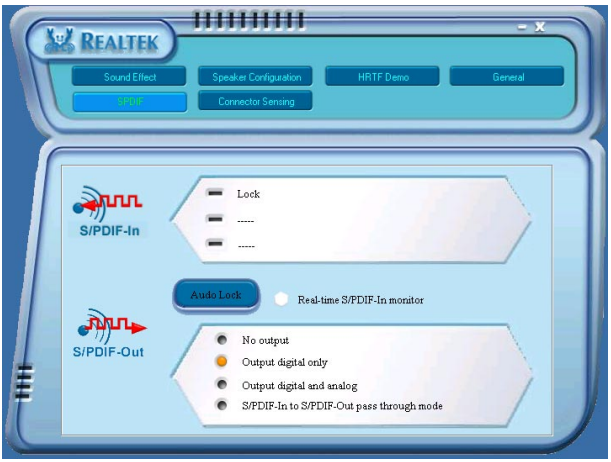
4. This page lets you test the HRTF 3D Positional Audio features.



General:

<Figure 5>

5. This page displays information regarding the audio hardware and software. To remove "Sound Manager" icon from Windows Task bar, uncheck "Show icon in system tray".



SPDIF:

<Figure 6>

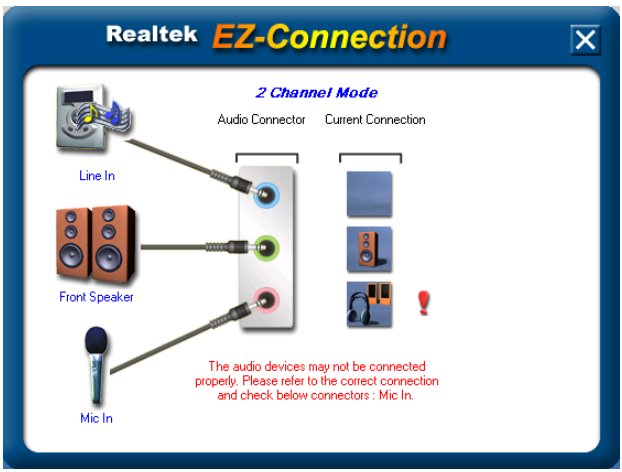
6. This page shows S/PDIF-In and S/PDIF-Out function on your system.
   S/PDIF-In: a. Click "Auto Lock" to detect S/PDIF input and display its information.
   b. Check "Real-time S/PDIF-In monitor" to listen to the S/PDIF In signal through Line-out connector.
   S/PDIF-Out: Choose the type of audio source that will appear on the S/PDIF-out connector.

This board is equipped with Jack Sensing capability. If an audio device is plugged into the wrong connector, a warning message will appear to remind users to check the connection.

Connector Sensing:

<Figure 7>

7. Push "Start" button to start the sensing. Please remember to terminate all audio applications before starting the sensing.



Connector Sensing:

<Figure 8>

8. EZ-Connection shows the result of the detection.
   "Audio Connector" column reflects the settings used in the "Speaker Configuration" page.
   "Current Connection" column shows the type of device detected. If the results do not match, an exclamation mark will appear on the right side.

Connector Sensing:

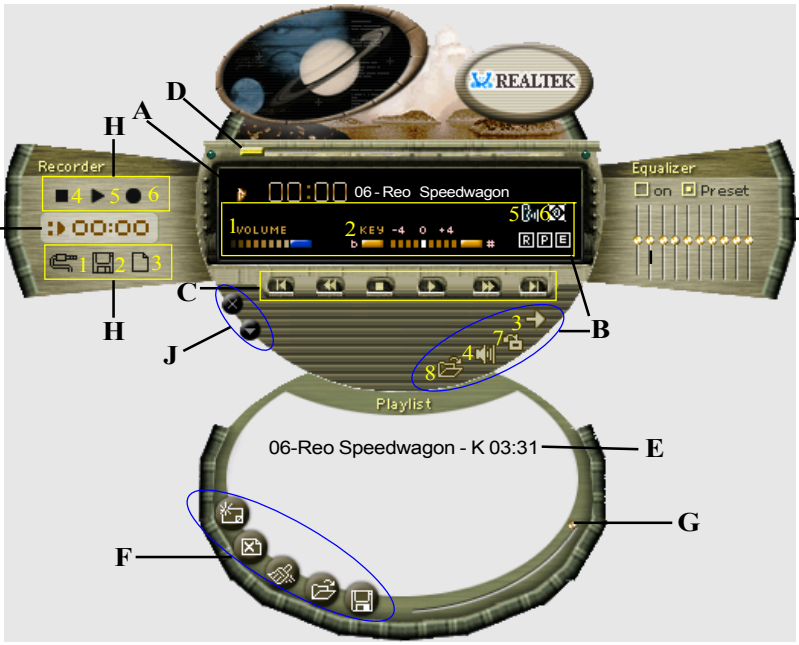
<Figure 9>

9. After closing EZ-Connector, this page will show the latest connector status as above.

Appendix A

A-1 Realtek Media Player User's Guide

Realtek Media Player Platform



Functional Descriptions

A. Playback Windows Display

Playback windows displays the following mode information:

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

B. Playback Function Controls

There are 8 selectable functions for the playback:

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

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

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

C. Playback Controls

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

D. Seeking bar

Display Animated Playback Status

E. Title/Play List Windows

Display Currently Selected Title(s)

F. Title/Play List Edit Controls

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

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

G. Title/Play List Scroll bar

Scroll Up/Down the Title/Play List.

H. Recording Function Controls

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

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

I. REC/Playback Time Display

Displays REC/Playback Time.

J. Platform Display Panel Controls

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

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

K. Equalizer Control Panel

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

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

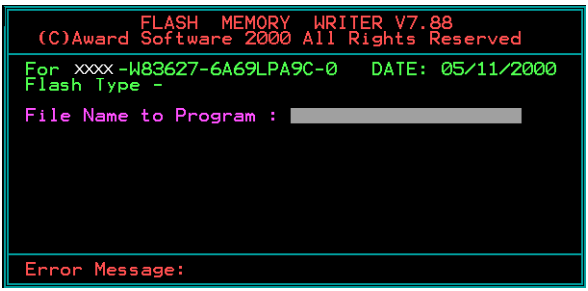
Appendix B

B-1 Update Your System BIOS

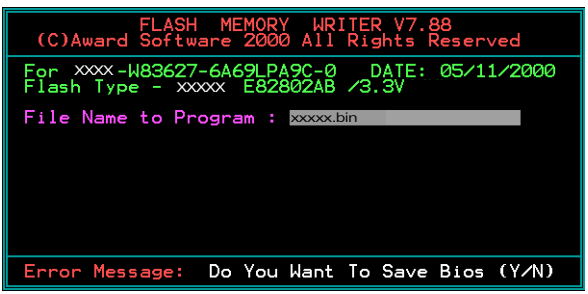
Download the xxxxx.EXE file corresponding to your model from our website to an empty directory on your hard disk or floppy. Run the downloaded xxxxx.EXE file and it will self extract. Copy these extracted files to a bootable DOS floppy disk.

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

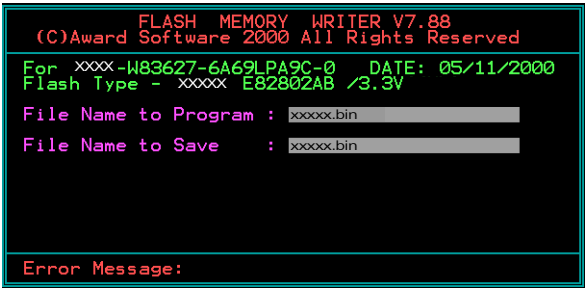
1. Type "A:\AWDFLASH and press <Enter> Key.
2. You will see the following setup screen.
3. Please key in the xxxxx.bin BIOS file name.



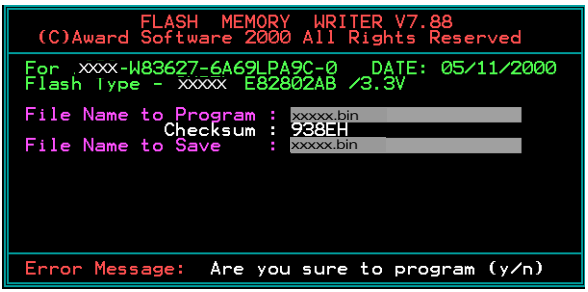
4. If you want to save the previous BIOS data to the diskette, please key in [Y], otherwise please key in [N].



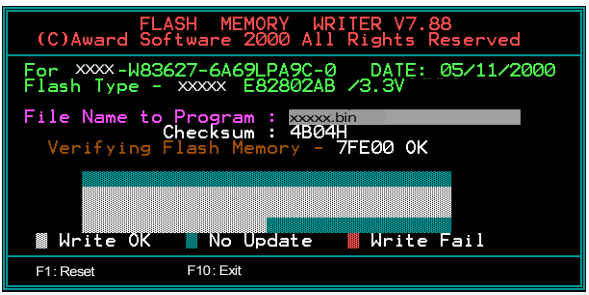
5. Key in File Name to save previous BIOS to file.



6. To confirm and proceed, please key in [Y] to start the programming.



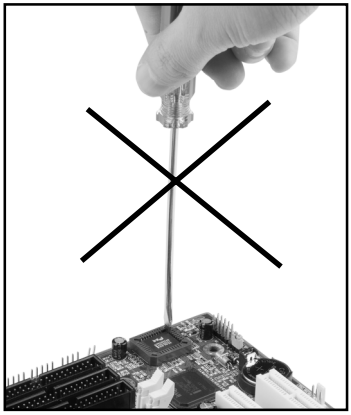
7. The BIOS update is finished.

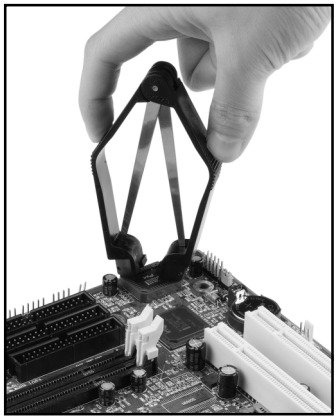


Appendix C

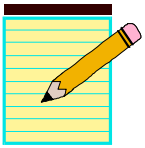
C-1 EEPROM BIOS Remover

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





The BIOS socket is fragile may be damaged if an improper method to replace the BIOS chip is applied.



Appendix D

D-1 Silicon Image Sil3114 RAID BIOS Utility

To enter this BIOS utility, power on and wait for the following message to appear during boot-up:

Press <CTRL-S> or F4 to enter RAID utility.

An easy-to-use screen will appear with the following choices in the top left:

- Create RAID Set
- Delete RAID Set
- Rebuild RAID Set
- Resolve Conflicts
- Low Level Format
- Logical Drive Info

Below this will be listed the drives currently installed on the system.

The top right half of the screen displays directions and comments for the user. The bottom right half lists the command keys:

- Arrows up and down are Select Keys
- ESC takes the user to the previous menu
- Enter selects the user's choice
- Ctrl-E exits the utility

Creating RAID Sets

This creates RAID Sets.

1. Select "Create RAID Set"
2. Choose either a "Striped" or "Mirrored" RAID Set.
3. Select if you want the utility to Auto Configure the RAID Set or if you want to manually configure the RAID Set. For Striped Sets, you can change the chunk size. For Mirrored Sets, you assign which is the Source and Target

drives, as well as if you want Disk Copy.

What is Disk Copy? If the disk assigned as the source disk already has been partitioned and has data stored on it, and then a second disk is added for redundancy, the data on the source drive can be copied to the destination drive, so the disks are identical, and all subsequent data will be written to both drives as a Mirrored set. If, however, the source disk does not have data already stored on it, there is no need for Disk Copy.

4. The utility will ask "Are You Sure?" before completing the configuration.

Rebuild RAID Sets

This is used to initiate the copying of data a from an existing drive to a replacement drive that has been installed in a RAID set after the failure of the members.

Deleting RAID Sets

1. To remove one or more RAID sets, select "Delete RAID Set."
2. Select desired set and press Y when asked "Are You Sure?"

Resolving Conflict

When a RAID set is created, the metadata written to the disk includes drive connection information (Primary Channel, Secondary Channel). If, after a disk failure, the replacement disk was previously part of a RAID set (or used in another system), it may have conflicting metadata, specifically in reference to the drive connection information. If so, this will prohibit the RAID set from being either created or rebuilt, In order for the RAID set to function properly, this old metadata must be first overwritten with the new metadata. To resolve this, select "Resolve Conflict" and the correct metadata, including the correct drive connection information, will be written to the replacement disk.

Low Level Format

This selection allows you to do "Low Level Format" for a single disk at a time.

Logical Drive Info

This selection shows the hard disk information of the RAID setup.

Appendix E

E-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)