AX4SG Max
Online Manual

DOC. NO.: AX4SGMAX-OL-E0307D

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What's in this manual

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Before You Start

This Online Manual will introduce to the user how this product is installed. All useful information will be described in later chapters. Please keep this manual carefully for future upgrades or system configuration changes. This Online Manual is saved in PDF format, we recommend using Adobe Acrobat Reader 5.0 for online viewing, it is included in Bonus CD or you can get free download from Adobe web site.

Although this Online Manual is optimized for screen viewing, it is still capable for hardcopy printing, you can print it by A4 paper size and set 2 pages per A4 sheet on your printer. To do so, choose **File > Page Setup** and follow the instruction of your printer driver.

Thanks for the help of saving our earth.

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Overview

Thank you for choosing AOpen AX4SG Max motherboard. AX4SG Max is Intel® Socket 478 motherboard (M/B) based on the ATX form factor featuring the Intel 865-G chipsets. As high performance chipset built in the M/B, AX4SG Max motherboard supports Intel® Socket 478 Pentium® 4 1.6GHz~3.06GHz. It supports 400/533/800MHz Front Side Bus (FSB) clock and Hyper-Threading Technology which brings additional intelligence to systems. In the AGP performance, it has one AGP slot to support AGP 8X/4X mode and pipelined spilt-transaction long burst transfer up to 2112MB/sec.The slot also support ADD card. According to different customer's requirements, this motherboard supports DDR266, DDR333 and DDR400 RAM up to 4GB maximum. The onboard IDE controller supports Ultra DMA 33/66/100 mode, Serial ATA 150 MB/s and IDE Raid 0, Raid 1 mode. There are 6 PCI slots provided on this board and two IEEE1394 connectors. A total of 6 USB 2.0 ports on the back panel and one connector on the board give you the best use of all USB devices with the fancy speed up to 480Mbps. More than that, on the strength of integrated BCM LAN controller on board, which is a highly integrated Platform LAN Connect devices, it provides 10/100/1000M bps Ethernet for office and home use. Besides, AX4SG Max has S/PDIF connector and an AC97 CODEC RealTek ALC650 chipset onboard, providing high performance and magic surround stereo sound to let people enjoy working with it. Now, let's enjoy all features from AOpen AX4SG Max motherboard.

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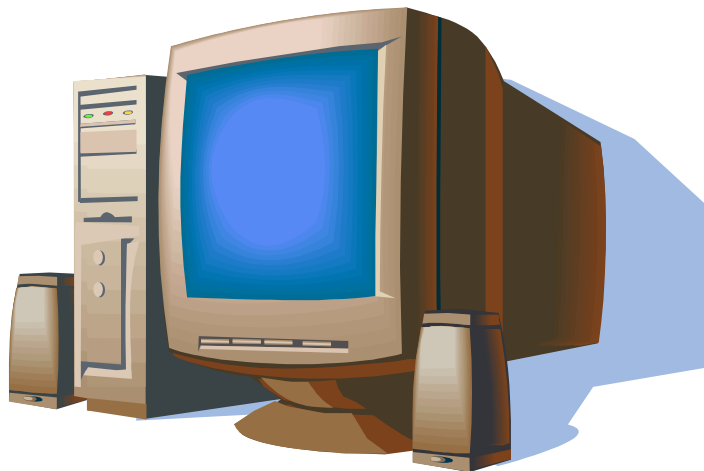
Feature Highlight

CPU

Supports Intel® Socket 478 Pentium® 4 (Northwood) 1.6GHz~3.06GHz+ with 400/533/800MHz Front Side Bus (FSB) designed for Socket 478 technology.

Chipset

Intel 865 is a Graphics Memory Controller Hub (GMCH) designed for use with the Pentium 4 processor with 512-KB L2 cache on 0.13 micron processor. It provides CPU, DDR, AGP, Hub, CSA Interfaces and integrated graphics with display interfaces. The CPU interface supports Pentium 4 processor subset of the Extended Mode of the Scalable Bus Protocol. The GMCH memory interface supports one up to two channels of DDR, and the AGP interface supports 0.8/1.5V signaling with 8X/4X data transfers and 8X/4X AGP Fast Writes. The integrated graphics controller provides 3D, 2D, and display capabilities while using a portion of system memory for graphics memory (UMA) to provide a cost effective, high performance graphics solution. The Intel 865 platform supports the fifth generation I/O Controller Hub (ICH5R).

The ICH5R integrates an Ultra ATA 100 controller, two Serial ATA host controllers, one EHCI host controller and four UHCI host controllers supporting eight external USB 2.0 ports, LPC interface controller; flash BIOS interface controller, PCI interface controller, AC'97 digital controller, integrated LAN controller, an ASF controller and a hub interface for communication with the 865 GMCH.

Memory

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With Intel 865 chipset, this motherboard can support dual channel Double-Data-Rate (DDR) RAM. The dual channel mode allows chipsets to get data in 128 bit and zero wait state bursting between the RAM. The data transfer at 266/333/400MHz. The four slots of DDR RAM can be composed of an arbitrary mixture of 64, 128, 256, 512 MB or 1GB DDR RAM and maximum up to 4GB.

Expansion Slots

Including six 32-bit/33MHz PCI and one AGP 8X/4X slots. The PCI local bus throughput can be up to 132MB/s. Of six PCI slots provided, all of them are master PCI slots with arbitration and decoding for all integrated functions and LPC bus. AX4SG Max motherboard includes one AGP expansion slot for a bus mastering AGP graphic card. The Accelerated Graphics Port (AGP) specification provides a new level of video display sophistication and speed. The AGP video cards support data transfer rate up to 2112MB/s. Or you may have ADD card cabled to this AGP slot to provide high-speed digital connection for digital displays.

AGP Protection Technology

With AGP Protection Technology implemented, this motherboard will automatically detect the voltage of AGP card and prevent your chipsets from being burnt out.

Hyper-Threading Technology

Support Hyper-Threading Technology which brings additional intelligence to systems so that multiple tasks received from the processor can be managed and prioritized more effectively.

Watch Dog ABS

Includes AOpen "Watch Dog ABS" function that can auto-reset system in 4.8 seconds when you fail the system overclocking.

1MHz Stepping CPU Frequency Adjustment

Provides "1MHz Stepping CPU Frequency Adjustment" function in the BIOS. This magic function allows you to adjust CPU FSB frequency from 100~400MHz by 1MHz stepping adjustment, and helps your system get maximum performance.

LAN Port

On the strength of BCM5705, a fourth-generation triple-speed 10/100/100 base-T Ethernet LAN Controller solution for high-performance network applications, this motherboard provides 10/100/1000 Mbps Ethernet for office and home use.

Ultra DMA 33/66/100 Bus IDE

Comes with an on-board PCI Bus Master IDE controller with two connectors that support four IDE devices in two channels, supports Ultra DMA 33/66/100, PIO Modes 3 and 4 and Bus Master IDE DMA Mode 5, and supports Enhanced IDE devices.

Serial ATA

Integrated in ICH5R that contains independent DMA operation on two ports, the SATA controllers are completely software transparent with the IDE interface, while providing a lower pin count and higher performance. The ICH5R SATA interface supports data transfer rates up to 150MB/s.In this motherboard the SATA interfaces support RAID 0 and RAID 1 modes.

On-board AC'97 Sound

AX4SG Max uses RealTek AC97 CODEC RealTek ALC650 sound chip. This on-board audio includes a complete audio recording and playback system.

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Eight USB 2.0 Ports

Provides six ports on the back panel and one USB 2.0 connector on the board, providing a total of eight USB 2.0 interface to connect devices such as mouse, keyboard, modem, scanner, etc.

Dr. Voice II

The Dr. Voice II can identify what kind of problems had occurred in the operating system. It provides four kinds language versions.

S/PDIF Connector

S/PDIF (Sony/Philips Digital Interface) is the newest audio transfer file format, which provides impressive quality through optical fiber and allows you to enjoy digital audio instead of analog audio.

Power Management/Plug and Play

Supports the power management function which confirms to the power-saving standards of the U.S. Environmental Protection Agency (EPA) Energy Star program. It also offers Plug-and-Play, which helps save users from configuration problems, thus making the system much user-friendlier.

Hardware Monitoring Management

Supports CPU or system fans status, temperature and voltage monitoring and alert, through the on-board hardware monitor module.

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SilentTek

Combines "Hardware-Status Monitoring", "Overheat Warning" and "Fan Speed Control" with user-friendly interfaces to provide a perfect balance among noises, system performance and stability.

Enhanced ACPI

Fully implement the ACPI standard for Windows$^®$ 98/ME/2000/XP series compatibility, and supports Soft-Off, STR (Suspend to RAM, S3), STD (Suspend to Disk, S4) and S5 features.

Quick Installation Procedure

This page gives you a quick procedure on how to install your system. Follow each step accordingly.

1. Installing CPU and Fan

2. Installing System Memory (DIMM)

3. Connecting Front Panel Cable

4. Connecting IDE and Floppy Cable

5. Connecting ATX Power Cable

6. Connecting Back Panel Cable

7. Power-on and Load BIOS Setup Default

8. Setting CPU Frequency

9. Reboot

10. Installing Operating System (such as Windows XP)

11. Installing Driver and Utility

Motherboard Map

AC'97 CODEC

AUX-IN Connector

CD-IN Connector

COM2 Connector

Game Port Connector

32-bit PCI Expansion Slot x6

Resetable Fuse

IrDA Connector

Front Audio Connector

S/PDIF Connector

USB 2.0 Connector

SATA Port x 4

JP14 CMOS Clear Jumper

IEEE1394 Connector x 2

Wake on LAN Connector
SYSFAN3 Connector

Front Panel Connector

Die-hard BIOS

JP24 BIOS Rescue Jumper

Case Open Connector

Colored Back Panel

JP28 Keyboard/Mouse
Wakeup Jumper

SYSFAN2 Connector

Low ESR Capacitors

4-pin 12V. ATX Power Connector

AGP 8x Expansion Slot
supports ADD card

478-pin CPU socket (Northwood)
with Voltage and Frequency
Auto-detection that supports Intel®
Pentium® 4 1.6~3.06GHz+ CPU

CPUFAN1 connector

Intel 865-G Chipset that
supports 533/800MHz FSB,
DDR 400 and AGP 8X

184-pin DIMMx4 support
DDR400/333/266 SDRAM
maximum up to 4GB

ATX Power Connector

JP2 Speaker Output Connector

JP15/JP16 Dr. Voice II
Language Select Jumper

ATA66/100 IDE Connector x2

FDD Connector

Block Diagram

DDR400/333/266 Dual Channel
RAM Up to 4GB

DIMM Socket x4

32-bit PCI Slot x6

PCI Bus

**4 Serial ATA Ports
150MB/s**

SATA 1
SATA 2
SATA 3
SATA 4

533/800MHz
System Bus

Socket 478
Intel Pentium 4
CPU

Intel
865-G

AGP bus

ATA 66/100

Primary
Channel

IDE Drive x4

Secondary
Channel

AGP 8X Slot

VGA onboard

ICH5R

RealTek
AC97
CODEC

LAN connect Component

Gigabit
BCM5705

USB Port

USB Port

4Mbit Flash EEPROM

USB Port x8

USB Port

Parallel Port

USB Port

Serial Port x2

Floppy Disk Drive x2

IEEE1394 x2

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Hardware Installation

This chapter describes jumpers, connectors and hardware devices of this motherboard.

Note: *Electrostatic discharge (ESD) can damage your processor, disk drives, expansion boards, and other components. Always observe the following precautions before you install a system component.*

1. *Do not remove a component from its protective packaging until you are ready to install it.*

2. *Wear a wrist ground strap and attach it to a metal part of the system unit before handling a component. If a wrist strap is not available, maintain contact with the system unit throughout any procedure requiring ESD protection.*

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About "User Upgrade Optional" and "Manufacture Upgrade Optional"…

When you read this online manual and start to assemble your computer system, you may notice that some of the functions are marked as "User Upgrade Optional" or "Manufacture Upgrade Optional". Although all of AOpen's motherboards have included many amazing and powerful features, sometimes not every user is familiar with these powerful features. As a result of this we define features that can be upgraded by users as "User Upgrade Optional". You can upgrade these functions by purchasing additional devices. As for functions that cannot be upgraded by users, we define them as "Manufacture Upgrade Optional". If need be, you can contact our local distributors or resellers to purchase "Manufacture Upgrade Optional" components, and again you are also welcome to visit our official website at english.aopen.com.tw for detail information.

JP14 Clear CMOS Data

You can clear CMOS to restore system default setting. To clear the CMOS, follow the procedure below.

1. Turn off the system and unplug the AC power.

2. Remove ATX power cable from connector PWR2.

3. Locate JP14 and short pins 2-3 for a few seconds.

4. Return JP14 to its normal setting by shorting pin1 & pin2.

5. Connect ATX power cable back to connector PWR2.

Pin 1 ————▶

1   1
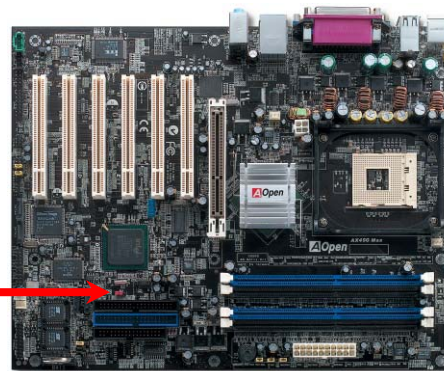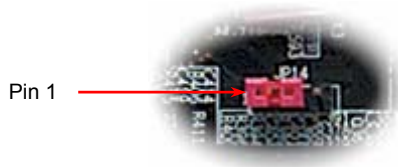
Normal   Clear CMOS
(default)

Tip: When should I Clear CMOS?

1. Boot fails because of overclocking…

2. Forget password…

3. Troubleshooting…

CPU Installation

This motherboard supports Intel® Pentium 4 Socket 478 series CPU (Northwood). Be careful of CPU orientation when you plug it into CPU socket.

1. Pull up the CPU socket lever and up to 90-degree angle.

2. Locate Pin 1 in the socket and look for mark on the CPU upper interface. Match Pin 1 and cut edge, then insert the CPU into the socket.

CPU socket Lever

CPU pin 1 and cut edge
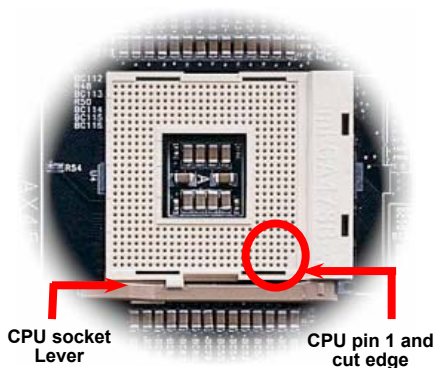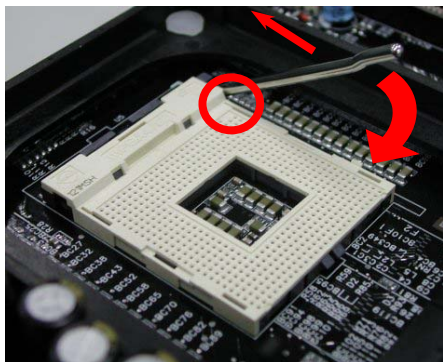
CPU cut edge

Note: Those pictures are for example only; they may not look the same with the motherboard you purchased.

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3. Press down the CPU socket lever and finish CPU installation.
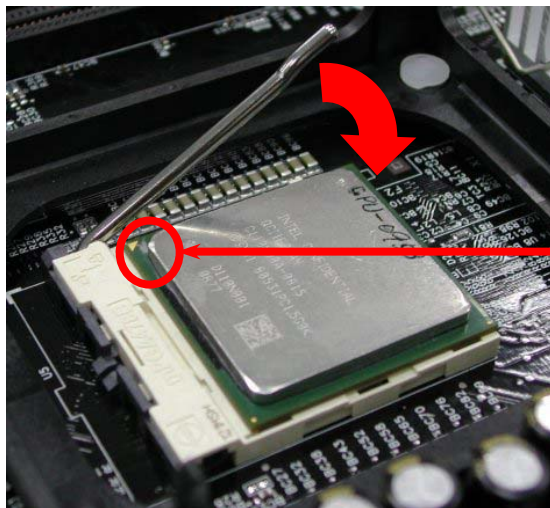
CPU cut edge

Note: If you do not match the CPU socket Pin 1 and CPU cut edge well, you may damage the CPU.

Note: This socket supports Micro-FC-PGA2 package CPU, which is the latest CPU package developed by Intel. Other forms of CPU package are impossible to be fitted in.

Note: This picture is for example only; it may not look the same with the motherboard you purchased.

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CPU Fan Installation

This motherboard comes with a retention module attached on the CPU socket when shipped, we strongly recommend you to install AOpen special designed CPU Fan as shown below on the retention module for better heat dissipation. Please install the CPU Fan correctly as the following pictures shown.

1. Gently put the CPU Fan down on the retention module with clips aligning correctly to the four corners.

2. Pressing down the four clips with force one by one on the retention module.

Clip
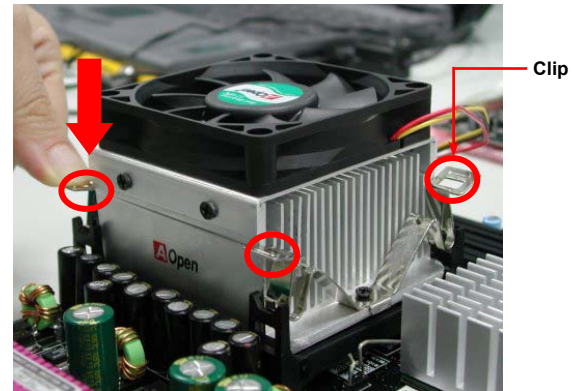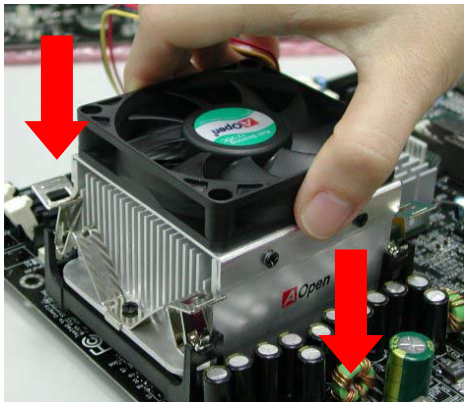
Note: The picture above may look different from the product you purchased.

CPU Jumper-less Design

CPU VID signal and SMbus clock generator provide CPU voltage auto-detection and allows the user to set the CPU frequency through the BIOS setup, therefore no jumpers or switches are used. The disadvantages of the Pentium based jumper-less designs are eliminated. There will be no worry of wrong CPU voltage detection.

Intel® Socket 478

Pentium 4

Clock Generator

BIOS

Controlled

Circuit

CPU Freq. Ratio

CPU VID signal

CPU voltage

Power Regulator

(Automatically generates CPU voltage)

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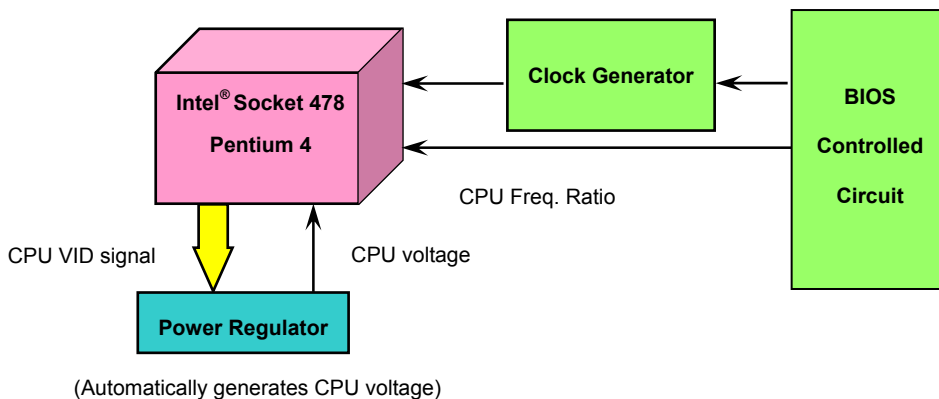
CPU Over-current Protection

The Over Current Protection is a popular implementation on ATX 3.3V/5V/12V switching power supply. However, the new generation CPU uses different voltage with a regulator to transfer 12V to CPU voltage (for example, 2.0V), and thus makes 5V over current protection useless. This motherboard is with switching regulator onboard supporting CPU over-current protection; in conjunction with 3.3V/5V/12V power supply provide the full line over-current protection.

12V (Protected by power supply)

3.3V (Protected by power supply)

ATX Switching Power Supply

5V (Protected by power supply)

Onboard Power Regulator
(Over-Current Protection)

CPU Core Voltage
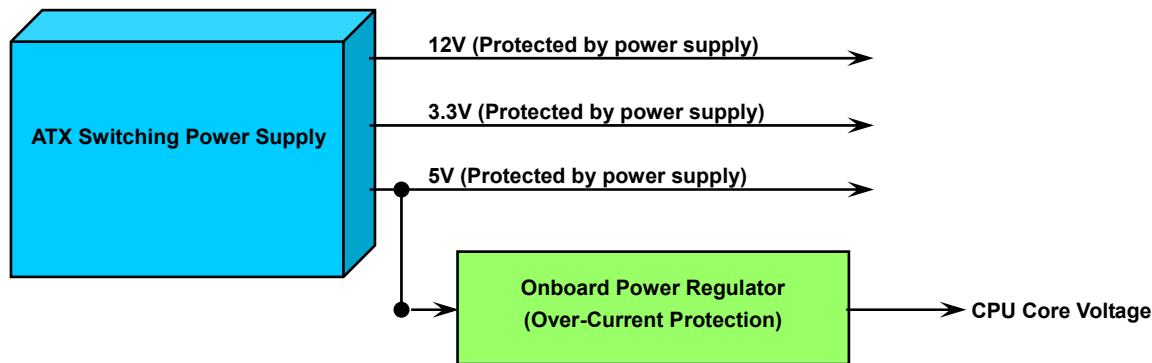
*Note: Although we have implemented protection circuit try to prevent any human operating mistake, there is still certain risk that CPU, memory, HDD, add-on cards installed on this motherboard may be damaged because of component failure, human operating error or unknown nature reason. **AOpen cannot guaranty the protection circuit will always work perfectly.***

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Battery-less and Long Life Design

This Motherboard implements a [Flash ROM](#) and a special circuit that provide you no batter power consumption of current CPU and CMOS Setup configurations. The RTC (real time clock) can also keep running as long as the power cord is plugged. If you lose your CMOS data by accident, you can just reload the CMOS configurations from Flash ROM and the system will recover as usual.

ATX Stand-by Power   **Battery**

Auto Switch

RTC
(Real Time Clock)
00:00:00

Auto switch to ATX standby power as long as AC power line is plugged. This smart design increases battery life if you still plug battery on motherboard.

Flash ROM

CMOS

Backup by EEPROM
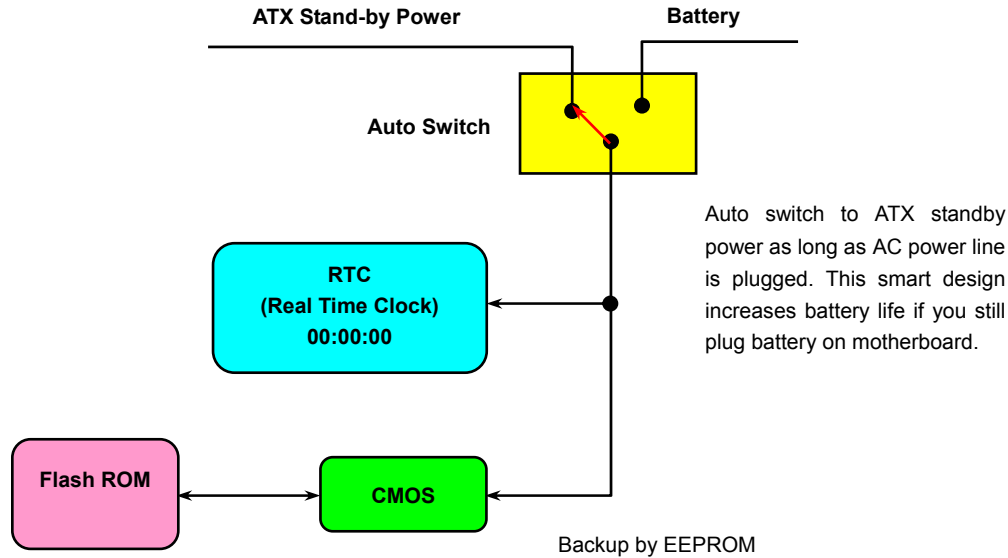
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AOpen "Watch Dog ABS"

AOpen provides a special and useful feature on this motherboard for overclockers. When you power-on the system, the BIOS will check last system POST status. If it succeeded, the BIOS will enable "Watch Dog ABS" function immediately, and set the CPU FSB frequency according to user's settings stored in the BIOS. If system failed in BIOS POST, the "Watch Dog Timer" will reset the system to reboot in five seconds. Then, BIOS will detect the CPU's default frequency and POST again. With this special feature, you can easily overclock your system to get a higher system performance without removing the system housing and save the hassle from setting the jumper to clear CMOS data when system hangs.

Enable/Disable Signal from BIOS

| BIOS |

Reset Signal

| AOpen Watch Dog ABS |

Countdown about 5 seconds if fails in POST

| Clock Generator |

CPU ID Signal

| CPU |
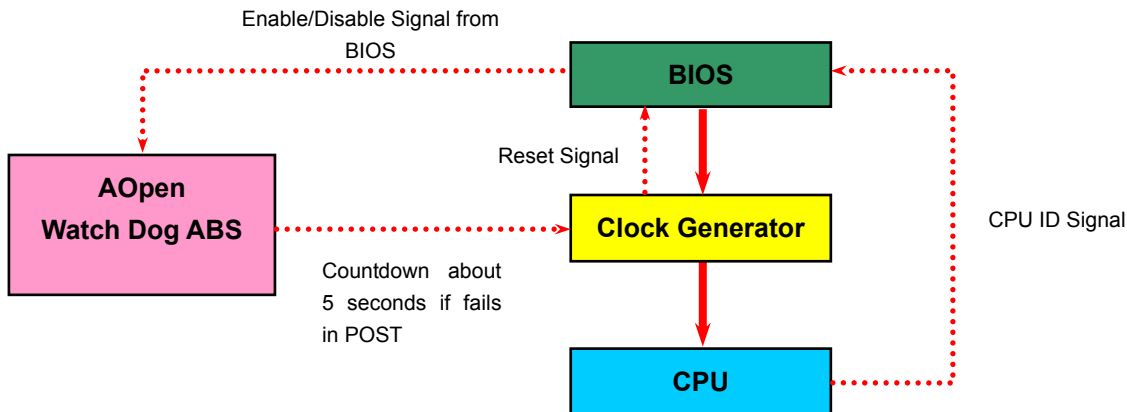
Full-range Adjustable CPU Core Voltage

This function is dedicated to overclockers and supports Adjustable CPU Core Voltage from 1.10V to 1.85V. However, this motherboard can also automatically detect CPU VID signal and generates proper CPU core voltage.

Setting CPU Frequency

BIOS Setup > Frequency/Voltage Control > CPU Bus Frequency

This motherboard is CPU jumper-less design, you can set CPU frequency in BIOS; no jumpers or switches are needed. The default setting is "table select mode". You can adjust the FSB from "CPU Host/RAM/PCI Clock" for overclocking.

*Core Frequency = CPU FSB Clock * CPU Ratio*

PCI Clock = CPU FSB Clock / Clock Ratio

AGP Clock = PCI Clock x 2

CPU Ratio	8x, 10x… 21x, 22x, 23x, 24x
CPU FSB (By BIOS table)	100-400MHz

Northwood CPU	CPU Core Frequency	FSB Clock	System Bus	Ratio
Pentium 4 1.6G	1600MHz	100MHz	400MHz	16x
Pentium 4 1.6G	1600MHz	133MHz	533MHz	12x
Pentium 4 1.7G	1700MHz	133MHz	533MHz	13x
Pentium 4 1.8G	1800MHz	100MHz	400MHz	18x
Pentium 4 2.0G	2000MHz	100MHz	400MHz	20x
Pentium 4 2.2G	2200MHz	100MHz	400MHz	22x
Pentium 4 2.2G	2200MHz	133MHz	533MHz	16x
Pentium 4 2.26G	2260MHz	133MHz	533MHz	17x
Pentium 4 2.4G	2400MHz	100MHz	400MHz	24x
Pentium 4 2.4G	2400MHz	133MHz	533MHz	18x
Pentium 4 2.53G	2530MHz	133MHz	533MHz	19x
Pentium 4 2.6G	2600MHz	200MHz	800MHz	13x
Pentium 4 2.66G	2660MHz	133MHz	533MHz	20x
Pentium 4 2.8G	2800MHz	133MHz	533MHz	21x
Pentium 4 2.8G	2800MHz	200MHz	800MHz	14x
Pentium 4 3.06G	3000MHz	200MHz	800MHz	15x
Pentium 4 3.20G	3200MHz	200MHz	800MHz	16x

Note: Intel 865-G chipset don't support Willamette or Celeron processors. Northwood processor would detect the clock ratio automatically, you may not be able to adjust the clock ratio in BIOS manually.

*Warning: Intel 865-G chipset supports maximum 800MHz (200MHz*4) system bus and 66MHz AGP clock; higher clock setting may cause serious system damage.*

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CPU and System Fan Connector (with H/W Monitoring)

Plug in the CPU fan cable to the 3-pin **CPUFAN1** connector. If you have chassis fan, you can also plug it on **SYSFAN2** or **SYSFAN3** connector.
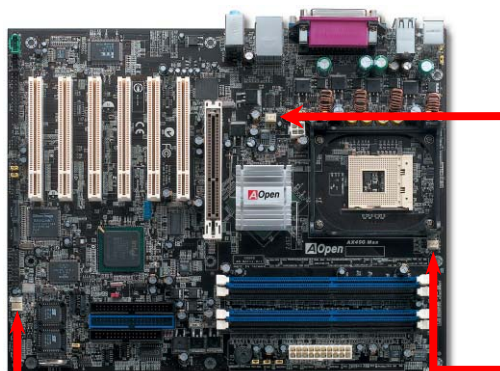
SYSFAN3 Connector

GND
+12V
SENSOR

CPUFAN1 Connector
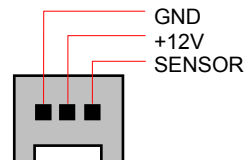
Note: Some CPU fans do not have sensor pin, so that they cannot support hardware monitoring function.

SYSFAN2 Connector

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JP28 Keyboard/Mouse Wake-up Jumper

This motherboard provides PS2 keyboard / mouse wake-up function. You can use JP28 to enable or disable this function, which could resume your system from suspend mode with keyboard or mouse. The factory default setting is set to "Disable" (1-2), and you may enable this function by setting the jumper to 2-3.

Pin 1

1   1

Disable   Enable
(Default)
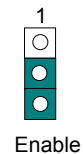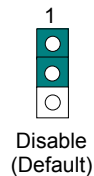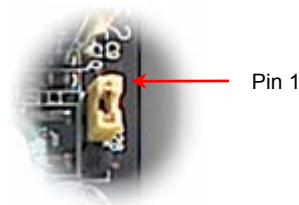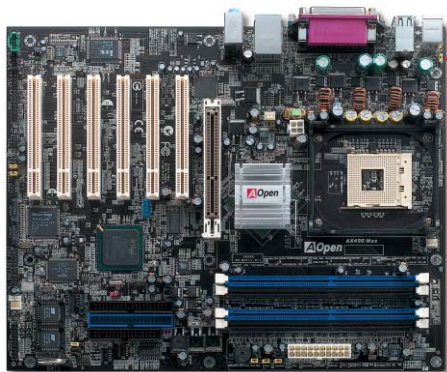
DIMM Sockets

This motherboard has four 184-pin DDR DIMM sockets that allow you to install 128-bit dual channel DDR400, DDR333 or DDR266 memory up to 4GB. Only non-ECC DDR RAM is supported. Please install suitable modules; otherwise serious damage may occur on memory sockets or you RAM modules. ***Please note that when you install DDR333 memory module and have your CPU FSB set at 800MHz, the memory can only run with the speed of DDR320. It is limitation of Intel.*** For other limitation of CPU types, please see the table below.
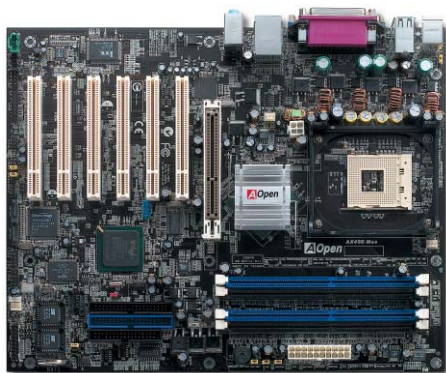
Item	DDR266	DDR333	DDR400
CPU FSB 400MHz	V	X	X
CPU FSB 533MHz	V	V	X
CPU FSB 800MHz	V	⊙	V

DIMMA1
DIMMA2

DIMMB1
DIMMB2

Warning: This motherboard supports DDR RAM. Please do not install the SDRAM on the DDR RAM sockets; otherwise it will cause serious damage on memory sockets or SDRAM module.

Note: To run dual channel speed, you have to use the same type memory modules installed on two DIMMs. If you install two different sized modules, the system can only run single channel mode and with the speed of that lower memory module.

How to Install Memory Modules

Please follow the procedure as shown below to finish memory installation.

1. Make sure the DIMM module's pin face down and match the socket's size as depicted below.

40 pins   52 pins
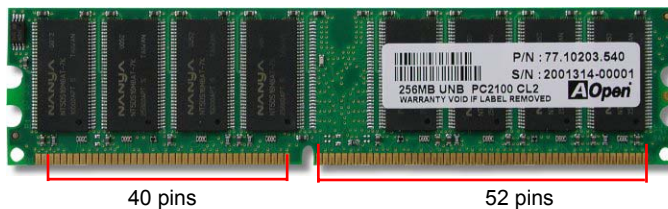
> **Note:** *Please pay attention to the Blue slots. To run dual channel speed, you should insert the RAM in the slot of DIMM A1 and DIMM B1 or DIMM A2 and DIMM B2.* **Please don't use the different frequency DIMM on dual channel**

2. Insert the module straight down to the DIMM slot with both hands and press down firmly until the DIMM module is securely in place.

Tab

Key

Pin 1
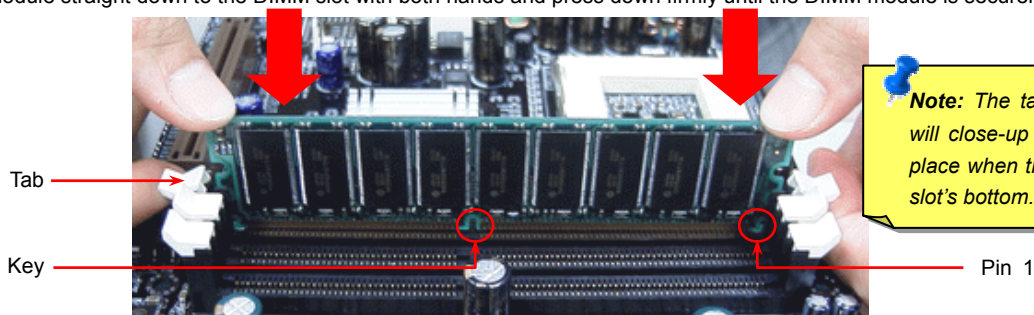
> **Note:** *The tabs of the DIMM slot will close-up to hold the DIMM in place when the DIMM touches the slot's bottom.*

3. Repeat step 2 to finish additional DIMM modules installation.

Note: These images are for example only; they may not be exactly the same as the motherboard you purchased.

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ATX Power Connector

This motherboard comes with a 20-pin and 4-pin ATX power connector. Make sure you plug in the right direction. We strongly recommend you to connect the 4-pin 12V ATX connector before connecting the 20-pin ATX power connector and use standard power supply specially designed for Pentium 4 system.
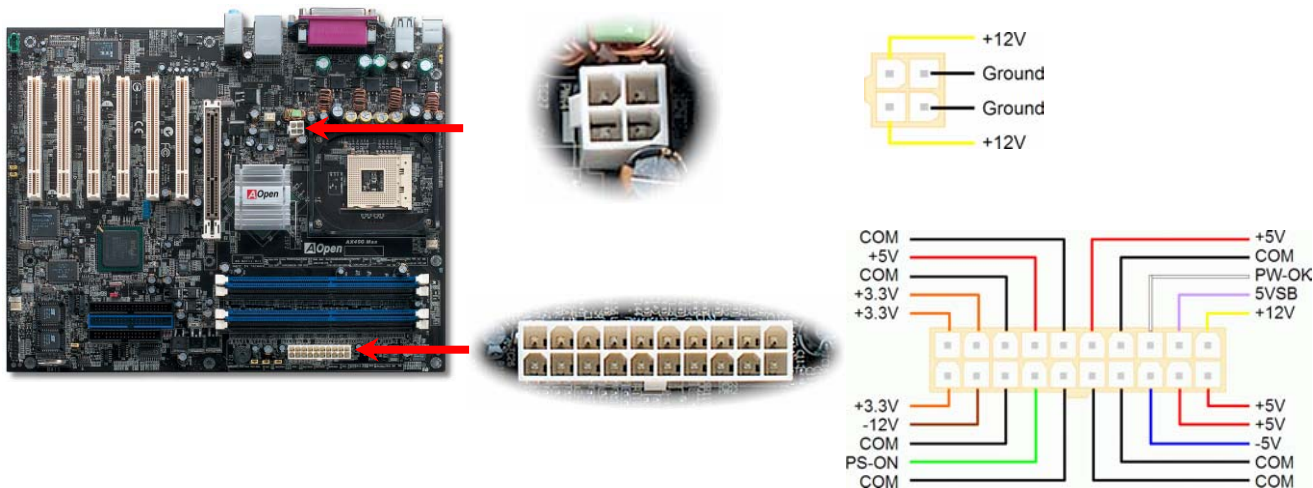
AC Power Auto Recovery

A traditional ATX system should remain at power off stage when AC power resumes from power failure. This design is inconvenient for a network server or workstation, without an UPS, that needs to keep power-on. This motherboard implements an AC Power Auto Recovery function to solve this problem.

IDE and Floppy Connector

Connect 34-pin floppy cable and 40-pin IDE cable to floppy connector FDD and IDE connector. Be careful of the pin1 orientation. Wrong orientation may cause system damage.

Pin 1

FDD Connector

Secondary
Slave (4th)

Secondary
Master (3rd)

IDE 2 (Secondary)

IDE 1 (Primary)

Pin 1

Primary
Slave (2nd)

Primary
Master (1st)

ATA 66/100 IDE
Connector
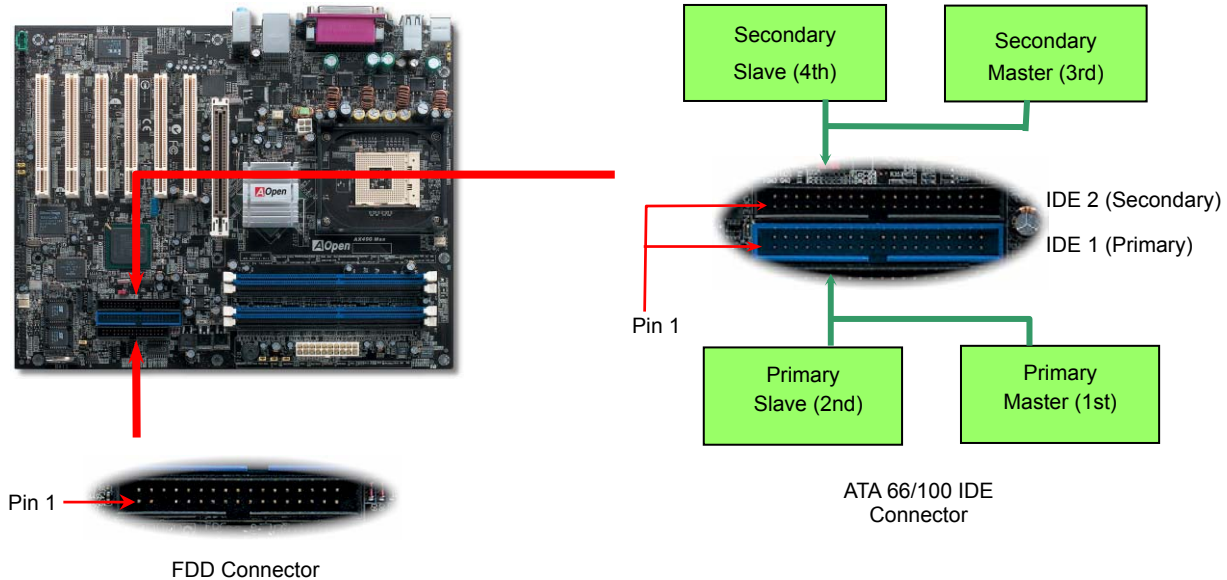
IDE1 is also known as the primary channel and IDE2 as the secondary channel. Each channel supports two IDE devices that make a total of four devices. In order to work together, the two devices on each channel must be set differently to **Master** and **Slave** mode. Either one can be the hard disk or the CDROM. The setting as master or slave mode depends on the jumper on your IDE device, so please refer to your hard disk and CDROM manual accordingly.

Tip:

1. *For better signal quality, it is recommended to set the far end side device to master mode and follow the suggested sequence to install your new device. Please refer to above diagram*

2. *To achieve the best performance of Ultra DMA 66/100 hard disks, a special* **80-wires IDE cable** *for Ultra DMA 66/100 is required.*

Warning: *The specification of the IDE cable is a maximum of 46cm (18 inches); make sure your cable does not exceed this length.*

Serial ATA Supported NEW!

The traditional parallel ATA specification has defined the standard storage interface for PCs with its original speed of just 3 Mbytes/second since the protocol was introduced in the 1980s. And the latest generation of the interface, Ultra ATA-133, has been developed further with a burst data transfer rate of 133 Mbytes/second. However, while ATA has enjoyed an illustrious track record, the specification is now showing its age and imposes some serious design issues on today's developers, including a 5-volt signaling requirement, high pin count, and serious cabling headaches.

The Serial ATA specification is designed to overcome these design limitations while enabling the storage interface to scale with the growing media rate demands of PC platforms. Serial ATA is to replace parallel ATA with the compatibility with existing operating systems and drivers, adding performance headroom for years to come. It reduces voltage and pins count requirements and can be implemented with thin and easy to route cables.
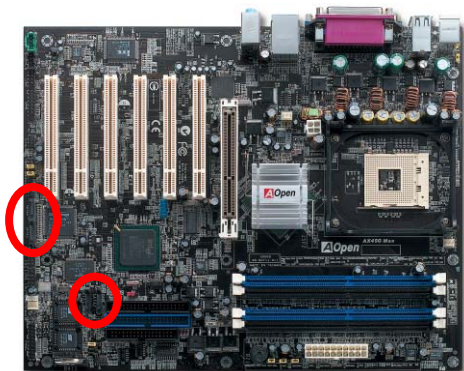
SATA port 1 (ICH5R)
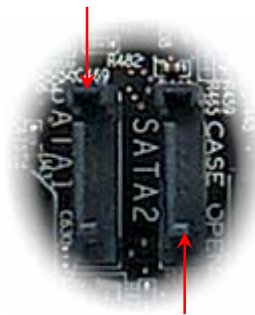
SATA port 4 (Sil 3112)

Serial ATA Ports

SATA port 3 (Sil 3112)

SATA port 2 (ICH5R)

Connecting Serial ATA Disk

To connect a Serial ATA disk, you have to have a 7-pin serial ATA cable. Connect two ends of the serial ATA cable to the serial ATA header on the motherboard and the disk. Like every other traditional disk, you also have to connect a power cable. Please be noted that it is a jumper free implement; you don't need to set jumpers to define a master or slave disk. When serial ATA hard disks are installed on serial ATA ports, the one connected on Port 0(SATA 1) will be set as the first boot device automatically. Please be noted that it doesn't support Hot-Plug in function.

Item	Parallel ATA	Serial ATA
Bandwidth	100/133 MB/Sec	150/300/600 MB/Sec
Volts	5V	250mV
Pins	40	7
Length Limitation	18 inch (45.72cm)	1 meter (100cm)
Cable	Wide	Thin
Ventilation	Bad	Good
Peer-to-Peer	No	Yes

Comparison between Parallel ATA and Serial ATA

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Adjusting Your Hard Disk

Except its original 2 sets of parallel IDE, this motherboard does come with the support for the latest Serial ATA hard disk. If you are unable to find your newly installed Serial ATA hard disks on your operating system after you have had installed them on, the problem mainly lies in the BIOS setting. You may simply adjust BIOS settings to have them work properly.

After having properly installed your hard disks, you may directly get into the BIOS setting screen for adjustment. You may simply press "Integrated Peripherals → On-Chip IDE Device → On-Chip Serial ATA" to choose your preferable mode. If you have no intention of changing its setting, the default would be Auto.
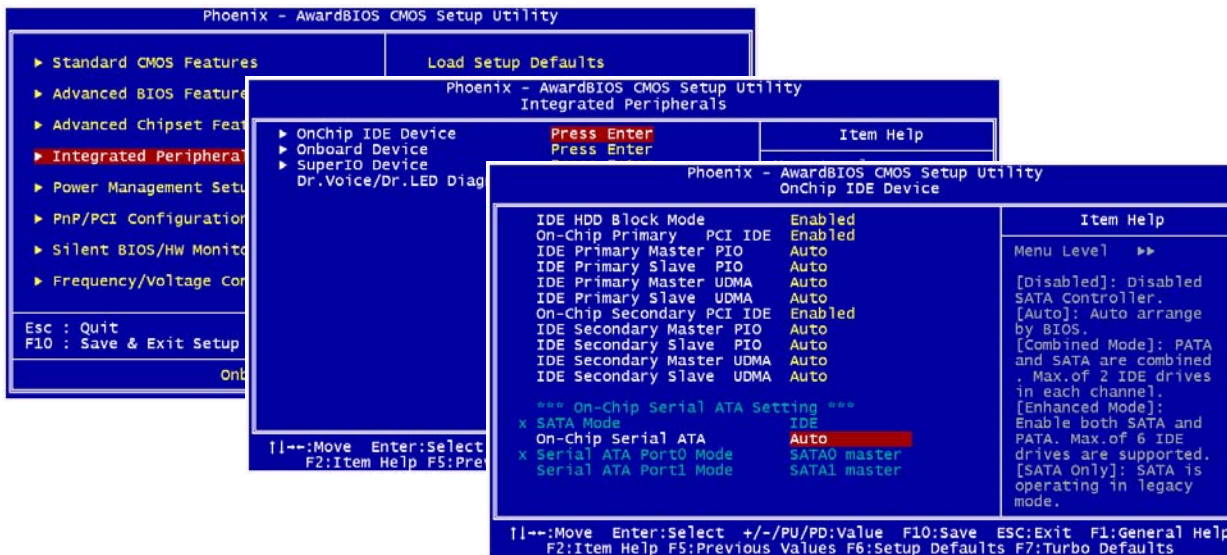
If you intend to change the default setting, simply press **Enter** for a list of selection:

```
On-Chip Serial ATA

Disabled      ..... [ ]
Auto          ..... [■]
Combined Mode ..... [ ]
Enhanced Mode ..... [ ]
SATA Only     ..... [ ]



  ↑↓:Move ENTER:Accept ESC:Abort
```
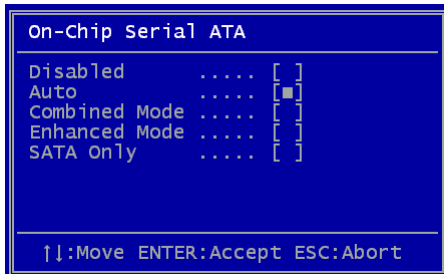
1. **Disabled**: You may choose this item if you're sure that only traditional IDE hard disks had been installed on your system. Disabling this item may also cancel the detection to Serial ATA hard disk during POST, which theoretically, could speed up your boot-up timing for a little bit; however, please remember to re-adjust the settings here if you intend to use Serial ATA hard disk later.
2. **Auto**: This is the default setting upon receipt of the motherboard. Basically, if your system functions properly, it's not necessary to change it. The system will automatically recognize the first hard disk on IDE1 as the first boot device.

Note: Please be informed that when you are using Windows98/ME with six hard disks fully installed, Auto mode is not able to function properly, it's just because Windows98/Me is not able to energize Enhanced Mode to detect all hard disks.

3. **Combined Mode:** If you have had installed traditional IDE hard disks and Serial ATA hard disks at the same time, then you may choose this Combined Mode. Under this mode, you may randomly choose either IDE hard disks or Serial ATA had disk as your first boot device. But please be aware that Serial ATA will exist with IDE in a mapping way, which also means it will occupy one of the IDE Channel and left you with one IDE Channel only.
4. **Enhanced Mode:** If you are using the latest operating system (say, Windows XP, Windows.NET Server), it is highly recommended to select Enhanced Mode. The system would be able to detect all six devices (traditional IDE x4, Serial ATA x 2) completely and functions perfectly under this mode. But please be noted that it is defaulted with using traditional IDE as the first boot device.
    Note: From our practical lab tests, we found no obvious problem or mistakes happened under Windows2000 operating system, but, however, it is not within the regulation recommended by Intel.
5. **SATA Only:** You may select this SATA Only mode if you have had installed Serial ATA hard disks only. It also allows you to select booting sequence from Port0 (SerialATA1) or Port1 (SerialATA2).

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Support RAID 0 and RAID 1 NEW!

With Intel ICH5R chipset and Silicon Image Sil3112A onboard, this motherboard provides a cost-effective, high performance stripping (RAID 0) and mirroring (RAID 1) solution. With stripping, identical drives can read and write data in parallel to increase performance. Mirroring increase read performance through load balancing and elevator seeking while creating a complete backup of your files. When supporting RAID 0 or RAID 1, you should connect SATA hard driver disks to SATA Header 1and 2. You can set in BIOS which mode you want to support.

Front Panel Connector

Attach the power LED, Keylock, speaker, power and reset switch connectors to the corresponding pins. If you enable "Suspend Mode" item in BIOS Setup, the ACPI & Power LED will keep flashing while the system is in suspend mode.

Locate the power switch cable from your ATX housing. It is 2-pin female connector from the housing front panel. Plug this connector to the soft-power switch connector marked **SPWR**.
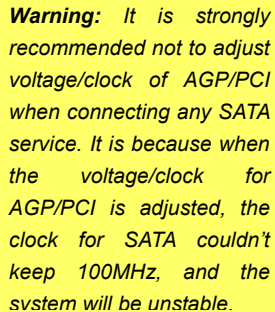
Suspend Type	ACPI LED
Power on Suspend (S1) or Suspend to RAM (S3)	Flashing for every second
Suspend to Disk (S4)	The LED will be turned off

Pin1

SPWR

IDE LED

ACPI & PWR LED

ACPI LED (BLUE)

Speaker

Reset

	1		
NC			5VSB
NC			SPWR
+5V			ACPI LED-
IDE LED			GND
IDE LED			ACPILED
+5V			NC
+5V			ACPI_B
GND			GND
NC			RESET
SPEAKER			GND
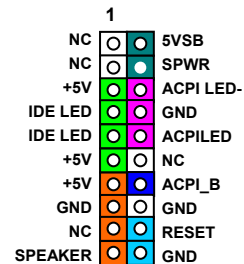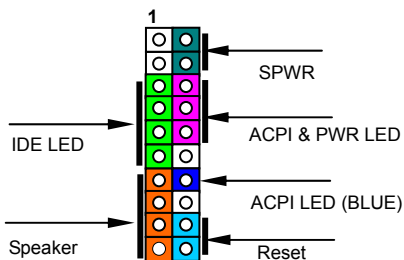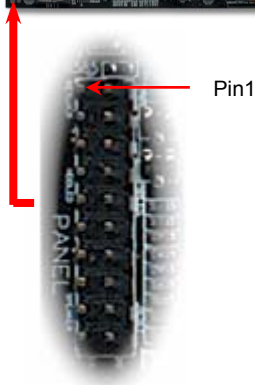
AGP (Accelerated Graphic Port) 8X Expansion Slot

AX4SG Max provides an AGP 8x slot. The AGP 8X is a bus interface targeted for high-performance 3D graphic. AGP uses both rising and falling edge of the 66MHz clock, for 4X AGP, the data transfer rate is 66MHz x 4bytes x 4 = 1056MB/s. AGP is now moving to AGP 8x mode, which is 66MHz x 4bytes x 8 =2.1GB/s. This AGP slot could automatically become an AGP slot or a Multiplexed Intel DVO Output depending on what kind of cards inserted, like AGP, or ADD (AGP Digital Display) cards. With ADD card cabled to this slot, Multiplexed Intel DVO output could provide high-speed digital connection for digital displays or TV-OUT functionality. You can also adjust AGP voltage in BIOS within a rage from 1.5V to 1.7V.

Warning: *It is strongly recommended not to adjust voltage/clock of AGP/PCI when connecting any SATA service. It is because when the voltage/clock for AGP/PCI is adjusted, the clock for SATA couldn't keep 100MHz, and the system will be unstable.*
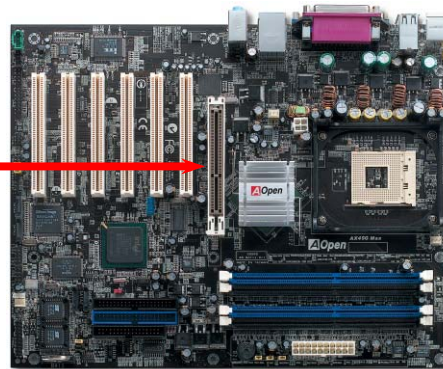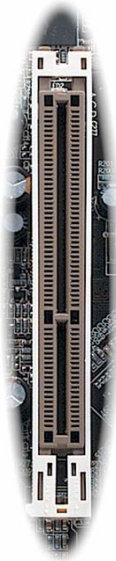
AGP Protection Technology and AGP LED

With the outstanding R&D ability of AOpen and its specially developed circuit, this motherboard implements a blend new technology to protect your motherboard from being damaged by over-voltaging of AGP card. When AGP Protection Technology is implemented, this motherboard will automatically detect the voltage of AGP card and prevent your chipsets from being burnt out. Please note that if you install a AGP card with 3.3V, which is not supported by Intel 865 chipset, the AGP LED on the motherboard will light up to warn you the possible damage of the exceeding voltage. You may contact your AGP card vendor for further support.
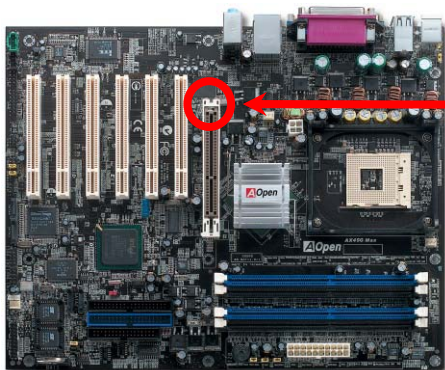
AGP LED

> **Warning:** It is strongly recommended not to install a 3.3V AGP card, which is not supported by Intel 865 chipset. When you do so, the AGP LED on the motherboard will light up to warn you the possible damage.

WOL (Wake on LAN)

To use Wake on LAN function, you must have a network card with chipset that supports this feature, and connect a cable from LAN card to motherboard WOL connector. The system identification information (probably IP address) is stored on network card and because there is a lot of traffic on the Ethernet, you need to install network management software, such as ADM, for the checking of how to wake up the system. Note that, at least 600mA ATX standby current is required to support the LAN card for this function.

+5VSB

GND

LID
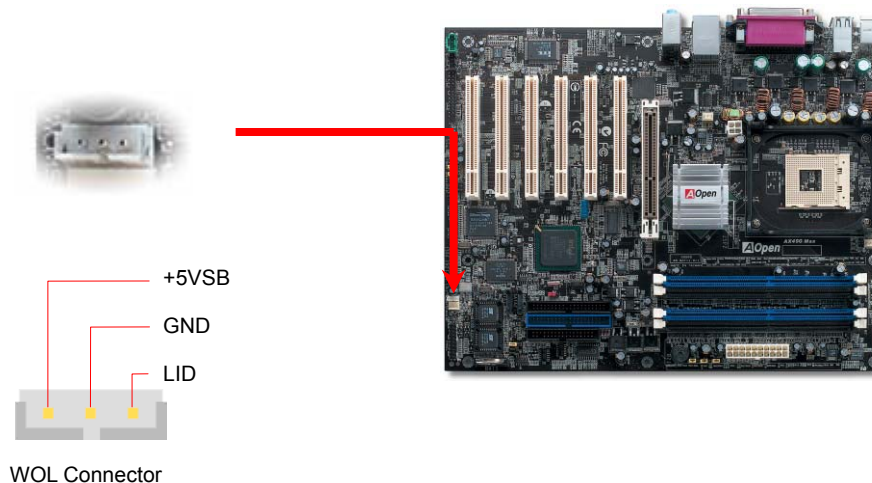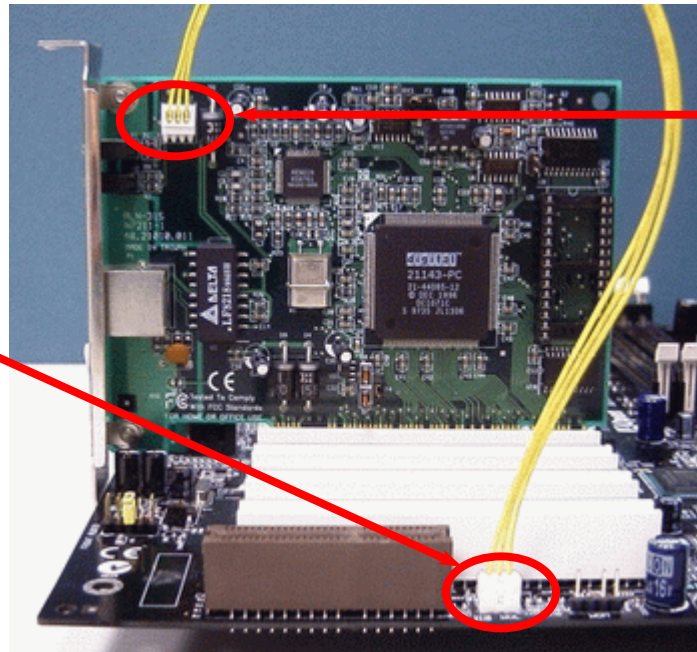
WOL Connector

WOL Connector
(Ethernet Card Side)

WOL Connector
(Motherboard Side)

Note: This picture is for example only, it may not exactly be the same motherboard.

IrDA Connector

The IrDA connector can be configured to support wireless infrared module, with this module and application software such as Laplink or Windows 98 Direct Cable Connection, the user can transfer files to or from laptops, notebooks, PDA devices and printers. This connector supports HPSIR (115.2Kbps, 2 meters) and ASK-IR (56Kbps).

Install the infrared module onto the **IrDA** connector and enable the infrared function from BIOS Setup, UART Mode, make sure to have the correct orientation when you plug in the IrDA connector.
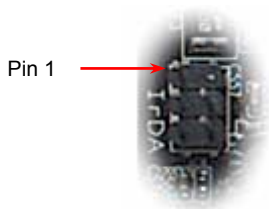
Pin 1

IrDA Connector

```
        1
NC    ⊙ ☐   KEY
+5V   ⊙ ⊙   GND
IR_TX ⊙ ⊙   IR_RX
```
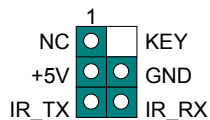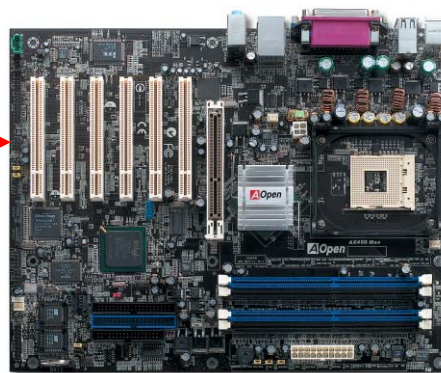
Support 10/100/1000 Mbps LAN onboard

On the strength of BCM5705, a fourth-generation triple-speed 10/100/100 base-T Ethernet LAN Controller solution for high-performance network applications, this motherboard provides 10/100/1000M bps Ethernet for office and home use. The Ethernet RJ45 connector is located on top of USB connectors. The right hand side LED indicates link mode, it lights in orange whenever linking to network. The left hand side LED indicates the transfer mode and it lights in green when data is transferring in 100Mbps (never lights while in 10Mbps), but lights in orange when transferring in Gigabit's mode. To enable or disable this function, you may simply adjust it through BIOS.
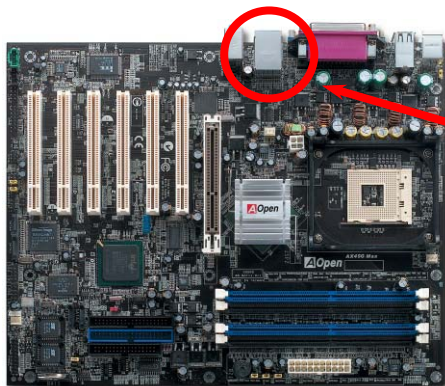
Linking (Right)
Orange

Transferring (Left)
Green 100Mbps
Orange Gigabit

Support USB 2.0 Ports

This motherboard provides eight USB 2.0 ports to connect USB devices such as mouse, keyboard, modem, printer, etc. There is one USB connector on the board for you to connect two USB devices and six other ports on the back panel. You can use proper cables to connect USB devices from back panel or connect the front USB connector to the front panel of chassis.

Compared to traditional USB 1.0/1.1 with the speed of 12Mbps, USB 2.0 has a fancy speed up to 480Mbps which is 40 times faster than the traditional one. Except for the speed increase, USB 2.0 supports old USB 1.0/1.1 software and peripherals, offering impressive and even better compatibility to customers. On this motherboard, all eight ports support USB 2.0 function.

```
               1
       +5V   [O O]   +5V
     SBD6-   [O O]   SBD7-
     SBD6+   [O O]   SBD7+
       GND   [O O]   GND
       KEY   [  O]   NC
```

USB 2.0 Connector

Pin 1 ——→
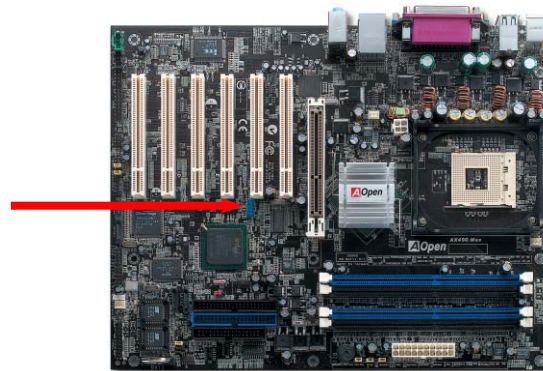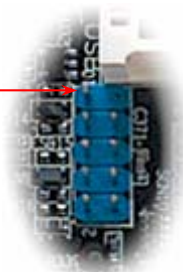
Note: Please note that if you would like to use USB devices (Example: keyboard, mouse etc.) under DOS environment, you must install driver that comes with the devices to make it work.

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IEEE 1394 Connectors NEW!

With IEEE1394 MAC Embedded in Intel ICH5R (with AGERE FW323), the IEEE 1394 provides data transfer rate up to 400Mb/s, and USB 1.0/1.1 just has 12Mbps. Hence, the IEEE 1394 interface can connect with the devices that need high data transferring performance, such as digital camera, scanner or others IEEE 1394 devices. Please use the proper cable to connect with devices.


```
              10   9
SHIED GND   [ o    ]
+12V (Fused) [ o  o ] +12V (Fused)
       TPB- [ o  o ] TPB+
        GND [ o  o ] GND
       TPA- [ o  o ] TPA+
               2    1
```
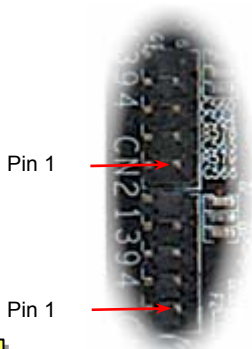
Pin 1 →

Pin 1 →

IEEE 1394
Port 1 & 2
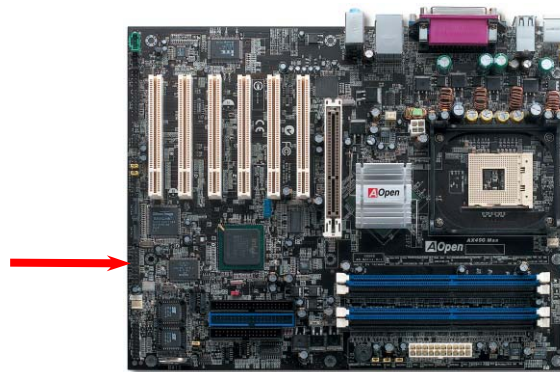
> *Warning: Please be noted that Hot-Plug in is not allowed on IEEE 1394 header, because it will burn the IC of the controller and damage the motherboard.*

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COM2 Connector

This motherboard provides two serial ports. One of them is on back panel connector, and the other is on the upper left of board. With proper cable, you can connect it to the back panel of chassis.

Pin 1 ——►
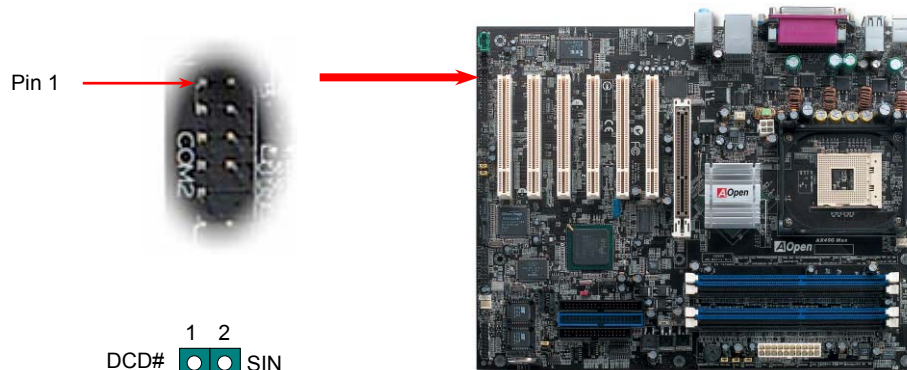
	1	2	
DCD#	○	○	SIN
SOUT	○	○	DTR#
GND	○	○	DSR#
RI#	○	○	CTS#
RTS#	○		

COM2 Connector

AOpen

Game Port Bracket Supported

This motherboard comes with a game port (Joystick-Midi) for you to connect any midi devices or joysticks. To use this function you have to have a joystick module and connect it with a game port cable to this port on the motherboard.

Joystick Module
(User Upgrade Optional)

Pin1 ——→

Game Port Connector

1

+5V		+5V
JAB1		JBB1
JACX		JBCX
GND		MIDI_TXD
GND		JBCY
JACY		JBB2
JAB2		MIDI_RXD
+5V		KEY
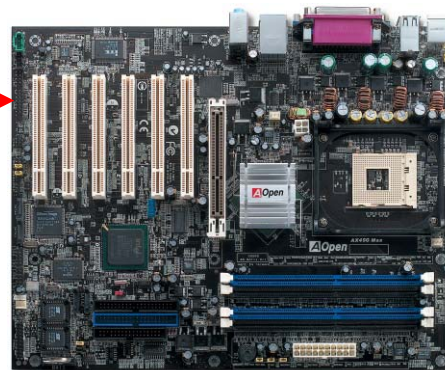
Note: This picture is for example only; it may not exactly look the same with the motherboard you purchased.

Color Coded Back Panel

The onboard I/O devices are PS/2 Keyboard, PS/2 Mouse, RJ-45 LAN Connector, COM1, VGA port, Printer, USB, AC97 sound and game ports. The view angle of drawing shown here is from the back panel of the housing.
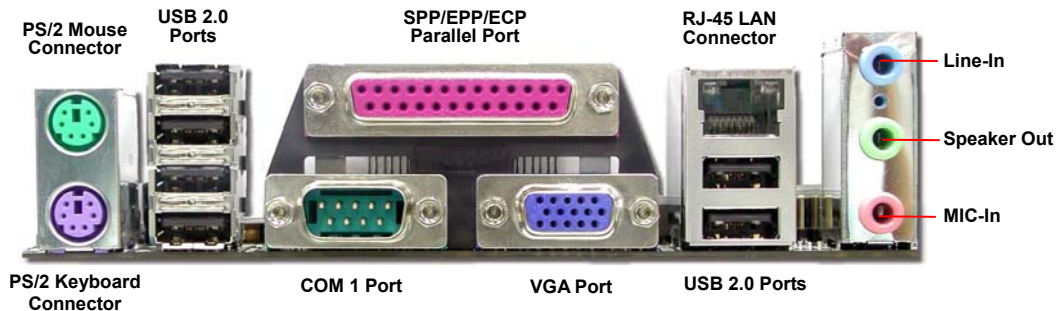
PS/2 Keyboard:	For standard keyboard, which use a PS/2 plug.	
PS/2 Mouse:	For PC-Mouse, which use a PS/2 plug.	
USB Port:	Available for connecting USB devices.	
Parallel Port:	To connect with SPP/ECP/EPP printer.	
COM1 Port:	To connect with pointing devices, modem or others serial devices.	
RJ-45 LAN connector	To connect Ethernet for home or office use.	
VGA Connector:	To connect with PC monitor.	
Speaker Out:	To External Speaker, Earphone or Amplifier.	
Line-In:	Comes from the signal sources, such as CD/Tape player.	
MIC-In:	From Microphone.	

S/PDIF (Sony/Philips Digital Interface) Connector

S/PDIF (Sony/Philips Digital Interface) is a latest audio transfer file format that provides impressive quality through optical fiber and allows you to enjoy digital audio instead of analog. Normally there are two S/PDIF outputs as shown, one for RCA connector, the most common one used for consumer audio products, and the other for optical connector with a even better audio quality. Through a specific audio cable, you can connect the S/PDIF connector to a S/PDIF audio module bearing S/PDIF digital output. However, you must have a S/PDIF supported speaker with S/PDIF digital input to make the most of this function.

S/PDIF OUT
S/PDIF IN ——   S/PDIF Cable

S/PDIF OUT
S/PDIF IN ——
(Optical)
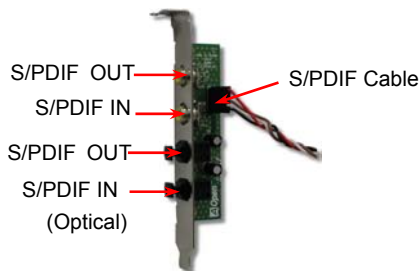
S/PDIF Module
(User Upgrade Optional)

Pin 1
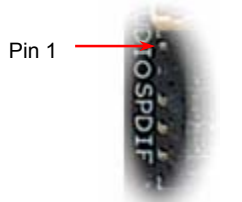
S/PDIF Connector

1   +5V
    NC
    SPDIFOUT
    GND
5   SPDIFIN
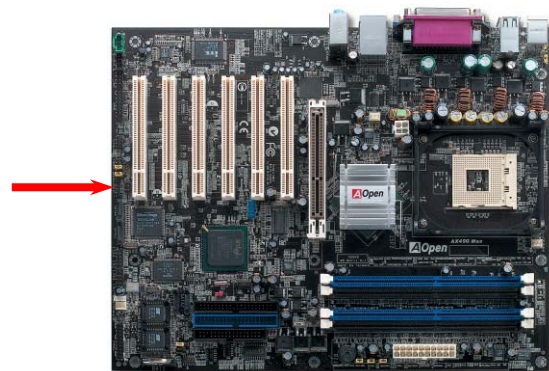
Super 5.1 Channel Audio Effect NEW!

This motherboard comes with an ALC650E CODEC, which supports high quality of 5.1 Channel audio effects, bringing you a brand new audio experience. On the strength of the innovative design of ALC650, you're able to use standard line-jacks for surround audio output without connecting any external module. To apply this function, you have to install the audio driver in the Bonus Pack CD as well as an audio application supporting 5.1 Channel. Picture bellow represents the standard location of all speakers in 5.1 Channel sound tracks. Please connect the plug of your front speakers to the green "Speaker out" port, rear speakers' plug to the blue "Line in" port and both of the center and subwoofer speakers to the red "MIC in" port.
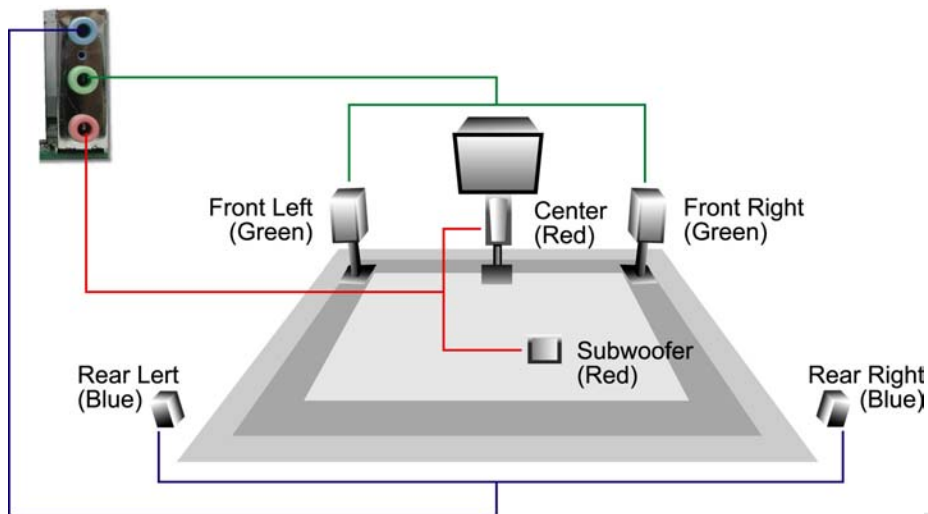
Front Audio Connector

If the housing has been designed with an audio port on the front panel, you'll be able to connect onboard audio to front panel through this connector. By the way, please remove the jumper cap from the Front Audio Connector before you connect the cable. Do not remove this yellow jumper cap if your housing doesn't have an audio port on the front panel.

Pin 1 ──────→
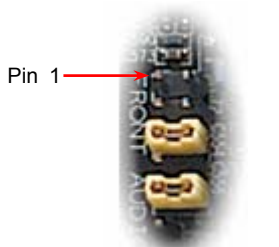
Front Audio Connector

1
AUD_MIC   AUD_GND
AUD_MIC_BIAS   AUD_VCC
AUD_FPOUT_R   AUD_RET_R
NC   KEY
AUD_FPOUT_L   AUD_RET_L
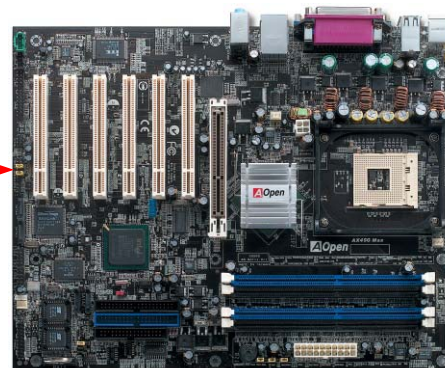
Note: Please remove the jumper cap from the front audio connector before you connect the cable. Do not remove this yellow jumper cap if your housing doesn't have an audio port on the front panel.

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Die-Hard BIOS II

Inherited DieHard BIOS, the steps of rescuing your crashed BIOS 1 back to life is the same. First step is to set JP24 to Pin2-3 to boot up the system with BIOS 2. After that, please set the JP24 back to Pin1-2, go to AOpen website to get your BIOS version suited for your motherboard, and have it downloaded. There are two kinds of ways to flash the BIOS 1; you may flash it under Window environment with EZWinflash or under DOS system. To flash under Window environment is easy; you may just download the BIOS version and implement it with EZWinflash. For Flashing BIOS under DOS system, please unzip the BIOS version after downloading from website, and execute it under DOS. These two versions of BIOS have been provided on our website for your downloading. DieHard BIOS II is further enhanced with data saving function. In addition to read-only ROM, DieHard BIOS II allows you to turn your second ROM into a Read-and-write ROM with larger space provided. You may download fancy skins from our website (http://download.aopen.com.tw/downloads) to apply them on JukeBox, JukeBox FM or VividBIOS by adjusting JP25 to Pin2-3 (No Protection).
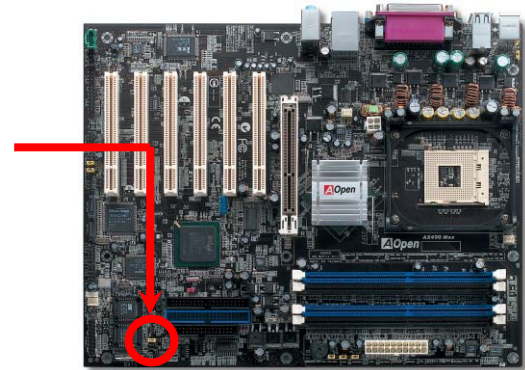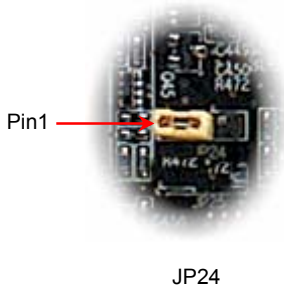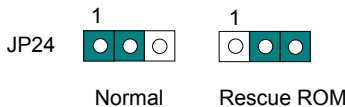
> **Note:** Please be noted that you will not be able to use the second BIOS ROM for boot-up after setting JP25 to Pin 2-3 for the purpose of saving skins of JukeBox, JukeBox FM or VividBIOS.

JP15/JP16 Dr. Voice Language Select Jumpers

Dr. Voice is a great feature of AX4SGMax, which can identify the problems you may encounter in the operating system. It can clearly "**tell you**" whether the problem is caused from components or improper installation such as CPU, memory module, VGA, PCI add-on card, FDD, HDD or keyboard. Dr. Voice provides four language versions: **English**, **German**, **Japanese** and **Chinese**. You can select your preferred language by **JP15** & **JP16** jumpers. However, you may also set JP2 to choose making out voices from buzzer or speaker.

JP15 →   ← JP16

Pin1   Pin1
Dr. Voice Language   JP15   JP16
Select Jumper

English
(Default)

Japanese

Chinese

German

Pin1   Pin1
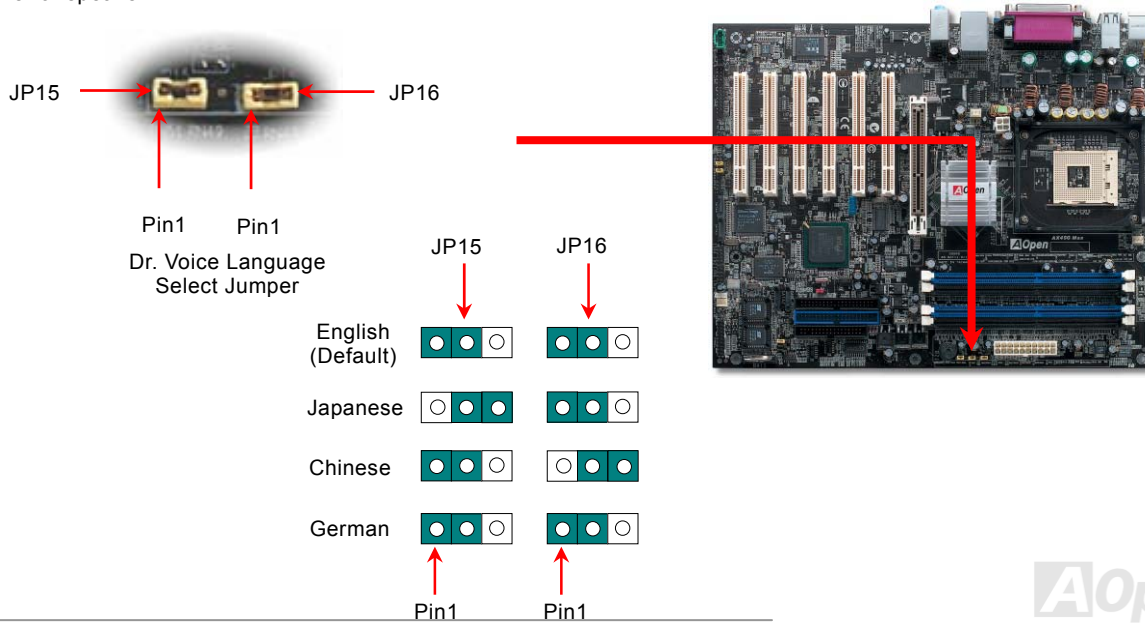
JP2 Speaker Output Jumper

This motherboard comes with another considerate option that allows you to turn off the voice from buzzer and speaker. You can choose not to be bothered by the warning made from Dr. Voice when it detects any error in operating system. You may also set JP2 to choose sending out voices from buzzer or speaker.

Pin 1 →

JP2 Speaker Output Jumper

1		
○	○	○

Buzzer
(default)

1		
○	○	○
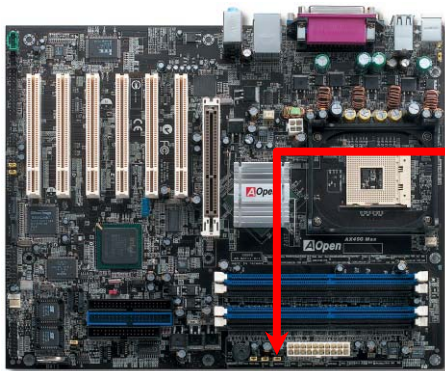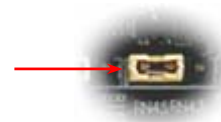
Speaker

CD Audio Connector

This connector is used to connect CD Audio cable from CDROM or DVD drive to onboard sound.

L

GND

GND

R
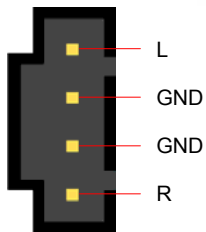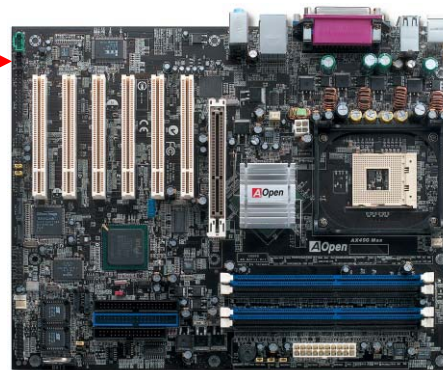
CD-IN Connector

Note: *Though some of the latest versions of Windows support "Digital Audio" through IDE bus. However, in order to use Open Jukebox player, which is driven under BIOS, it is a* **MUST** *to connect audio cable to CD-IN connector on the motherboard.*

AUX-IN Connector

This connector is used to connect MPEG Audio cable from MPEG card to onboard sound.

L

GND

GND

R
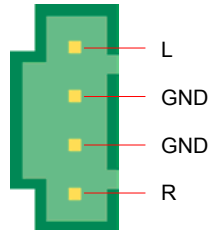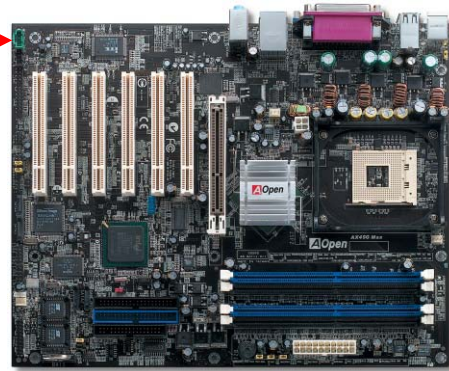
AUX-IN Connector

Case Open Connector

The "CASE OPEN" header provides chassis intrusion-monitoring function. To make this function works, you have to enable it in the system BIOS, connect this header to a sensor somewhere on the chassis. So, whenever the sensor is triggered by lights or by the opening of the chassis, the system will beep to inform you. Please be informed that this useful function only applies to advanced chassis, you may purchase an extra sensor, attach it on your chassis, and make a good use of this function.

Pin 1

1
GND
Sensor

Case Open Connector
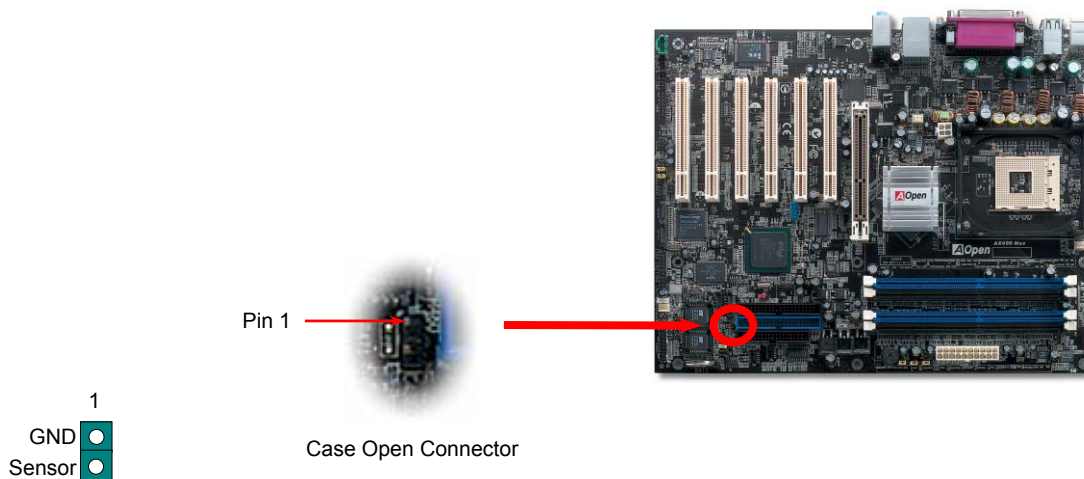
STBY LED (Standby LED)

STBY LED is AOpen's considerate design that we aim at providing you friendly system information. The STBY LED will light up when power is provided to the motherboard. This is a convenient indication for you to check the system power status in many circumstances such as power on/off, stand-by mode and RAM power status during Suspend to RAM mode.
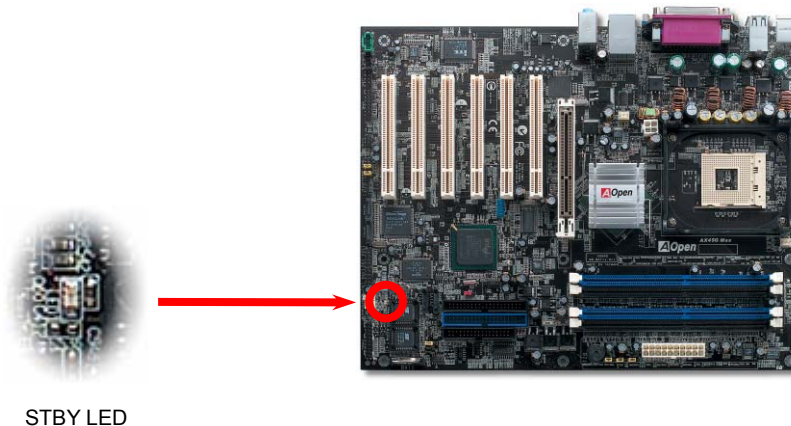
STBY LED

> *Warning:* Do not install or remove the DIMM module or others devices when the STBY LED lights on.

Resetable Fuse

Traditional motherboard uses fuses to prevent Keyboard and USB port from over-current or shortage. These fuses are soldered onboard that when it is broken (function to protect motherboard), user cannot replace them and result in malfunction of motherboard.

With expensive Resetable Fuse, the motherboard can be resumed back to normal function even after the fuse had done its protection job.
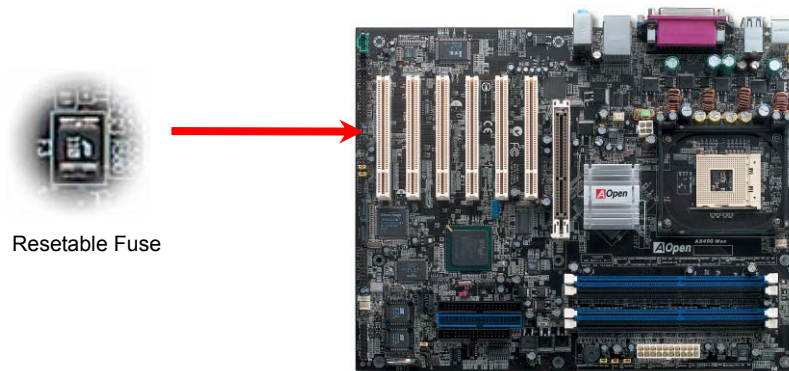
Resetable Fuse

Enlarged Aluminum Heatsink

Cool down CPU and Chipset are important for system reliability. Enlarged aluminum heat sink provides better heat consumption especially when you are trying to over-clock the CPU.
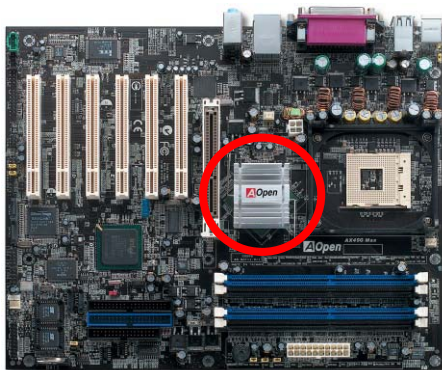
Low ESR Capacitor

The quality of low ESR capacitor (Low Equivalent Series Resistance) during high frequency operation is very important for the stability of CPU power. The idea of where to put these capacitors is another know-how that requires experience and detail calculation.

Not only that, AX4SG Max implements 3300 μ F capacitors, which is much larger than normal capacitor (1000 & 1500 μ F) and it provides better stability for CPU power.
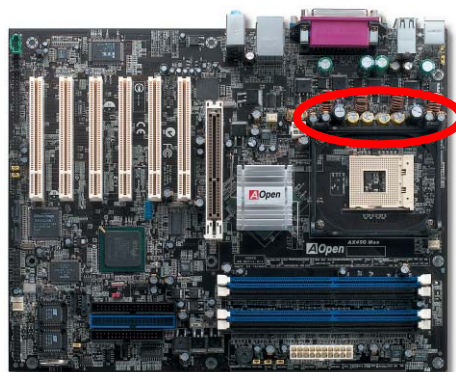
V4 Power Engine NEW!

While the market are flooded with low quality, cost-down power materials on motherboard by treacherous manufacturers that subsequently cause the stability of your system, unknown system crashing, overheating of your motherboard, we, AOpen have decided to maintain our long-lasting reputation of refined manufacturer by keep providing solid materials on our products.

As if V6 engine gives more horsepower to your car driving on the road, so as motherboard needed to have stronger and more robust power to protect your system. Adopted 4 parelelled PWM (Pulse Width Modulation) controller channels in 4-phase form, this motherboard provide optimized power density, transient response and thermal performance for satisfying the increasing high CPU temperature. And one thing for sure, 4-phase PWM controller would definitely be better for 3-phase PWM controller as the same theory of 3000c.c car would certainly be better than 2000c.c car. Therefore, It is a must for motherboard these days to get prepared with stronger, more stable power.

If we take 60W power consumption shared by 3-phase PWM controller for example, testings shows that it transmits higher temperature to its surrounding components and thus increasing the temperature of motherbaord, which is very frustrating for CPU overclocking or for system stability concern at high loading. However, with 4-phase PWM controller implemented, voltage are averagely shared in 4-phase PWM controller and transmit less temperature onto the board and thus cool down motherboard temperature, so as to protect your system.
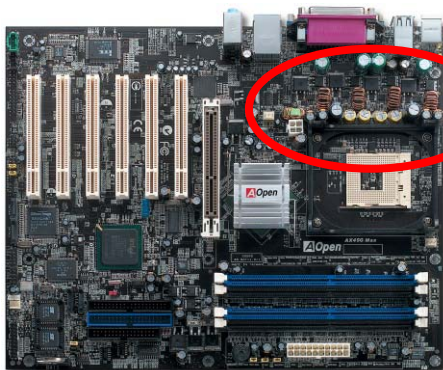
Comprison Transient of 3-phase and 4-phase PWM

As test report shows, while most of the motherboards on the market are powered by 3-phase PWM controller, this motherboard does comes with 4-phase PWM controller providing stronger power, and could lower down the temperature of motherboard from 15℃ to 30℃.

4-phase	Vcore tolerance of **- 116 mv**
3-phase	Vcore tolerance of **- 126 mv**
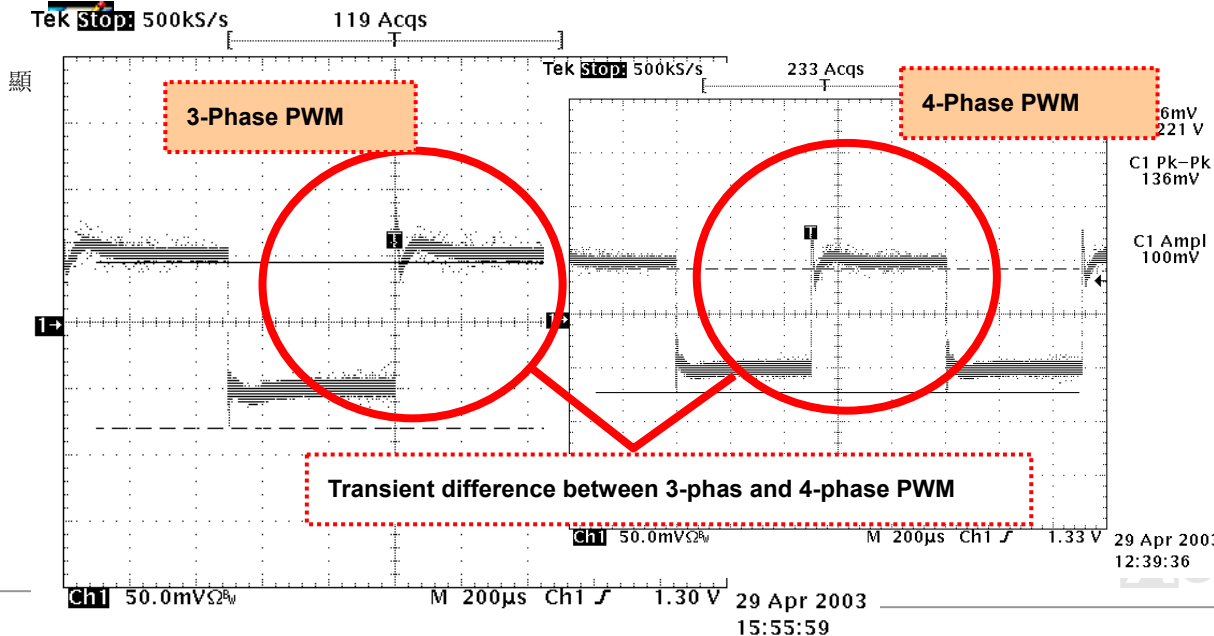
The noise is gone!! ---- SilentTek

As the clock of CPU keeps rocketing higher and higher, it inevitably brings higher heat and system temperature in a relative way. The way we deal with this heat problem, however, is to spare no effort to add one fan after another to protect our pampered system, expecting these fans could cool down our machine as much as they could.

But at the same time, we believe that same users are affected terribly by the irritating noises of these fans while working with their PC. As a matter of fact, we do not have to get our fans running at such a high speed in most cases; on the contrary, we

```
          Phoenix - AwardBIOS CMOS Setup Utility
                 Silent PC/PC Health Status

   CPU Warning Temp.        60° C/140° F     ▲      Item Help

   CPUFan1 Boot Speed        70% 3150 RPM        Menu Level    ►
   SYSFan2 Boot Speed        70% 3500 RPM
   CPUFan1 OS Speed         100% 4500 RPM        This is fan control
   SYSFan2 OS Speed         100% 5000 RPM        mode during POST and
   Fan Mode              Smart Control           Open Jukebox, after
 x CPUFan1 Fixed Speed     100% 4500 RPM         exitting the Jukebox,
 x SYSFan2 Fixed Speed     100% 5000 RPM         the fan will be set to
   CPU Set Temp.             40° C               Fan OS Speed.
   SYS Set Temp.             30° C
                                                 [Full Speed]
   CPU Kernel Temp.         69° C/156° F         Run in full speed.
   CPU Temp.                47° C/116° F         [Smart Control]
   SYS Temp.                31° C/107° F         According to the
   CPUFAN1 Speed            4500 RPM             safety temperature you
   SYSFAN2 Speed            5000 RPM             set below, fan speed
   SYSFAN3 Speed            5532 RPM             will be controlled as
   Vcore(V)                 1.48 V      ▼        slow as possible.

↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
     F2:Item Help F5:Previous Values F6:Setup Defaults F7:Turbo Defaults
```

discovered that having your fans running at appropriate time and speed not only reduces the noise, but also consumes the least power the system needs, so as to prevent over-wasting of energy resource.

Today, AOpen Motherboard is honored to bring you a new overall solution, SilentTek, to make your system quiet. To collocate with hardware circuit, BIOS and the utility under Windows, SilentTek combined "Hardware-Status Monitoring", "Overheat Warning" and "Fan Speed Control" with user-friendly interfaces to provide you a perfect balance among noises, system performance and stability.

The first image you have here is the Voltage Status page. You can find current status of all voltages and set your expected margins of warning level.

In "Temp/Fan/Case" page, you may get aware of the current temperature of CPU and the heat inside chassis. Also, you can check if fans are running properly.
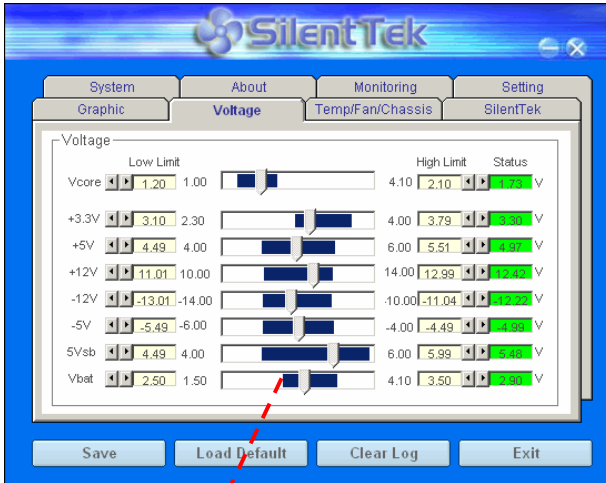
You may check your system voltage from the indicating bar here.
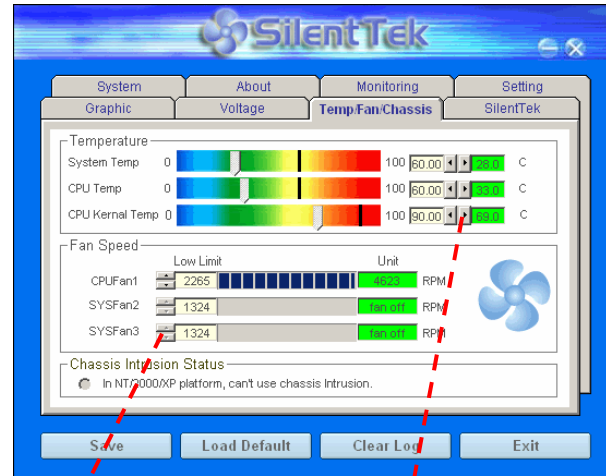
Of course, you may set your defaulted lowest margin for your fans and SilentTek would also pop up a message box to alarm you when the fan is rotating slower than this specified speed.

You may set the highest margin of your CPU and system temperature as default, and SilentTek would pop up a message box to alert you with alarm when the temperature goes beyond the specified margin.

The following page is surely the most important part of this utility. You may control the rotation speed of specific fans that you have got the options inside in this page.

1. **Smart FAN Control**: This is the default setting of SilentTek and can be used for any branded computer housing. With a special algorithm developed by AOpen, the fan speed is automatically adjusted by the factors of CPU and ambient temperature. Ease-of-use and trouble free at your service.

2. **Fixed FAN Control**: Under this setting, a desired fan speed is set fixed when operating.

3. **Multiple Level Control**: This is the most versatile setting that allows you to set fan speed in relation to temperature. You may find that this setting fits you best.

4. **AOpen Recommend Setting**: This setting is designed specifically for AOpen housing. A series of lab tests were conducted under the real world scenario to determine optimum fan speed to reduce noise level within CPU working condition and temperature. Most of the time, the fan would remain still when CPU is not fully utilized.

CD-ROM Rotation Speed Control: by enabling the CD-ROM Rotation Speed Control, you can adjust the rotation speed of your CD-ROM. When you set the speed to high level, the CD-ROM will work at its fastest speed and it will run at basic required speed while you set the value to low speed.

Note: Due to hundreds different brands of fan on the market, inaccuracy may happen in some cases when you had your rotation speed adjusted. It is still under the criterion and please rest assured that it won't cause any problem to your system.

EzClock *NEW!*

Have you ever thought how great it would be if you can adjust the frequency setting on your motherboard under Windows environment and be a real master of your system? Everybody knows that the ratio and frequency setting are key factors to influence the system performance, however, it's absolutely not an easy task for an amateur to adjust the setting value. On most traditional motherboards, you

have to get into BIOS screen for the frequency and reboot the system again and again. But from now on, you don't have to surfer the boring stuffs anymore.

With brand-new and user-friendly EzClock that AOpen specially designs for his users, you can adjust those important values as you please and think of suitable. This tailor-made EzClock allows you to set the voltage and frequency of CPU, VGA, PCI and memory under Windows environment as well as in BIOS setting page; even better, those settings will be displayed realtime. Having this handy EzClock, you can monitor the system when you're fine-tuning the performance of your system. It provides you detailed and necessary information. Now let's take a look how it works on utility, BIOS and POST.

How You Adjust the Settings in EzClock Utility

In EzClock utility, you can adjust CPU Front Side Bus (FSB), the voltage and frequency of VGA, AGP, PCI and DRAM. Besides, the CPU related information such as CPU voltage, temperature and CPUFAN rotation speed will also be displayed on this utility.

CPU Color Bars:
The color bar will light on and show different colors as values change. On default values, it will show green.

On the left circle area shows Ratio, FSB and frequency information about CPU. When the values are set to factory default, the light on the top and bottom of the circle will show green and it will vary as you change these CPU settings.

CPU Ratio, FSB and frequency displaying area:
You can adjust CPU FSB here by entering preferred value.

On the right part of the panel is the section that you adjust the settings of VGA, AGP, PCI and memory. To adjust the voltage and clock frequency of those installments, you can press "-" or "+" on corresponding items. The color parts represent the situation of values. The higher value you set, the light on the color bar goes to right and turns red. After finishing those value settings, you can press "S" button on the upper right hand corner to save changes to CMOS.

Control buttons:
"_" button allows you to minimize the utility and "X" button to close the utility. Pressing "Apply" button you can save the changes to CMOS.

VGA, AGP, PCI and DRAM Voltage / Clock Area:
Pressing "_" and "+" buttons, you can adjust the voltage and clock frequency values of onboard VGA, AGP, PCI and DRAM.

75

On the bottom rectangular panel represents CPU fan speed, CPU voltage and CPU temperature. The three color bars on the right hand side will light on according to operation temperature. Please refer to the picture shown above.

CPU Color Bars:
The color bars will light on according to CPU operation temperature.

CPU Fan, Voltage and Temperature:
representing CPU fan speed, CPU voltage and CPU temperature in Celsius and Fahrenheit degrees.

How You Adjust the Settings in BIOS

Apart from EzClock utility, the voltage and frequency values of CPU, PCI and memory can also be adjusted on BIOS page. By pressing
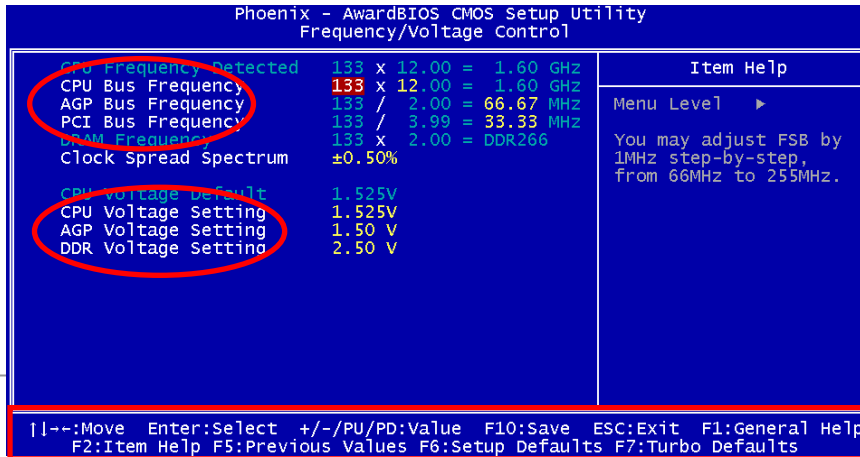
"+", "-", "PgUp" or "PgDn" keys, you can adjust the frequency values of CPU Bus, PCI Bus and DRAM.

Also, the same keys help you adjust the voltage of CPU and DDR settings. Some values may change while you adjust the settings. You can press "F10" to save the changes you've made.

Function Keys Description

How Your Boot Screen Looks Like

After you finish setting BIOS, these setting values will be displayed on the boot screen like the shown picture here.

Every time you boot your system, both default and current settings will pop up on the screen. Your personal settings that had been adjusted earlier will be highlighted; thus, you can have clear idea how your system functions and monitor your system more easily.

Current values of
your system
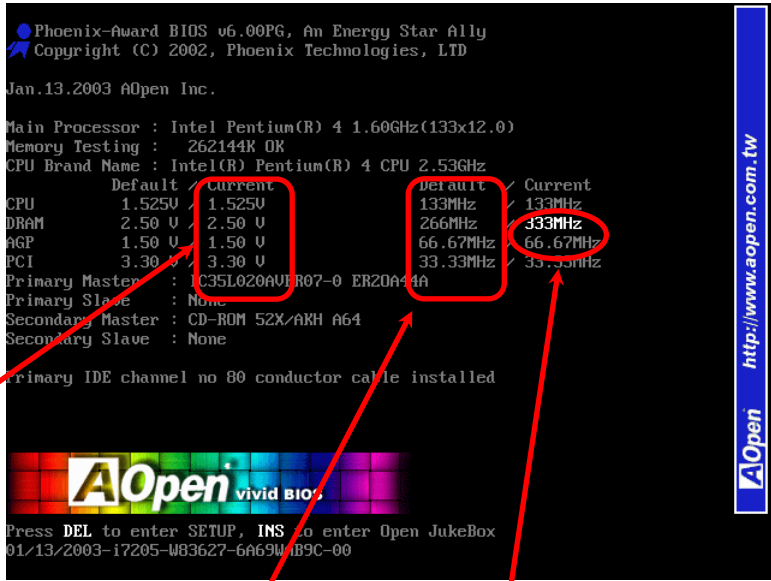
Default settings of this
motherboard

The highlighted setting
value you manually adjust

Hyper Threading Technology

What is Hyper-Threading?

Hyper-Threading technology is an innovative design from Intel that enables multi-threaded software applications to process threads in parallel within each processor resulting in increased utilization of processor execution resources. As a result, an average improvement of ~40% in CPU resource utilization yields higher processing throughput.

How Hyper-Threading Works

A form of simultaneous multi-threading technology (SMT), Hyper-Threading technology allows multiple threads of software applications to be run simultaneously on one processor by duplicating the architectural state on each processor while the same processor execution resources is shared. The figure below represents how a Hyper-Threading based processor differentiates a traditional multiprocessor. The left-hand configuration shows a traditional multiprocessor system with two physical processors. Each processor has its own independent execution resources and architectural state. The right-hand configuration represents an Intel Hyper-Threading technology based processor. You can see that the architectural state for each processor is duplicated, while the execution resources is shared.
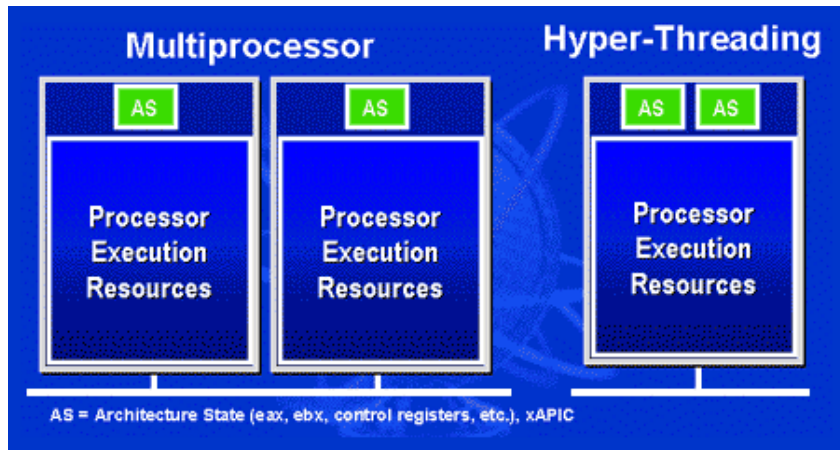
For multiprocessor-capable software applications, the Hyper-Threading based processor is considered two separate logical processors on which the software applications can run without modification. Also, each logical processor responds to interrupts independently. The first logical processor can track one software thread, while the second logical processor tracks another software thread simultaneously. Because the two threads share the same execution resources, the second thread can use resources that would be otherwise idle if only one thread was executing. This results in an increased utilization of the execution resources within each physical processor.
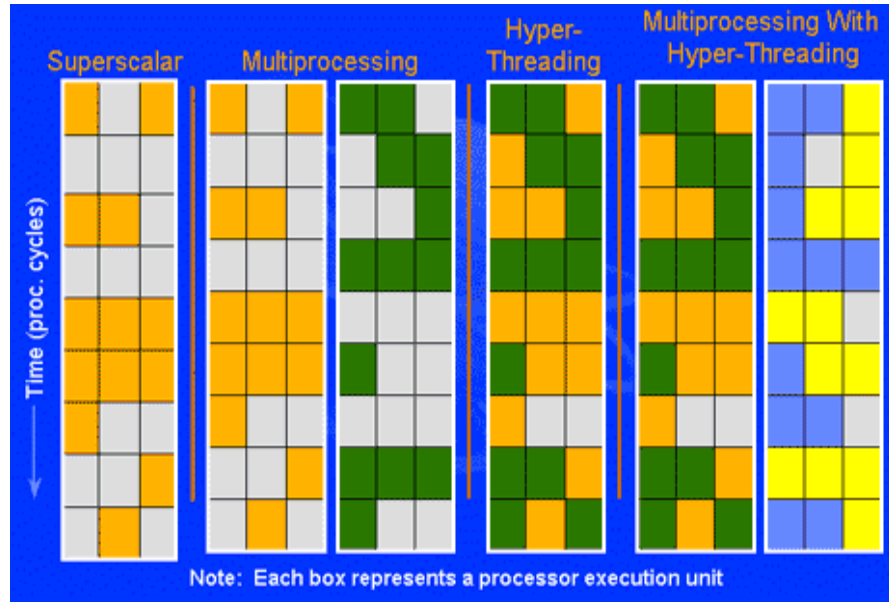
The figure below represents how Hyper-Threading saves time when it works. With two logical processors available on every single physical processor, multi-threaded applications can now take advantage of thread-level parallelism on each physical processor for additional performance. As software applications continue to be optimized to take greater advantage of processor parallelism, Hyper-Threading technology provides an additional boost for newer capabilities and the growing needs of today's users.

AOConfig Utility NEW!

AOpen always dedicated to provide users a much friendly computer environment. We now bring you a comprehensive system detection utility. AOConfig is a Windows based utility with user-friendly interface that allows users to obtain information of the operation system and hardware such as motherboard, CPU, memory, PCI devices and IDE devices. The powerful utility also displays the version of BIOS and firmware for your convenience of maintenance.

Moreover, AOConfig allows users to save information in *.BMP or *.TXT format which users may collect the system information in detail and send them to AOpen directly for technical support or for further diagnose of system problems.

1. The system page shows the detailed information of the motherboard, operating system, processor, and BIOS version.

2. The PCI device page shows the configurations of all PCI devices installed in your motherboard.

3. This page presents the IDE device information, such as serial number, manufacturer, firmware version, and capacity.

4. From this page, users can obtain the technical support information of AOpen. Moreover, detailed information could be saved in .bmp or .txt format.
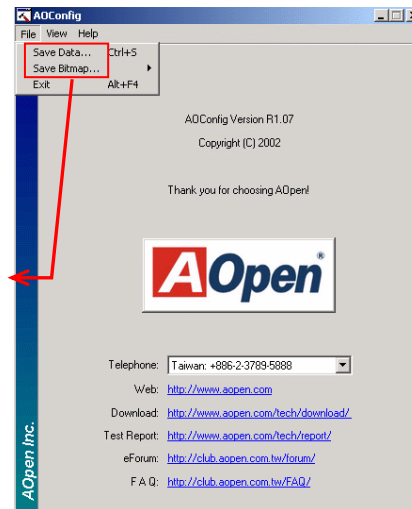
NOTE:

AOConfig can be used under Windows 98SE/ME, NT4.0/2000, or Windows XP. Please also note that AOConfig can only be operated in a system equipped with an AOpen motherboard. Before running AOConfig, all applications must be closed.

RAID Introduction

What's RAID?

Two major challenges facing the storage industry today are keeping pace with the increasing performance demands of computer systems by improving disk I/O throughput and providing data accessibility in the face of hard disk failures.

The idea of RAID (Redundant Array of Independent Disks) was first introduced by David A. Patterson, Garth Gibson and Randy H. Katz at the University California at Berkeley in 1988. RAID is a purpose of storing the same data in different places on multiple hard disks and improves storage subsystem performance. The advantage of RAID is to provide better throughput performance and/or data fault tolerance. Better performance is accomplished by sharing the workload in parallel among multiple physical hard drives. Fault-tolerance is achieved through data redundant operation where if one (or more) drive fails or has a sector failure, a mirrored copy of the data can be found on another drive(s).

A RAID appears to the operating system to be a single logical hard disk. The RAID controller manages how the data is stored and accessed across the physical and logical arrays. The RAID controller help users to ensure that the operating system only sees the logical drives and users do not need to worry about managing the complicated schema.

For optimal performance results, select identical hard drives to install in disk arrays. The drives' matched performance allows the array to function better as a single drive.

> *Warning:* The Serial ATA RAID function can be supported under **Windows XP** and **Windows .Net** environments.

AOpen

What are the RAID levels?

Striping / Span (RAID 0)

RAID level 0, which is the fastest drive array you can have, is a performance-oriented disk mapping method. The data in this array gets written across a stripe or different disks for a faster transfer. This technique has striping but no redundancy of data. It offers the best performance but no fault-tolerance. Reads and writes sector of data interleaved between multiple drives. When any disk member fails, it affects the entire array. Performance is better than a single drive since the workload is balanced between the array members. This array type is for high performance systems. Identical drives are recommended for performance as well as data storage efficiency. The disk array data capacity is equal to the number of members times the smallest member capacity. For example, one 40GB and one 60GB drives will form an 80GB (40GBx2) disk array.

Logical Drive		Physical Disks
Block 1		Block 1
Block 2	Striping	Block 3
Block 3		Block 5
Block 4		Block 7
Block 5		Block 2
Block 6		Block 4
Block 7		Block 6
Block 8		Block 8
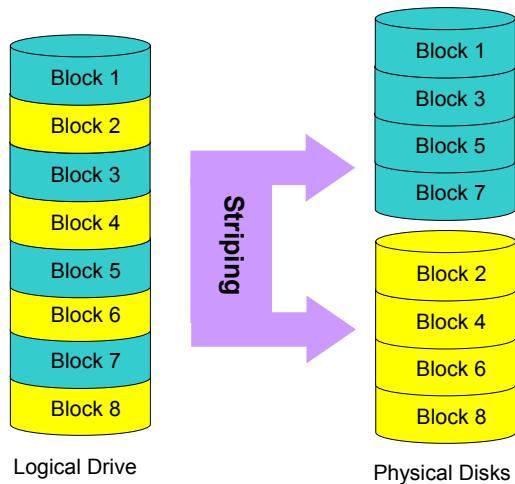
Mirroring (RAID 1)

RAID level 1 uses at least two duplicate hard drives and store the exact same blocks of information between them. This is the slowest form of fault tolerance because the data has to be replicated onto two disks at the same time. However, this is the simplest way to provide high reliability.

If one of the mirrored drives suffers a mechanical failure or does not respond, the remaining drive will continue to serve and provide correct data. If one drive has a physical sector error, the mirrored drive will continue to function.

Due to redundancy, the drive capacity of the array is half the total drive capacity. For example, two 40GB drives that have a combined capacity of 80GB would have 40GB of usable storage. With drives of different capacities, there may be unused capacity on the larger drive. RAID 1 increases cost as it takes twice as much hard drives to build our arrays.

Logical Drive

Mirroring

Physical Disks
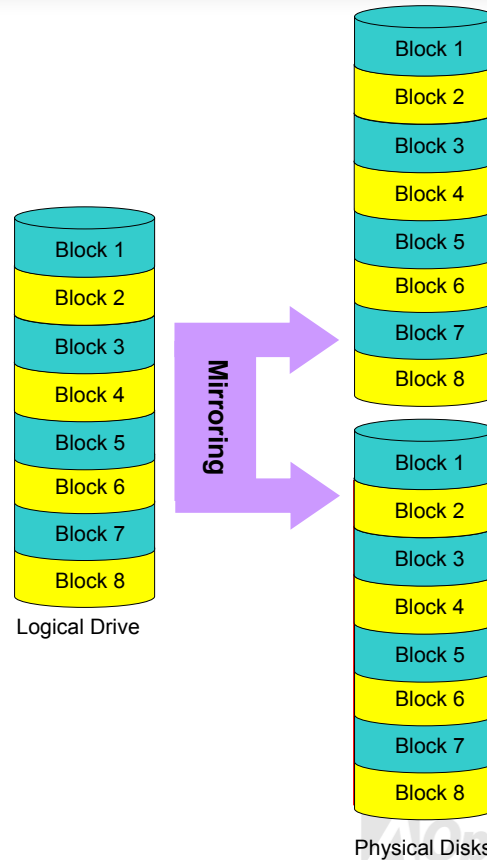
Striping with Mirroring (RAID 0+1)

As the name would suggest, RAID 0+1 is striping and mirroring combined. This RAID combines the best of both RAID 0 and RAID 1. It takes a Disk stripe using two disks, and mirrors it to another set of disks for fault tolerance. Data is stripped across several disks, each disk has partner with exactly the same data on it. You get the benefits of fast data access as in RAID 0, with the fault tolerance of RAID 1. This configuration provides optimal speed and reliability. You need double the number of disks as a RAID 0, half for each side of the mirror. At least 4 hard disks are needed while performing RAID 0+1. There is other RAID configurations in addition to those described here, but these are the types most commonly used in the industry.

Logical Drive

Physical Disks

Physical Disks
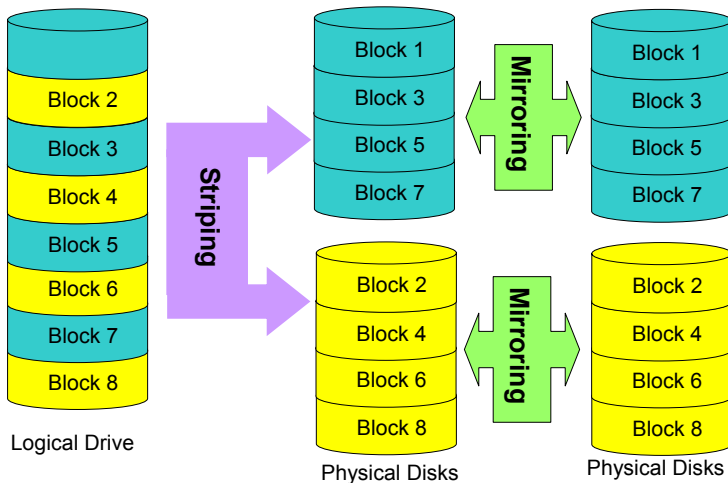
HDD Capacity of RAID Levels

Striping / Span (RAID 0)

Physical Disks 40 GB
Physical Disks 40 GB
Logical Drive 80 GB

Mirroring (RAID 1)

Physical Disks 40 GB
Physical Disks 40 GB
Logical Drive 40 GB

Striping with Mirroring (RAID 0 +1)

Striping

Physical Disks 40GB
Physical Disks 40 GB

Mirroring

Physical Disks 40GB
Physical Disks 40 GB

Striping

Logical Drive 80 GB
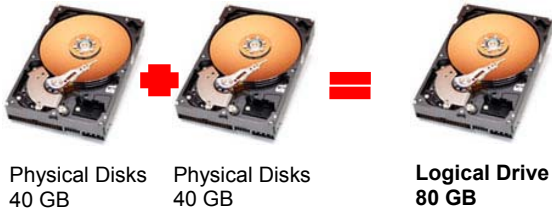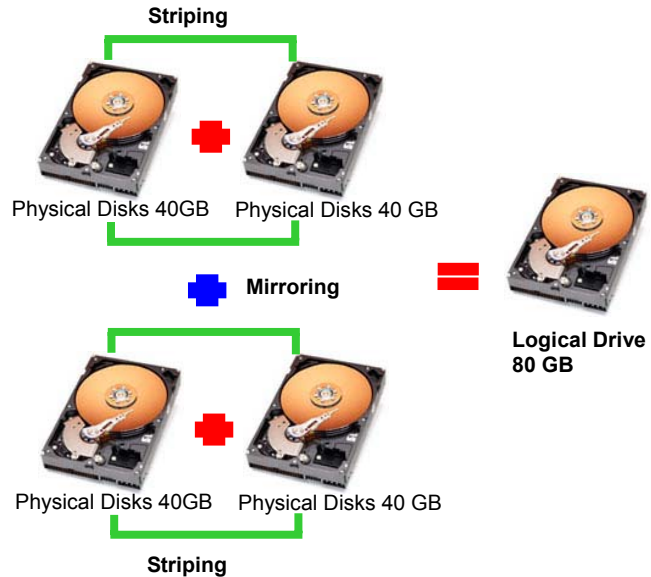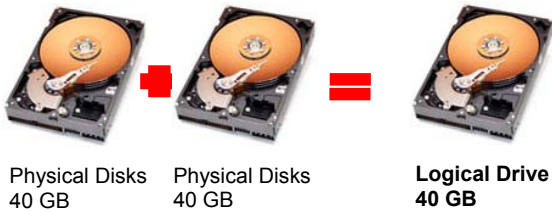
Serial ATA RAID for Intel ICH5R

With the latest chipsets implemented, Intel ICH5R provides RAID 0, 1 function in Windows 2000/XP for the Serial ATA hard disks. You may follow the steps shown below to setup your disk array.

Arouse RAID function in BIOS

After having properly installed your Serial ATA hard disks, you may directly get into the BIOS setting screen for adjustment. You may simply press "Integrated Peripherals → On-Chip IDE Device → On-Chip Serial ATA" to choose Enhanced mode. In order to utilize Serial ATA function, please select RAID in SATA Mode. Finally, do save the changes and exit BIOS setup screen.
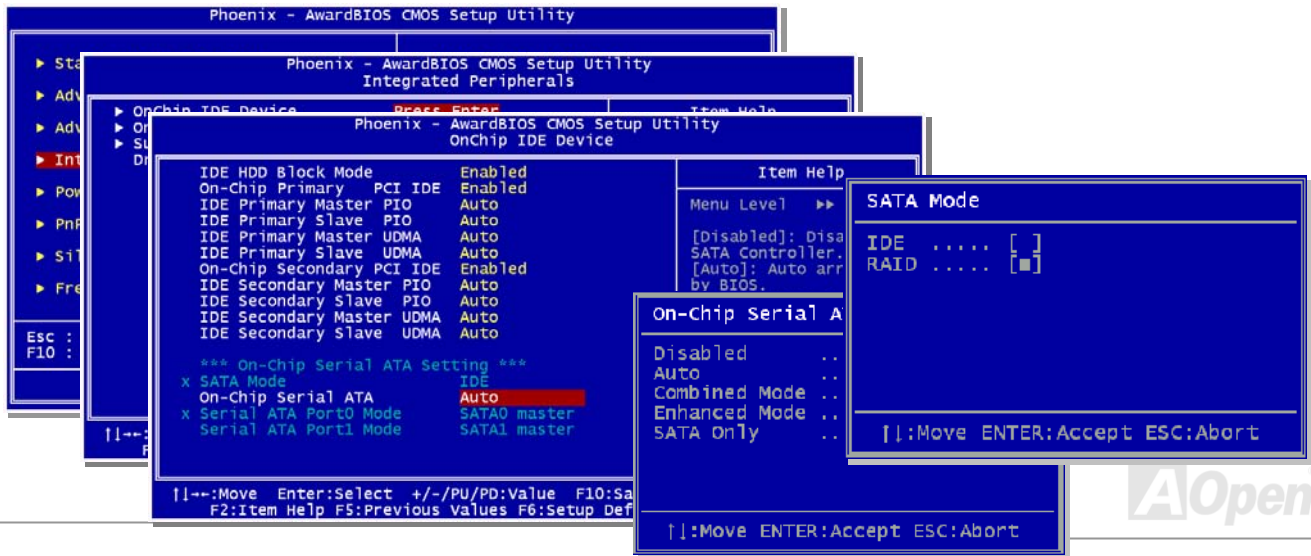
RAID Configuration Utility

In order to make sure your system can recognize and operate Serial ATA RAID device smoothly, we have to enter RAID Configuration Utility to do some configuration. After finishing the BIOS setup and reboot, you will see [Press CTRL + I to enter configuration Utility] about half way through the boot up. Please press these two buttons simultaneously. When you enter you will be presented with a screen as shown below:

1. **Create RAID Volume:**

   This section allows users to choose the strip size and disk volume of RAID.

2. **Delete RAID Volume:**

   This section allows users to delete the volume of RAID. Please be noted that deleting a volume will destroy volume data and cause any member disks to become available as non-RAID disks.

3. **Reset Disks to Non-RAID:**

   Users can remove any internal RAID structures from all RAID disks, including disks with working volume. Select "Yes" will cause all data on any disk to be lost.

AOpen

Serial ATA RAID for Silicon Image 3112A

Silicon Image's SATARaid™ provides Serial ATA Software RAID including Striping and Mirroring to enhance the industry's first proven PCI-to-SATA host controller product.

Standard with SATARaid software is a Graphical User Interface (GUI) that provides easy-to-use configurations for the different RAID Sets supported.

Installing Drivers and SATARaid GUI in Windows 98SE/ME/2000/NT/XP

The driver is located on the provided floppy disk. Insert the floppy disk into the floppy disk drive and click Browse. Most floppy disk drives are configured as [A:]. Choose the [A:] drive in your browser and the Si3112r.inf file for the SiI 3112. Select the file and click Open.

For Windows NT system, please select the file Oemsetup.inf and click Open. The next window allows you to select which driver to install. Select SiI 3112 Raid Controller and click on OK.

For Windows 98/ME, please use the driver installation files (siI3112r.sys) on the provided floppy disk if necessary.

Now, a window verifying that the new Driver for the board has been properly installed. Click Finish.

It is always good to restart the computer after an installation. When asked to do so, click yes.

To install SATARaid, use Windows InstallShield by performing the following:

1.   After computer restarts, insert CD in disk drive.

2.   Double-click on Install SATARaid.exe.

3.   Follow on-screen instructions to complete installation.

Note: Do NOT install in the Start Up folder. Choose the Default folder (normally Accessories or Administrative Tools or something similar).
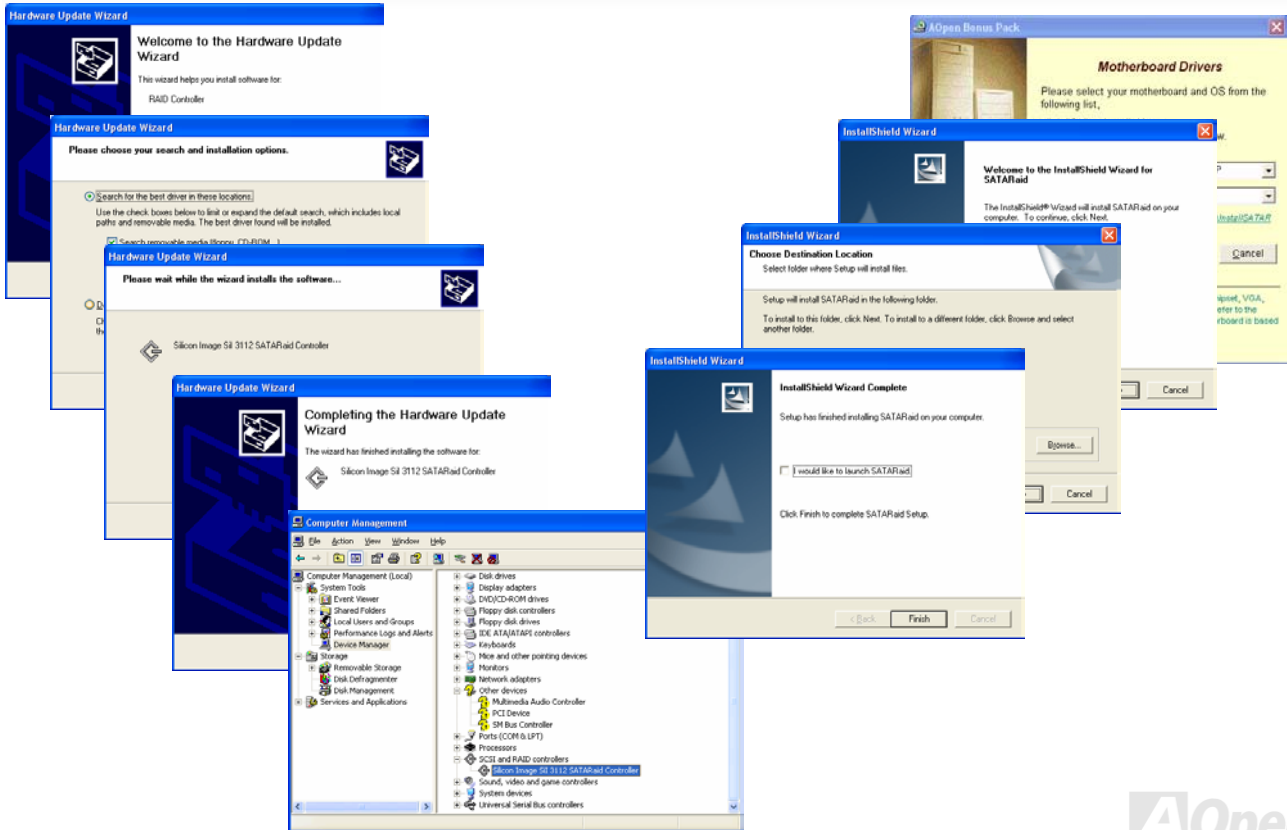
Creating and Deleting Raid Sets

Creating and Deleting RAID Sets is a function set in the BIOS and please press <CRTL-S> or F4 to enter RAID utility during boot.

Creating 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.

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

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?"

Creating and Naming Partitions

The creating and naming of partitions is something done within the Windows operating system. Windows XP/2000 and Windows NT both use the Disk Management window to start this work. And Windows 98/ME uses FDISK to realize this function.

Windows XP/2000

SECTION 1: System listing of all formatted and available disks/RAID Sets.

SECTION 2: Report of physical connection of disks/RAID Sets.

SECTION 3: Report of partition status, disk letter, and volume name.
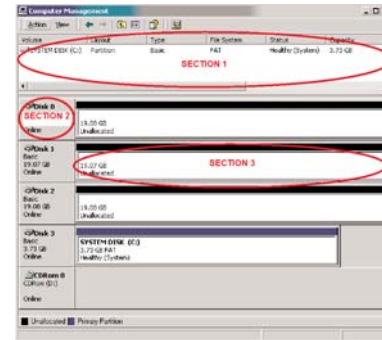
Windows NT

Button 1: opens the Disk Administrator Volumes window which lists the recognizable Volumes, their capacity, free space, type of format, etc.

Button 2: opens the Disk Configuration window (shown above), detailing all disks (or RAID Sets), partitions, and allows the user to format and name each partition and volume.

Section 1: reports the size of each disk (or RAID Set).

Section 2: reports on each partition, and allows the user to format or delete partitions.
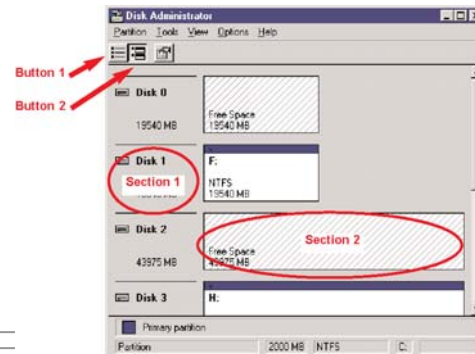
Using Silicon Image SATARaid GUI

The SATARaid GUI offers the user the ability to easily monitor your RAID Set. To launch the GUI, simply double-click on the icon located in the bottom right hand corner of the Desktop.
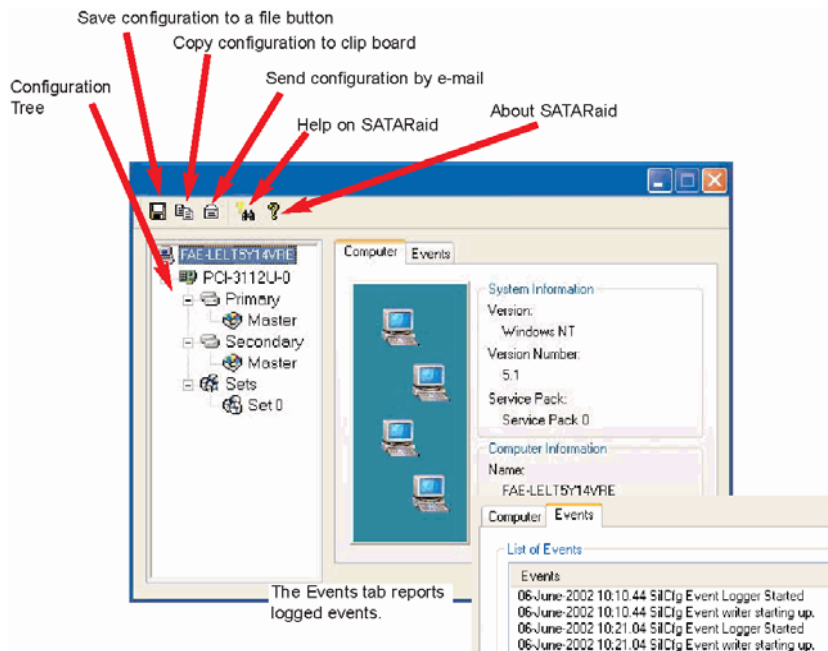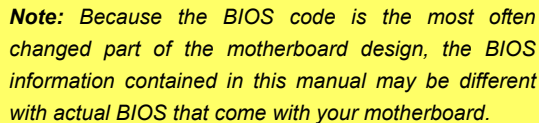
Phoenix-AWARD BIOS

System parameters can be modified by going into BIOS Setup menu, this menu allows you to configure the system parameters and save the configuration into the 128 bytes CMOS area, (normally in the RTC chip or in the main chipset).

Phoenix-Award BIOS™ installed in the Flash ROM of the motherboard is a custom version of an industry standard BIOS. The BIOS provides critical low-level support for standard devices such as hard disk drives, serial and parallel ports.

Most BIOS settings of AX4SG Max have been optimized by AOpen's R&D engineering team. But, the default setting of BIOS still can't fine-tune the chipset controlling entire system. Therefore, the rest of this chapter intends to guide you the process of configuring your system setup.

To enter to BIOS setup menu, press <Del> when POST (Power-On Self Test) screen is shown on your monitor.

> *Note: Because the BIOS code is the most often changed part of the motherboard design, the BIOS information contained in this manual may be different with actual BIOS that come with your motherboard.*

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How To Use Phoenix-Award™ BIOS Setup Program

Generally, you can use arrow keys to highlight items that you want to choose, then press <Enter> key to select, and use the <Page Up> and <Page Down> key to change setting values. You can press <Esc> key to quit Phoenix-Award™ BIOS setup program. The following table provides details about how to use keyboard in the Phoenix-Award™ BIOS setup program. Alternatively, it's strongly recommended to install AOpen's newest WinBIOS Utility to get more detailed description, further powerful functions and advanced setting of BIOS.

Key	Description
Page Up or +	Changing setting to next value or increase the value.
Page Down or -	Changing setting to previous value or decrease value.
Enter	Select the item.
Esc	1.　In main menu: Quit and don't save any change. 2.　In sub menu: Exit current menu to main menu.
Up Arrow	Highlight previous item.
Down Arrow	Highlight next item.
Left Arrow	Move the light bar to left side of menu.
Right Arrow	Move the light bar to right side of menu.
F6	Load fail-save setting value from CMOS.
F7	Load turbo setting value from CMOS.
F10	Save changed setting and exit setup program.

How To Enter BIOS Setup

After you finish jumper settings and connect correct cables, power on and enter the BIOS Setup. Press <Del> during POST (Power-On Self Test) and choose "Load Setup Defaults" for recommended optimal performance.

```
             Phoenix - AwardBIOS CMOS Setup Utility

  ► Standard CMOS Features          Load Setup Defaults
  ► Advanced BIOS Features          Load Turbo Defaults
  ► Advanced Chipset Features       Set Password
  ► Integrated Peripherals          Save & Exit Setup
  ► Power Management Setup          Exit Without Saving
  ► PnP/PCI Configurations          Load EEPROM Defaults
  ► Silent BIOS/HW Monitor          Save EEPROM Defaults
  ► Frequency/Voltage Control      ► Credits

  Esc : Quit                  ↑ ↓ → ←   : Select Item
  F10 : Save & Exit Setup
             Load Setup Defaults
```

[Del]

Warning: *Please avoid of using "Load Turbo Defaults", unless you are sure your system components (CPU, DRAM, HDD, etc.) are good enough for turbo setting.*

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WinBIOS Utility

In the past, users have to keep punching the DEL key at a good timing during POST (Power-On-Self-Test) screen to get into the BIOS, which is inconvenient and clumsy. From now on, AOpen provides an easier way to configure your BIOS. WinBIOS is a customized utility for running exclusively on AOpen motherboards, which allows you to setup your BIOS under Windows environment. Designed with traditional-BIOS-alike interface, you may adjust BIOS parameter with clear descriptions for each item.

WinBIOS is natively designed with multi-language support. There are various widely-use languages provided on our website for your downloading, which also helps to prevent wrong settings caused by misunderstanding of the languages. The only thing you have to do is to visit our official website and download your respective language pack (of few KB size), then double-click on it to activate the support with your chosen language.

Moreover, with high scalability, either for newly bought motherboard or the latest BIOS version with new function, you don't have to re-install the whole program again and again. All you have to do is to grab the latest profile from our website, simply double-click on it as well to support the latest version of your BIOS. You don't have to spend any extra effort to have your motherboard supported by WinBIOS.
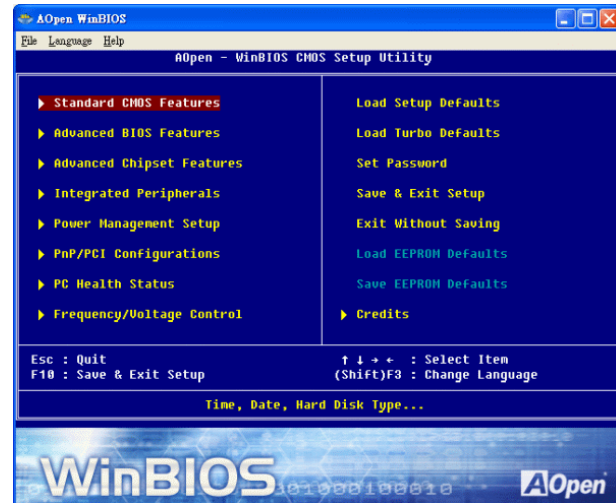
Function keys:

It's definitely easy to handle WinBIOS as if you're using traditional BIOS setting. Users can use the arrow keys such as ⬆ ⬇ ⬅ ➡ to move around the items in WinBIOS screen. And use PGUP PGDN, "+" or "-" to change the setting value if they are available. Press ESC to get back to the previous screen. Furthermore, the hotkeys shown in the table may help you and save your time. Some settings may not come into effect until you reboot your system.

Hotkey	Function Description
F1	Get help description.
F2	Item Help
F3	Changing menu language.
F5	Load previous setting
F6	Load setup default setting
F7	Load turbo setting
F10	Save changed setting and exit setup program.
F12	Full Screen / Normal Mode

Caution: **After updating your BIOS, please remember to update WinBIOS profile as well. If the upgraded BIOS version is newer than WinBIOS profile, WinBIOS will not be able to launch and a dialog box with error message will pop up. This verification is designed on purpose to protect your BIOS from damaged by wrong profile version.**

For the latest WinBIOS profile and language pack modules, you may find them from AOpen official web site as shown below:

(http://english.aopen.com.tw/tech/download/WinBIOS/default.htm)

Note: Due to BIOS versions are updated in an extremely fast speed, it's strongly recommended to download the latest BIOS version and WinBIOS profile from our website upon receipt of the motherboard.

Error

Sorry! WinBIOS cannot support this version of BIOS.(049)

確定

BIOS Upgrade under Windows environment NEW!

With outstanding R&D ability of AOpen, we now bring you a whole new BIOS Flash wizard ---- EzWinFlash. With an eye to users convenience, EzWinFlash combines the BIOS binary code and flash module together, so the only thing you have to do is just clicking on the utility you downloaded from web and let it helps you complete the flash process automatically. EzWinFlash detects your motherboard and checks the BIOS version cleverly to prevent your system from any possible failure. Moreover, EzWinFlash has been taken into consideration to go with any windows platform you might be using, no matter if you're using Windows 95/98, 98SE/ME, NT4.0/2000, or Windows XP.

In the meanwhile, in order to provide a much more user-friendly operating environment, AOpen EzWinFlash is natively designed to have multi-language function to provide easier way for users' usage in changing BIOS setting.
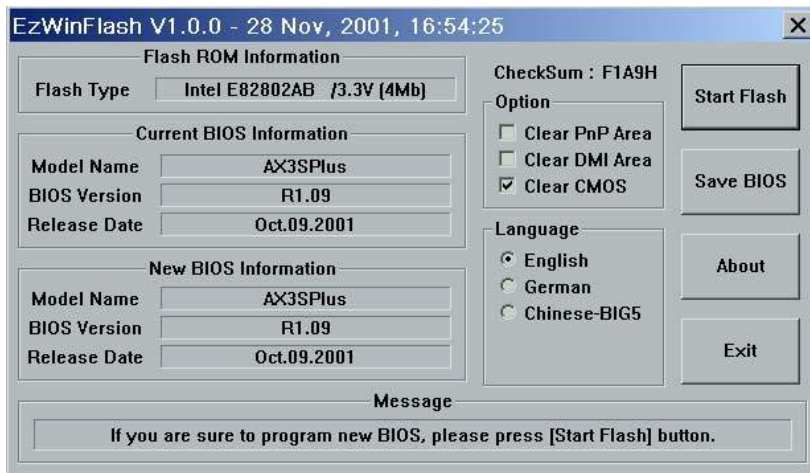
Caution: By updating your motherboard, you are taking a risk of BIOS flash failure. If your motherboard is working stable, and there are no major bugs that had been fixed by a latter BIOS revision, we recommend that you DO NOT try to upgrade your BIOS.

If you intent on upgrading, PLEASE BE SURE to get the right BIOS revision for the right motherboard model to avoid any possibility failure.

You may accomplish BIOS upgrade procedure with EzWinFlash by the following steps, and it's STRONGLY RECOMMENDED to close all the applications before you start the upgrading.

1. Download the new version of BIOS package zip file from AOpen official web site. (ex: http://www.aopen.com)

2. Unzip the download BIOS package (ex: WSGMAX102.ZIP) with WinZip (http://www.winzip.com) in Windows environment.

3. Save the unzipped files into a folder, for example, WSGMAX102.EXE & WSGMAX102.BIN.

4. Double click on the WSGMAX102.EXE; EzWinFlash will detect the model name and BIOS version of your motherboard. If you had got the wrong BIOS, you will not be allowed to proceed with the flash steps.

5. You may select preferred language in the main menu, then click [Start Flash] to start the BIOS upgrade procedure.

6. EzWinFlash will complete all the process automatically, and a dialogue box will pop up to ask you to restart Windows. You may click [YES] to reboot Windows.

7. Press <Del> at POST to enter BIOS setup; choose "Load Setup Defaults", then "Save & Exit Setup". Done!

It is strongly recommended NOT to turn off the power or run any application during FLASH PROCESS.

> *Warning: The new BIOS upgrade will permanently replace your original BIOS's settings when flashing. You may need to reconfigure your BIOS setting so that your system can go back to work as normal.*
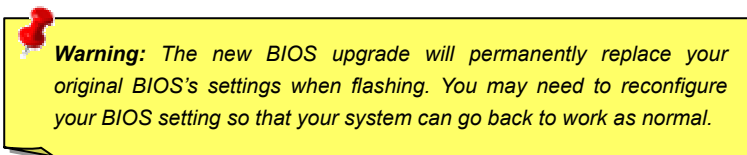
AOpen

Vivid BIOS technology NEW!

Have you been fed up with the conservative and immutable POST screen? Let's rule out the tradition idea that POST screen are stiff and frigid, and let AOpen show you the newly developed VividBIOS to experience the lively vivid colourful POST screen!

Unlike earlier graphic POST screen which could occupy the whole screen and mask text information during POST, AOpen VividBIOS deals with graphics and texts separately, and makes them running simultaneously during POST. With this innovative design, VividBIOS now brings you a beautiful and sleek 256 colours screen without missing any important information shown on POST screen.

In addition, the limited space of BIOS ROM is another big issue. When all of the traditional BIOS can only show space-consuming and uncompressed Bitmap, AOpen has considerately tuned the BIOS to next generation, to recognize the smaller-sized GIF format and even dynamic-showing GIF animation.

Vivid BIOS shares the same fundamental technology with Open JukeBox CD Player, you may use the same EzSkin utility to change your

Vivid BIOS screen or to download your favourite Open JukeBox skin. If you see this little logo shown beside your model name on the BIOS download page, http://english.aopen.com.tw/tech/download/skin, it is assured that your motherboard supports this innovative feature!

Driver and Utility

There are motherboard drivers and utilities in AOpen Bonus CD. You don't need to install all of them to boot your system. But after you finish the hardware installation, you have to install your operation system first (such as Windows XP) before you install any drivers or utilities. Please refer to your operation system's installation guide.

Auto-run Menu from Bonus CD

You can use the auto-run menu of Bonus CD. Choose the utility and driver and select model name.
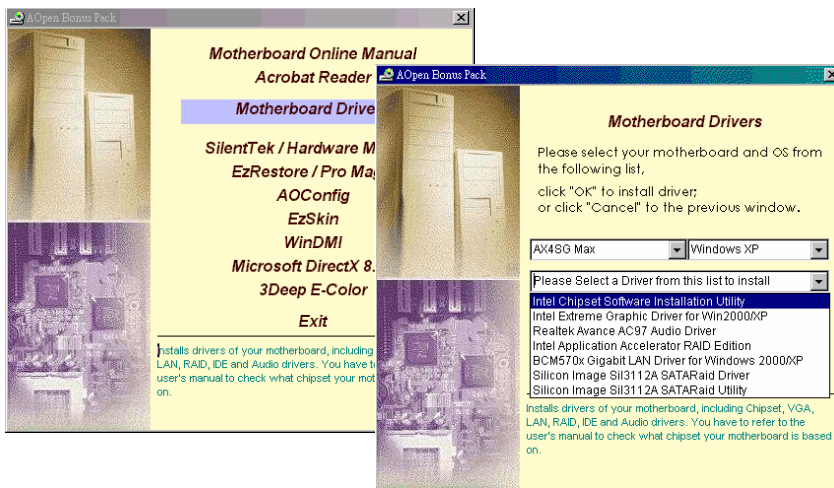
Installing Intel® Chipset Software Installation Utility

The Intel® Chipset Software Installation Utility should be installed onto the target system and the Windows * INF files outline the operating system how the chipset components will be configured. It is recommended that the Intel® Chipset Software Installation utility be installed onto the target system prior to the installation of other drivers.
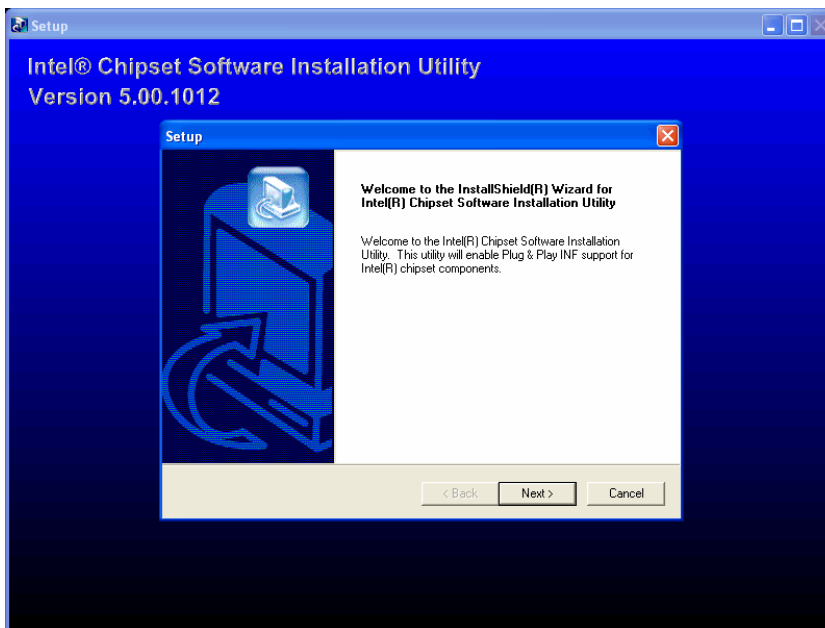
Installing Intel Extreme Graphic Driver

You can install Intel Extreme graphic driver to get the best graphics function of the chipset. You can find it in the Bonus Pack CD disc.
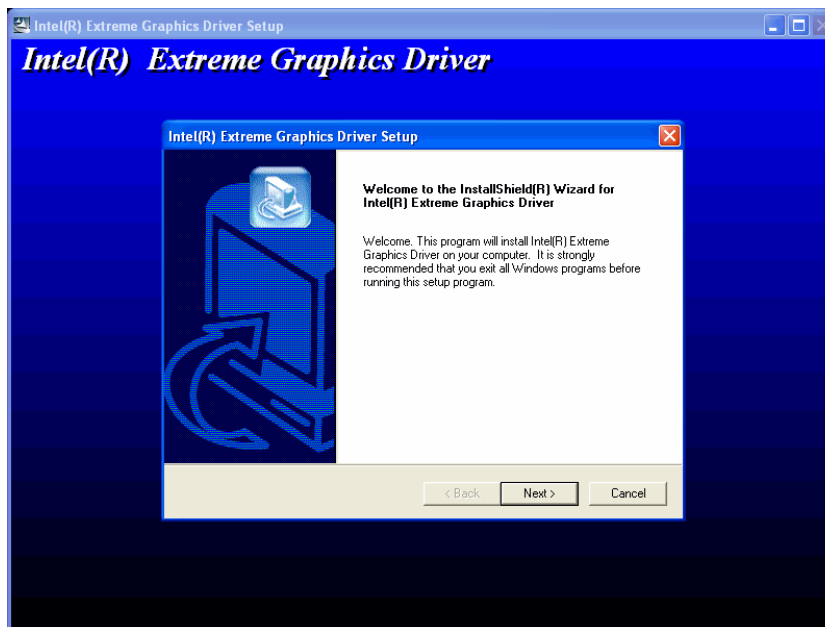
Installing Onboard Sound Driver

This motherboard comes with AC97 CODEC. This audio driver supports Windows 98SE and upper Windows OS; you can find the audio driver from the Bonus Pack CD auto-run menu.
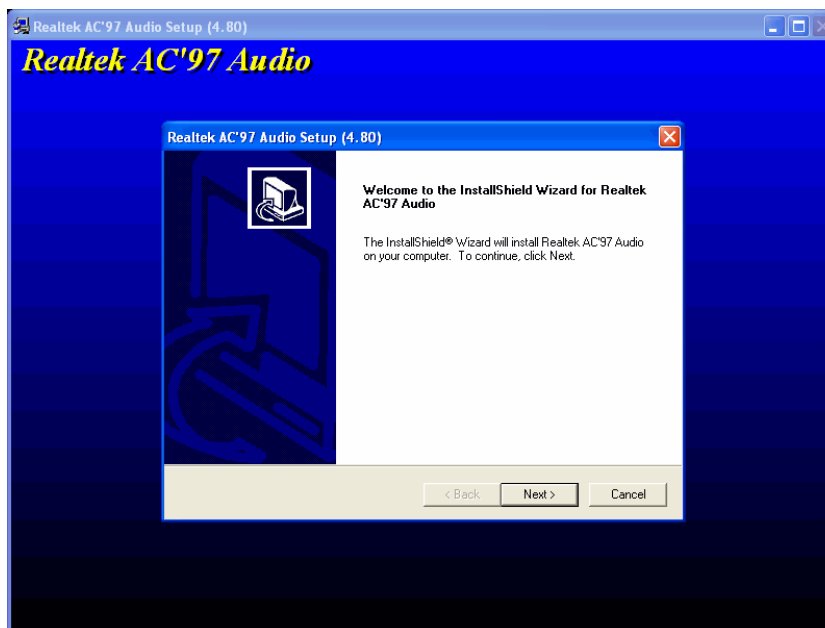
Installing Intel Application Accelerator RAID Edition Driver in Windows 2000/XP

You can install Intel IAA RAID Edition Driver in Windows 2000/XP to increase the performance of software applications and reduce PC boot times. The IAA RAID Edition is designed to provide functionality for the Intel ICH5R SATA RAID Controller. This product is available for use on Pentium (R) 4 processor-based systems with an ICH5R I/O Controller Hub and running Microsoft Windows 2000/XP. Software installation is flexible and fully automated for Windows 2000/XP. You can find it in the AOpen Bonus Pack.
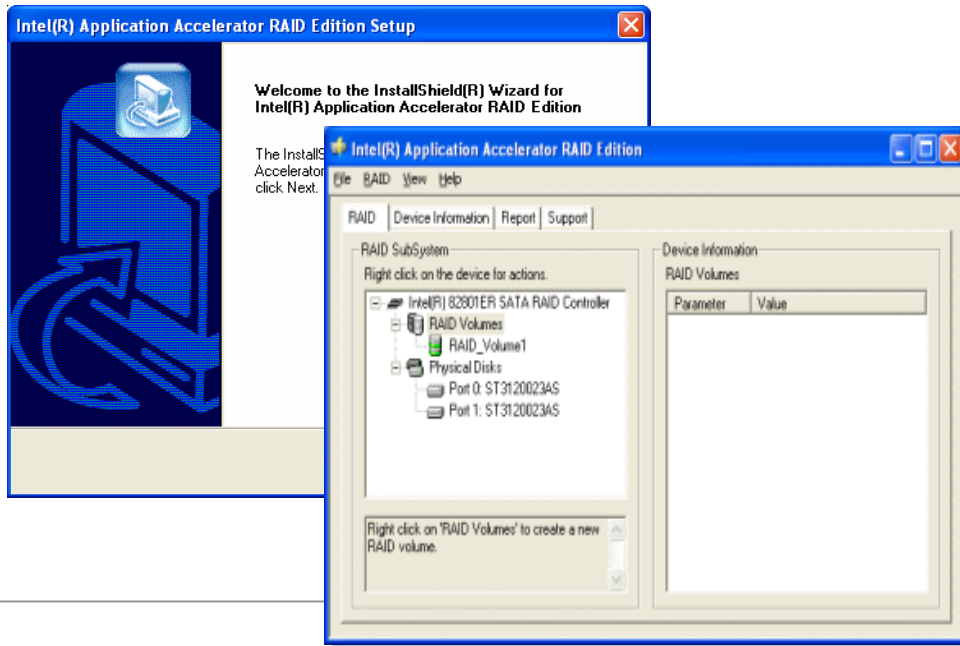
Installing LAN Driver in Windows 2000/XP

This motherboard integrates BCM5705 Gigabit Ethernet Chip. You can find this driver from the Bonus Pack CD auto-run menu.

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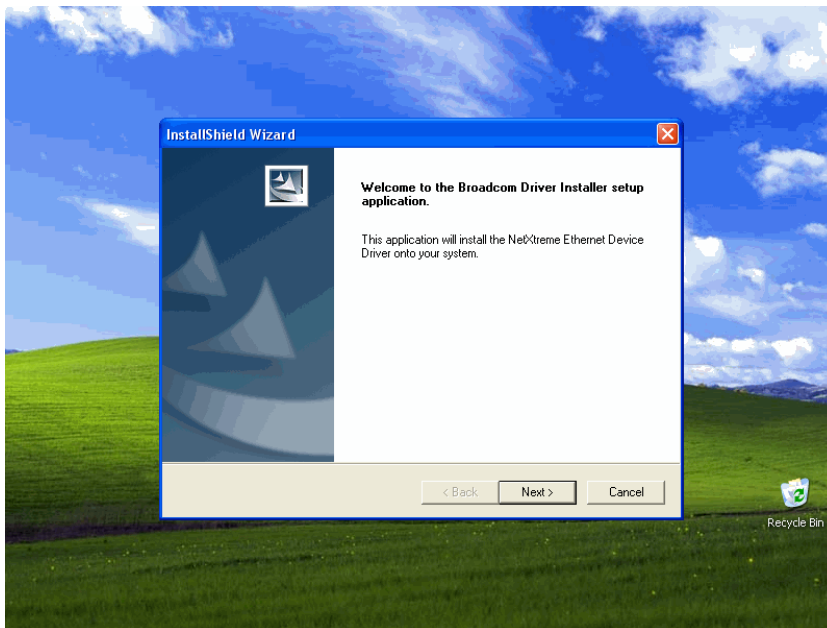
Install LAN Driver in Windows 98SE/ME

1. Open the Device Manager and check if there is a "PCI Ethernet Controller" in "Other devices"

2. Insert the supplied "Bonus CD"

Click "PCI Ethernet Controller " ->" Driver" -> "Update Driver" and Select "Install the software automatically (Recommended) " And then Click "Next".

When prompted, insert the media to be searched into your CD-ROM drive, type the path to the driver, and select **OK**.

Example: e:\Driver\Lan\BCM5705 Where is the designation of the driver on your system.

In the Driver Files Search Results window, verify that the correct path to the driver software is shown, and then click **Next**
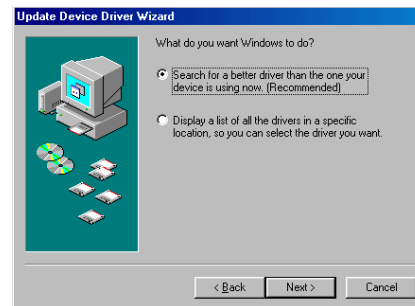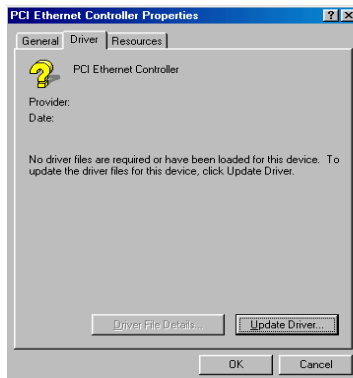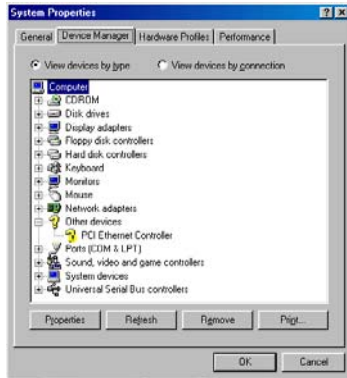
3. Then OS will request to insert the Bonus CD into CD-ROM Drive
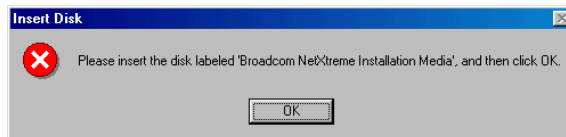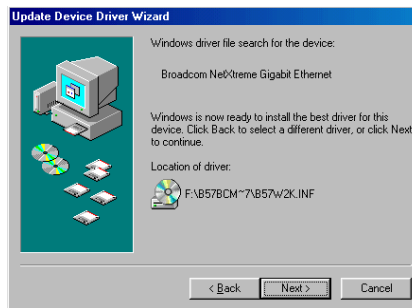
4. Type the path of the BroadCom Ethernet driver and select "OK"

Example: e:\Driver\Lan\BCM5705 Where is the designation of the "b57w2k.sys "on your Bonus CD.

BroadCom Ethernet driver installation finish
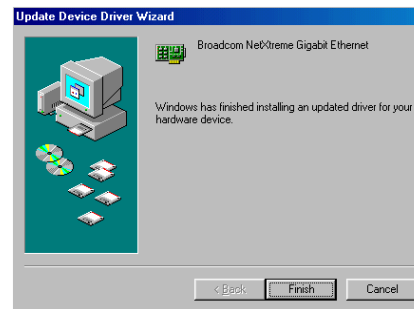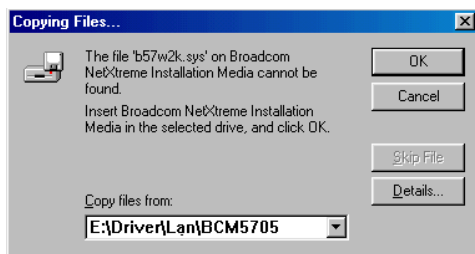
Install LAN Driver in Windows NT 4.0

1. Verify that the Windows NT system is upgraded with Service Pack 4 or later.

2. Start your Windows NT system and log in. You must have System Administrator privileges to install the driver software.

3. Open the Control Panel.

4. In the Control Panel, double-click the Network icon.

5. When the Network window opens, select the Adapters tab

6. Click "Add" to install a new adapter. All previously installed drivers are listed under Network Adapters
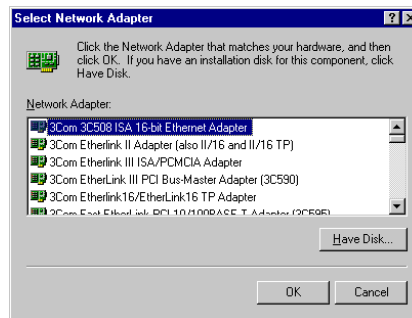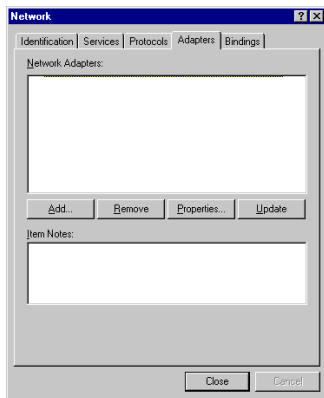
7. When the Select Network Adapter window opens, click **"Have Disk"**....

8. When prompted, insert the driver installation media, or choose a location to install the driver from. Type the path to the driver, and click **"OK"**.

    For example, to install the adapter driver software for Windows NT, type *D:\Driver\Lan\BCM5705* in the Insert Disk location box (where is the designation of the LAN driver on Bonus CD)

9. With "Gigabit Ethernet Controller" highlighted in the Select OEM Option window, click **"OK"**.
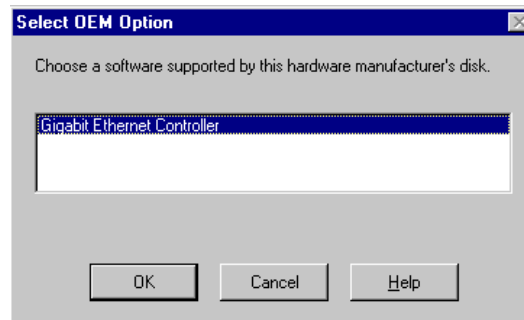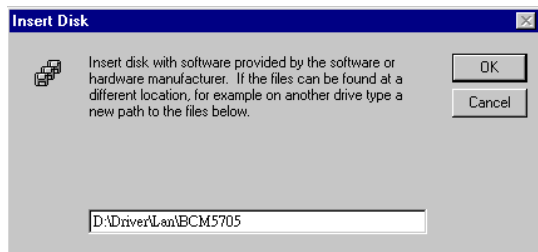
The adapter files are installed, and then the Network window is displayed showing the newly installed adapter

Click **"Close"**, then the Microsoft TCP/IP Properties window appears.

Configure the TCP/IP protocol and click "OK". When prompted to restart your computer, click "Yes".
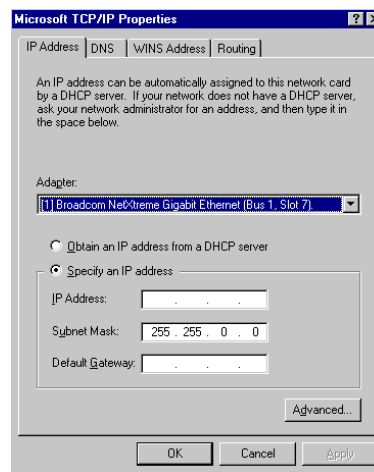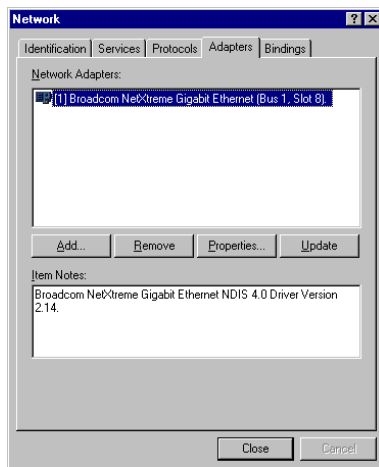
Installing USB 2.0 Driver

* Windows 98SE Installation Guide

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Installing Drivers during Windows 98SE Installation

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The following details the installation of the USB 2.0 driver while installing Windows 98SE (with the USB 2.0 controller is enabled already).

1. After enabling the USB 2.0 controller, install Windows 98/98SE normally.

2. After installation, go the "Start" menu and choose "Settings."

3. From the "Settings" menu, choose "Control Panel."

4. In the "Control Panel" window, double-click on the "System" icon.

5. In the "System" window, choose the "Device Manager" tab.

6. In the hierarchical display under "Other Devices" is a listing for "PCI Universal Serial Bus." Choose it and then press the "Properties"

button.

7.   Choose the "Driver" tab in the "Properties" window, choose "Update Driver," and then press "Next."
8.   Choose "Search for a better driver than the one your device is using now (recommended)," then press "Next."
9.   Insert the "Bonus CD" in CD-ROM.
10. Choose "Specify a Location," and then type "[CD-ROM]:\Driver\Intel\USB2.0\Win98ME" in the text box

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11. Press the "Next" button. A message informing you that Windows has found "Intel USB 2.0 Enhanced Host Controller" should appear.

12. Press "Next," then "Finish," then "Yes" when asked if you want to restart your computer.

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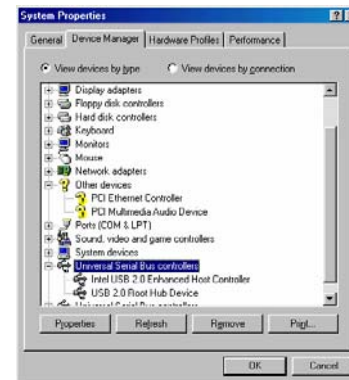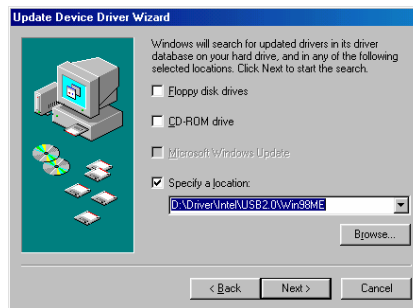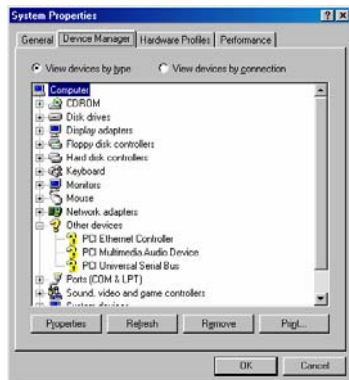
Installing Drivers with Existing Windows 98SE

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The following section details the installation of USB 2.0 driver on a system that has Windows 98SE already installed.

1. Enable the USB 2.0 controller and boot Windows.

2. The "Add New Hardware Wizard" will appear, informing you that it has found a "PCI Universal Serial Bus."

3. Click on "Next," and from the generated list box, choose "Search for best driver for your device (Recommended)".

4. Insert the "Bonus CD" in CD-ROM.

5. Click on "Next," and from the generated choices, choose "Specify a location."

6. Type "[CD-ROM]:\Driver\Intel\USB2.0\Win98ME" in the text box that appears.

7. Click on "Next." A message informing you that Windows has found "Intel USB 2.0 Enhanced Host Controller" should appear.

8. Click on "Next," and then on "Finish."

****

Confirming Driver Installation in Windows 98SE

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To confirm that the driver has been properly loaded in Windows 98SE, perform the following steps:

1. Choose "Settings" from the "Start" menu.

2. Choose "Control Panel," and then double-click on the "System" icon.

3. Choose the "Device Manager" tab, and then click the "+" in front of "Universal Serial Bus Controllers." "Intel USB 2.0 Enhanced Host

Controller" should appear.

* Windows Me Installation Guide

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Installing Drivers During Windows Me Installation

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The following details the installation of the USB 2.0 driver while installing Windows Me (with the USB 2.0 controller is enabled already).

1. Install Windows Me fully.

2. After installation, go the "Start" menu and choose "Settings."

3. From the "Settings" menu, choose "Control Panel."

4. In the "Control Panel" window, double-click on the "System" icon.

5. In the "System" window, choose the "Device Manager" tab.

6. In the hierarchical display under "Other Devices" is a listing for "PCI Universal Serial Bus." Choose it and then press the "Properties"

button.

7.   Choose the "Driver" tab in the "Properties" window, choose "Update Driver," and then press "Next."
8.   Choose "Specify the location of the driver (Advanced)," then press "Next".
9.   Insert the Bonus CD in CD-ROM.
10.   Choose "Specify a Location," and then type "[CD-ROM]:\Driver\Intel\USB2.0\Win98ME" in the text box

11.   Press the "Next" button. A message informing you that Windows Me has found "Intel USB2.0 Enhanced Host Controller" should appear.

12. Press "Next," then "Finish".

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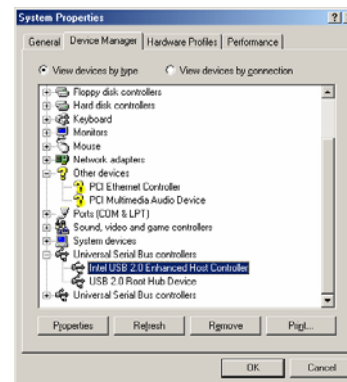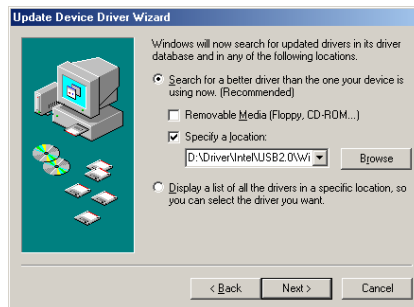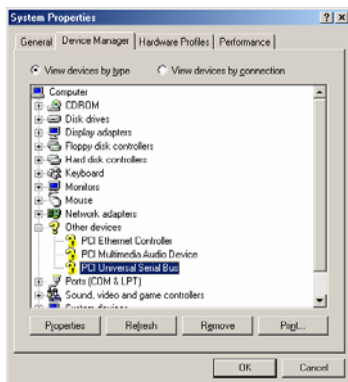
Installing Drivers with Existing Windows Me System

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*************************************************************
```

The following section details the installation of USB 2.0 driver on a system that has Windows Me already installed and running.

1. After installing the USB 2.0 controller, boot system.

2. The "Add New Hardware Wizard" will appear, informing you that it has found a "PCI Universal Serial Bus."

3. Click on "Next," and from the generated list box, choose "Specify the location of the driver (Advanced)."

4. Click on "Next," and from the generated choices, choose "Specify a location."

5. Insert the Bonus CD in CD-ROM.

6. Type "[CD-ROM]:\Driver\Intel\USB2.0\Win98ME" in the text box that appears.

7. Click on "Next." A message informing you that Windows Me has found "Intel USB2.0 Enhanced Host Controller" should appear.

8. Click on "Next," and then on "Finish."

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Confirming Driver Installation in Windows Me

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To confirm that the driver has been properly loaded in Windows Me, perform the following steps:

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1. Choose "Settings" from the "Start" menu.

2. Choose "Control Panel," and then double-click on the "System" icon.

3. Choose the "Device Manager" tab, and then click the "+" in front of "Universal Serial Bus Controllers." "Intel USB2.0 Enhanced Host

Controller" should appear.

* Windows 2000 Installation Guide

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Installing Drivers during Windows 2000 Installation

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The following details the installation of the USB 2.0 driver while installing Windows 2000 (with the USB 2.0 controller is enabled already).

1.   After enabling the USB 2.0 controller, install Windows 2000 normally.
2.   After installation, go the "Start" menu and choose "Settings."
3.   From the "Settings" menu, choose "Control Panel."
4.   In the "Control Panel" window, double-click on the "System" icon.
5.   In the "System" window, choose the "Hardware" tab.
6.   Press the "Device Manager..." button in the "Hardware" window.
7.   In the hierarchical display under "Other Devices" is a listing for "Universal Serial Bus (USB) Controller". Choose it and then press the mouse right button and click "Properties"

8.   Choose the "Driver" tab in the "Properties" window, choose "Update Driver," and then press "Next."
9.   Choose "Search for a suitable driver for my device (Recommended)". from the list, and then press "Enter".
10.   Choose "Specify a location." and then press "Next"
11.   Insert the Bonus CD in CD-ROM.
12.   Type "[CD-ROM]:\Driver\Intel\USB2.0\Win2000" in the text box that appears. Press " OK ".

13. Click on "Next." A message informing you that Windows has found "Intel PCI to USB Enhanced Host Controller - ICH5" should appear.

14. Click on "Next," and then on "Finish."

AOpen

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****
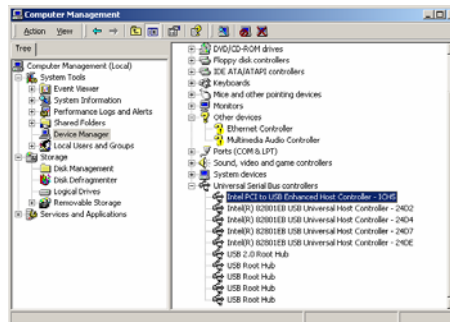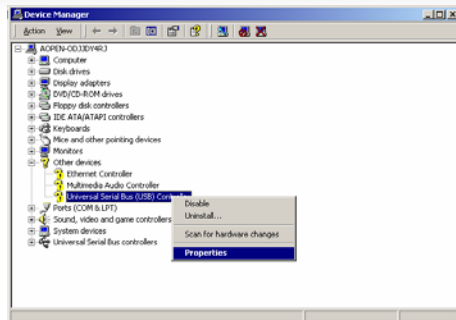
Installing Driver in Existing Windows 2000 System

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After enabling the USB 2.0 controller and rebooting your system, Windows 2000 setup will show a "New Hardware Found" dialog box.

Under Windows 2000, "Universal Serial Bus (USB) Controller" will be displayed.

1. Choose "Search for a suitable driver for my device (Recommended)". from the list, and then press "Enter".

2. Choose "Specify a location." and then press "Next"

3. Insert the Bonus CD in CD-ROM.

4. Type "[CD-ROM]:\Driver\Intel\USB2.0\Win2000" in the text box that appears. Press " OK ".

5. Click on "Next." A message informing you that Windows has found "Intel PCI to USB Enhanced Host Controller - ICH5" should appear.

6. Click on "Next," and then on "Finish."

****

Confirming Windows 2000 Installation

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1. From Windows 2000, open the Control Panel from "My Computer" followed by the System icon.

AOpen

2. Choose the "Hardware" tab, and then click the "Device Manager" tab.

3. Click the "+" in front of "Universal Serial Bus controllers". "Intel PCI to USB Enhanced Host Controller - ICH5R" should appear.

Installing Silicon Image Sil3112A SATA Raid Driver

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1) Windows NT 4.0 and Windows 2000/XP Fresh Installation

Follow the instructions in this section if you are performing a new installation of Windows NT 4.0 or Windows 2000/XP, and you wish to boot from a device attached to the Sil 3112 controller.

1. Power off the system.   Connect the hard drives to the Sil 3112 controller and insert the controller into a PCI slot. Power up the system.

2. Put your Windows NT/2000/XP CD into the CD-ROM/DVD drive, or the NT/2000/XP boot diskette #1 in the floppy drive if your system cannot boot from the CD.

3. Press F6 for third party SCSI or driver installation at the beginning of text mode installation. Press's' when setup asks if you want to specify an additional device, and insert the diskette labeled 'Silicon Image Sil 3112 SATA Raid Driver Installation Disk' . Press 'Enter' and select 'Silicon Image Sil 3112 SATA Raid Controller'

4. Press 'Enter' to continue on with text mode setup.

5. Follow the setup instructions to select your choice for partition and file system.

6. After setup examines your disks, it will copy files to Windows 2000 installation folders and restart the system. The setup program will continue and finish the installation after Restart.

7. Wait until Windows 2000 finishes installing devices, regional settings, networking settings, components, and final set of tasks, reboot the system if it is required.

8. See instructions in section 4 to verify controller was installed correctly.

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2) Adding the SiI RAID controller to an existing Windows NT 4.0 installation

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Follow the instructions in this section to install the Silicon Image SiI 3112 driver on a system already running Windows NT 4.0.

1. Power off the system.   Connect the hard drives to the SiI 3112 controller and insert the controller into a PCI slot. Power up the system.

2. After OS boots up, Click 'Start'

3. Under 'Settings', click 'Control Panel'.

4. Select 'SCSI Adapters' from the Control Panel.

5. Select the 'Drivers' tab and click 'Add'.

6. Click 'Have Disk'.

7. Insert the diskette labeled ' Silicon Image SiI 3112 SATA Raid Driver Installation Disk' into A: and press 'Enter'.

8. Choose 'Silicon Image SiI 3112 SATA Raid Controller' and click 'OK'.

9. See instructions in section 4 to verify controller was installed correctly.

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3) Adding the SiI RAID controller to an existing Windows 2000/XP installation

----

Follow the instructions in this section to install the Silicon Image SiI 3112 driver on a system already running Windows 2000.

1.   Power off the system. Connect the hard drives to the SiI 3112 controller and insert the controller into a PCI slot. Power up the system.

2.   During OS boot up, Windows 2000 will display the 'Found New Hardware Wizard'. Click 'Next'.

3.   Select 'Search for a suitable driver for my device (Recommended)' and Click 'Next'.

4.   Under 'Optional search locations' insure that 'Floppy disk drives' is checked.

5.   Insert the diskette labeled ' Silicon Image SiI 3112 SATA Raid Driver Installation Disk' into A: and click 'Next'.

6.   When the wizard indicates that it found a driver for the device click 'Next'.

7.   If the 'Digital Signature Not Found' dialog appears, click 'Yes' to continue installing the driver.

8.   The wizard will now copy the required files to the system and start the driver. After starting the driver the wizard will display a completion dialog, click 'Finish' to exit the wizard.

9.   See instructions in section 4 to verify controller was installed correctly.

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4) Verifying controller installation under Windows NT, 2000 and XP

Follow the instructions in this section to verify that the controller was installed correctly.

For Windows 2000/XP

1. Right click on 'My Computer' icon, select 'Properties', left click on 'Hardware' tab, and then on 'Device Manager' button.

2. Double click on 'SCSI and RAID Controllers', If there is no yellow '! 'or' ? 'in front of 'Silicon Image SiI 3112 SATA Raid Controller', the driver is started correctly.

3. To view information about the devices attached to the controller, use the SiICfg Utility and click on the device from the list.

For Windows NT 4.0

AOpen

1. Double click on 'My Computer' icon, select 'Control Panel', click on 'SCSI Adapters' icon, 'Silicon Image SiI 3112 SATA Raid Controller' should displayed correctly under 'Device' and 'Driver' tab.

2. To view information about the devices attached to the controller, use the SiICfg Utility and click on the device from the list.

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5) Update SiI RAID driver on Windows NT 4.0 with existing Silicon Image driver

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1. After OS boots up, Click 'Start'

2. Under 'Settings', click 'Control Panel'.

3. Select 'SCSI Adapters' from the Control Panel.

4. Select the 'Drivers' tab and click 'Add'.

5. Click 'Have Disk'.

6. Insert the diskette labeled 'Silicon Image SiI 3112 SATA Raid Driver Installation Disk' into A: and press 'Enter'.

7. Choose 'Silicon Image SiI 3112 SATA Raid Controller' and click 'OK'.

8. Refer to instructions in section 4 to verify controller was installed correctly.

----

6) Update SiI RAID driver on Windows 2000/XP with existing Silicon Image driver

----

AOpen

With the Silicon Image controller already plugged in and the driver already installed. Follow the instructions to update SiI RAID driver.

1. Right click on 'My Computer' and select 'Properties'. Under the 'System Properties' section, click on 'Hardware' tab, and then on 'Device Manager' click 'SCSI and RAID Controller' and right click 'Silicon Image Ultra-133 Medley ATA Raid Controller'.

2. Click 'Driver', 'Update Driver' and select 'Search for a suitable driver for my device [Recommended]'. Insert the driver diskette into floppy drive. Click 'Next' and complete the driver installation.

3. System will go through the enumeration process and install the driver. At the end of the process, click 'Yes' to reboot your system when necessary.

4. See instructions in section 4 to verify controller was installed correctly.

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7) Windows 98SE and Windows ME Fresh Installation Instructions

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Follow the instructions in this section if you are performing a new installation of Windows 98SE/ME and you wish to boot from a device attached to the SiI 3112 controller.

You may start up the Windows 98SE/ME installation from CD. If either your Windows 98SE/ME CD or CD-ROM drive is not bootable, your can start up with floppy diskettes.

1. Power off the system.   Connect the hard drives to the SiI RAID controller and insert the controller into a PCI slot. Power up the system

2. Put your Windows 98SE/ME CD into the CD-ROM/DVD drive, and the Windows 98SE/ME boot diskette in the floppy drive if your system cannot boot from the CD.

3. Follow the normal Windows 98SE/ME setup instructions to select your choice for partition and file system.

4. Wait until Windows 98SE/ME finishes installing devices, regional settings, networking settings, components, and final set of tasks, reboot

the system.

5. After the system reboot, right click on 'My Computer' and select 'Properties'. From the 'System Properties' , select 'Device Manager', right click on the '?PCI RAID controller' and select 'Properties' from the pop-up menu.

6. Click 'Driver','Update Driver' and select 'Automatic search for a better driver [Recommended]'. Insert the driver diskette into floppy drive. Click 'Next' and complete the driver installation.

7. System will go through the enumeration process and install the driver. At the end of the process, click 'Yes' to reboot your system.

8. See instructions in section A to verify controller was installed correctly.

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8) First time installing SiI RAID driver with existing Windows 98SE/ME

If you have an existing Windows 98SE/ME system and just obtained a Silicon Image SiI 3112 controller card, you need to run the update program to install Silicon Image driver. The driver package is located in the Silicon Image driver diskette or the diskette provided by OEM vendor.

1. Power off the system.   Connect the hard drives to the SiI 3112 controller and insert the controller into a PCI slot. Power up the system.

2. During the system boot up, the Hardware Wizard will display that it found a ' PCI RAID Controller' , click ' Next' . Select ' Search for the best driver for your device [Recommended]'   and click ' Next' .

3. Check the ' Floppy disk drives' and insert the driver diskette into floppy drive. Click ' Next' .

4. System will go through the enumeration process and install the driver. At the end of the process, Click ' Finish'   to complete the installation. Reboot the system if your Windows 98SE/ME drive is connected on the SiI RAID Controller.

5. See instructions in section A to verify controller was installed correctly.

----

9) Update SiI RAID driver on Windows 98SE/ME with existing Silicon Image driver

----

With the Silicon Image controller already plugged in and the driver already installed. Follow the instructions to update SiI 3112 driver.

1. Right click on 'My Computer' and select 'Properties'. Under 'System Properties', click 'SCSI and RAID Controller' and right click 'Silicon Image Ultra-133 Medley ATA Raid Controller'.

2. Click 'Driver', 'Update Driver' and select 'Automatic search for a better driver [Recommended]'. Insert the driver diskette into floppy drive. Click 'Next' and complete the driver installation.

3. System will go through the enumeration process and install the driver. At the end of the process, click 'Yes' to reboot your system.

4. See instructions in section A to verify controller was installed correctly.

A) Using Control Panel Utility (Windows 98SE/ME)

Follow the instructions in this section to verify that the controller was installed correctly on Win98SE and Windows ME.

1. Right click on 'My Computer' icon, select 'Properties'. Click on 'Device Manager' tab.

2. Double click on 'SCSI and RAID Controllers', if there is no yellow '! 'or ' ? 'in front of 'Silicon Image SiI 3112 SATA Raid Controller', the driver is started correctly.

3. To view information about the devices attached to the controller, use the SiICfg Utility and click on the device from the list.

Glossary

AC97 CODEC

Basically, AC97 CODEC is the standard structure of PCI sound card. As we know, computer is digital-based, but music is based on analog-based. Therefore, there must be a process to turn digital into analog during the last stage processing of sound in computer. Hence, the component on sound card that play this important task is what we called CODEC.

Audio CODEC 97 (briefly called AC97) is the specification regulated by Intel, and it's about the structure of audio conversion. The special place about CODEC is that it is separated from sound card (CODEC is an independent chipset). Therefore, PCI sound card could possess with 90db and do other application process as well. We called CODEC that meets this structure AC97 CODEC.

ACPI (Advanced Configuration & Power Interface)

ACPI is the power management specification of PC97 (1997). It intends to save more power by taking full control of power management to operating system and bypass BIOS. The chipset or super I/O chip needs to provide standard register interface to operating system (such as Windows 98). This is a bit similar as the PnP register interface. ACPI defines ATX momentary soft power switch to control the power state transition.

ACR (Advanced Communication Riser)

Building on the PC motherboard riser architecture, ACR slot is backward compatible with AMR but beyond the limitation of it. The ACR specification is designed to support modem, audio, Local Area Network (LAN) and Digital Subscriber Line (DSL).

AGP (Accelerated Graphic Port)

The main function of AGP simply put is to tell monitor what screen information had to be shown, a visual transmission device actually. With the rapid developing of AGP card, we can see that it had been developed from single colorful AGP card to 2D and 3D graphic. AGP supports only memory read/write operation and single-master single-slave one-to-one only. Though AGP and PCI share the same algorithm of 32-bit, its frequencies are 66MHz and 33MHz respectively. AGP interface had been developed from 2X to 8x.

1X AGP, data transfer rate is 66MHz x 4byte x 1 = 264MB/s
2X AGP, data transfer rate is 66MHz x 4byte x 2 = 528MB/s
4X AGP, data transfer rate is 66MHz x 4byte x 4 = 1056MB/s.
8X AGP, data transfer rate is 66MHz x 4byte x 8 = 2112MB/s.

AMR (Audio/Modem Riser)

The CODEC circuit of AC97 sound/modem solution can be put on motherboard or put on a riser card (AMR card) that connects to motherboard through AMR connector.

ATA (AT Attachment)

Before talking about ATA (AT Attachment), we must understand **DMA** (Direct Memory Access), which allows devices to skip the CPU devices and access memory directly. DMA specification could not only eliminate the workload of CPU, but also accelerate the transmission of data. DMA begins with a data transfer rate of 16.6MB/Sec, but afterward developed to new data rate of 33.3MB/Sec, which is twice the data rate and we called it **Ultra DMA**.   **ATA** details power and data signals between the drive and integrated drive controller and the computer's motherboard. Two drives (master and slave) are supported. The ATA specification allows the drive to connect directly to the ISA bus on the computer. ATA transfer rate then had been developed to 133MHz/Sec and would come out with fastest rate later (please refer to Serial ATA).

DMA, data transfer rate is 16.6MHz/s

Ultra DMA, data transfer rate is 16.6MHz x 2 = 33MB/s.

ATA/66, data transfer rate is 16.6MHz x 4 = 66MB/s.

ATA/100, data transfer rate is 16.6MHz x 6 = 100MB/s.

ATA/133, data transfer rate is 16.6MHz x 8 = 133MB/s.

(ATA/133 uses both rising edge and falling edge as ATA/66 but clock cycle time is reduced to 30ns.)

BIOS (Basic Input/Output System)

BIOS, is a set of assembly routine/program that reside in EPROM or Flash ROM. BIOS controls Input/output devices and other hardware devices of motherboard. In general, to provide hardware independent portability, operation system and drivers is required to access BIOS without directly access hardware devices.

Bluetooth

Bluetooth is a wireless transferring technology that enables short-range wireless connections between desktop and laptop computers, personal digital assistants (PDAs), cellular phones, printers, scanners, digital cameras and even home appliances. The principle of Bluetooth (a chipset) is to transfer information and voices at the frequency of ISM Band. Every Bluetooth technology devices do come with a standard address for you to connect one-to-one or one-to-seven (to form a Pico-net), with transferring range up to 10 meters (100 meters to follow), using low power radio. Bluetooth do not only possess high transfer rate of 1MB/s, it also could be encrypted with pin code. With hopping rate of 1600 hops per second, it's difficult to be intercepted and are less interrupted by electromagnetic wave.

CNR (Communication and Networking Riser)

The CNR specification provides the PC industry the opportunity to deliver a flexible and cost reduced method of implementing LAN, home networking, DSL, USB, wireless, audio and modem subsystems widely used in today's "connected PCs". The CNR specification is an open industry specification and is supported by OEMs, IHV card manufacturers, silicon supplier and Microsoft.

DDR (Double Data Rate) RAM

DDR RAM utilizes the existing SDRAM (For ex, PC-100, PC-133) infrastructure and technology while doubling the nominal bandwidth available to systems in an easy to design and simple to adopt way. Based on FSB frequency, DDR RAM on the market are DDR200, DDR266 and DDR333 with more coming around soon.
DDR200, transfer bandwidth up to 200x64/8=1600MB/s (PC1600)
DDR266, transfer bandwidth up to 266x64/8=2100MB/s (PC2100)
DDR333, transfer bandwidth up to 333x64/8=2700MB/s (PC2700)
DDR400, transfer bandwidth up to 400x64/8=3200MB/s (PC3200)

ECC (Error Checking and Correction)

The ECC mode needs 8 ECC bits for 64-bit data. Each time memory is accessed; ECC bits are updated and checked by a special algorithm. The ECC algorithm has the ability to detect double-bit error and automatically correct single-bit error while parity mode can only detect single-bit error.

EEPROM (Electronic Erasable Programmable ROM)

Also known as E^{2}PROM. Both EEPROM and Flash ROM can be re-programmed by electronic signals, but the interface technology is different. Size of EEPROM is much smaller than flash ROM.

AOpen

EPROM (Erasable Programmable ROM)

Traditional motherboard stores BIOS code in EPROM. EPROM can only be erased by ultra-violet (UV) light. If BIOS has to be upgraded, you need to remove EPROM from motherboard, clear by UV light, re-program, and then insert back.

EV6 Bus

EV6 Bus is the technology of Alpha processor from Digital Equipment Corporation. EV6 bus uses both rising and falling clock edge to transfer data, similar as DDR RAM or ATA/66 IDE bus.
EV6 Bus Speed = CPU external bus clock x 2.
200 MHz EV6 bus, 200MHz = 100 MHz external bus clock x 2

FCC DoC (Declaration of Conformity)

The DoC is component certification standard of FCC EMI regulations. This standard allows DIY component (such as motherboard) to apply DoC label separately without a shielding of housing.

FC-PGA (Flip Chip-Pin Grid Array)

FC means Flip Chip, FC-PGA is a package of Intel for Pentium III for 0.18μm process CPU, which can be plugged into SKT370 socket.

FC-PGA2 (Flip Chip-Pin Grid Array)

After FC-PGA, FC-PGA2 is the package for 0.13μm process CPU developed by Intel, which can be plugged into SKT423/478 socket as well.

AOpen

Flash ROM

Flash ROM can be re-programmed by electronic signals. It is easier for BIOS to upgrade by a flash utility, but it is also easier to be infected by virus. Because of increase of new functions, BIOS size is increased from 64KB to 512KB (4M bit).

Hyper Threading

Hyper-Threading technology is an innovative design from Intel that enables multi-threaded software applications to process threads in parallel within each processor resulting in increased utilization of processor execution resources. As a result, an average improvement of ~40% in CPU resource utilization yields higher processing throughput.

IEEE 1394

IEEE 1394, which also called Firewire, is a serial data transfer protocol and interconnection system. The main feature of the Firewire that assures its adoption for the digital video and audio (A/V) consumer application is its low cost. Fire wire interface is capable of supporting various high-end digital A/V applications, such as consumer A/V device control and signal routing, Digital Video (DV) editing, home networking, and more than 32 channels of digital mixing. Gone are those days of expensive video capture cards. Firewire allows for video capture from both newer DV camcorders with Firewire ports and older analog equipment using A/V to Firewire converters.

The advantages of the IEEE1394:

High data transfer rate – Start from 400 Mbps, (with 800/1600/3200 Mbps coming soon), which is about 30 times faster than USB 1.1.

Supports up to 63 devices (16 - daisy chained) with cable length up to about 4.5 m (14 feet).

Hot-pluggable (like USB). No need to turn of your device to connect or disconnect, and you don't need to reboot your PC. Also, it is a plug-and-play bus.

IEEE1394 is very easy to connect (Like USB1.1/2/0).

Parity Bit

The parity mode uses 1 parity bit for each byte, normally it is even parity mode, that is, each time the memory data is updated, parity bit will be adjusted to have even count "1" for each byte. When next time, if memory is read with odd number of "1", the parity error is occurred and this is called single bit error detection.

PCI (Peripheral Component Interface) Bus

Developed by Intel, Peripheral Component Interconnect (PCI) is a local bus standard. A bus is a channel used to transfer data to (input) and from (output) a computer and to or from a peripheral device. Most PCs have a PCI bus usually implemented at 32-bits providing a 33 MHz clock speed with a throughput rate of 133 MBps.

PDF Format

With PDF file, it is easy to do universal document exchange. Virtually any document may be converted in Portable Document Format (PDF). Contents in PDF documents are exactly the same as the original file, including fonts and graphics, and they can be distributed by e-mail or stored on the World Wide Web, an intranet, a file system, or a CD-ROM for other users to view on any platforms. You may download Acrobat Reader in order to read PDF file from its website (www.adobe.com).

PnP (Plug and Play)

Oversimplified, Plug-and-Play automatically tells the software (device drivers) where to find various pieces of hardware (devices) such as modems, network cards, sound cards, etc. Plug-and-Play's task is to match up physical devices with the software (device drivers) that operates them and to establish channels of communication between each physical device and its driver.

POST (Power-On Self Test)

The BIOS self-test procedure after power-on, sometimes, it is the first or the second screen shown on your monitor during system boot.

PSB (Processor System Bus) Clock

PSB Clock means the external bus clock of CPU.

CPU internal clock = CPU PSB Clock x CPU Clock Ratio

RDRAM (Rambus Dynamic Random Access Memory)

A DRAM technology developed by Rambus Corporation*, to achieve high speed of memory through the use of multiple channels in parallel by 16-bits. Basically, RDRAM uses new structure of Multibank, which is quite different from FPM, EDO, SDRAM. Using different memory module as well, RDRAM uses "RIMM" with transfer rate of 600/700/800MHz, providing bandwidth as high to 1.6GB.

RIMM (Rambus Inline Memory Module)

184-pin memory module that supports RDRAM memory technology. A RIMM memory module may contain up to maximum of 16 RDRAM devices.

SDRAM (Synchronous DRAM)

SDRAM is one of the DRAM technologies that allow DRAM to use the same clock as the CPU host bus (EDO and FPM are asynchronous and do not have clock signal). It is similar as PBSRAM to use burst mode transfer. SDRAM comes in 64-bit 168-pin DIMM and operates at 3.3V, and have been gradually replaced by DDR RAM.

AOpen

SATA (Serial ATA)

The Serial ATA specification is designed to overcome speed limitations while enabling the storage interface to scale with the growing media rate demands of PC platforms. Serial ATA is to replace parallel ATA with the compatibility with existing operating systems and drivers, adding performance headroom for years to come. It is developed with data transfer rate of 150 Mbytes/second, and 300M/bs, 600M/bs to come. It reduces voltage and pins count requirements and can be implemented with thin and easy to route cables.

SMBus (System Management Bus)

SMBus is also called I^2C bus. It is a two-wire bus developed for component communication (especially for semiconductor IC). For example, set clock of clock generator for jumper-less motherboard. The data transfer rate of SMBus is only 100Kbit/s, it allows one host to communicate with CPU and many masters and slaves to send/receive message.

SPD (Serial Presence Detect)

SPD is a small ROM or EEPROM device resided on the DIMM or RIMM. SPD stores memory module information such as DRAM timing and chip parameters. SPD can be used by BIOS to decide best timing for this DIMM or RIMM.

USB 2.0 (Universal Serial Bus)

A Universal Serial Bus (USB) is an external bus (an interconnect) standard that supports data transfer rates of 12 Mbps. A single USB port can be used to connect up to 127 peripheral devices, such as mouse, modems and keyboards. Introduced in 1996, USB has completed replaced serial and parallel ports. It also supports plug-and-play installations and hot plugging Plug-and-play is the ability to add and remove devices to a computer while the computer is running and have the operating system automatically recognize the change. USB 2.0, which supports data transfer rates of 480 Mbps, has been widely used in motherboard these days.

VCM (Virtual Channel Memory)

NEC's Virtual Channel Memory (VCM) is a new DRAM core architecture that dramatically improves the memory system's ability to service multimedia requirements. VCM increases memory bus efficiency and performance of any DRAM technology by providing a set of fast static registers between the memory core and I/O pins. Using VCM technology results in reduced data access latency and reduced power consumption.

Wireless LAN – 802.11b

802.11 is a specification developed by IEEE and Wireless LAN technology, which is an interface between a wireless client and a base station or between two wireless clients.

802.11 families include the following specifications and with more coming:

802.11 = 1 or 2 Mbps transmission in the 2.4 GHz band, using either frequency hopping spread spectrum (FHSS) or direct sequence spread spectrum (DSSS)).

802.11a = 54 Mbps in the 5GHz band, using orthogonal frequency division multiplexing)

802.11b (11 Mbps transmission in the 2.4 GHz band, using direct sequence spread spectrum (DSSS).

ZIP file

A compressed file format to reduce file size. To unzip file, run shareware PKUNZIP (http://www.pkware.com/) for DOS and other operating system or WINZIP (http://www.winzip.com/) for windows environment.

Troubleshooting

If you encounter any trouble to boot you system, follow the procedures accordingly to resolve the problem.

```
                          ╭───────────────╮
                          │     Start     │
                          ╰───────┬───────╯
                                  │
                                  ▼
┌─────────────────────────────────────────────────────────────────┐
│  Turn off the power and unplug the AC power cable, then remove    │
│  all of the add-on cards and cables, including VGA, IDE, FDD,     │
│  COM1, COM2 and printer.                                          │
└─────────────────────────────────┬───────────────────────────────┘
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                                  ▼
        ┌──────────────────────────────────────────────────┐
        │     Make sure if all jumper settings are correct. │
        └────────────────────────┬─────────────────────────┘
                                  │
                                  ▼
        ┌──────────────────────────────────────────────────┐
        │  Clear CMOS, then plug the ATX power cord correctly │
        │  (For P4 system, please also plug the 4pin(+12V) cord) │
        └────────────────────────┬─────────────────────────┘
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                                  ▼
                          ╭───────────────╮
                          │     Next      │
                          ╰───────────────╯
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AOpen

Continue

Install the VGA card. Then connect your monitor and keyboard.

Turn on the power and check if the power supply and CPU fan work properly.

Yes   **No**

Next

The problem is probably caused by power supply or motherboard failure. Please contact your reseller or local distributor for repairing.

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Continue

Check if there is display? — **No** → Perhaps your VGA card or monitor is defective.

Yes

Press <Ctrl> and <Alt> key at the same time, hold them and then press <Del> to reboot the system.

Check if the system reboots? — **No** → It is very possible that your keyboard is defective.

Yes

Next

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Continue

During system rebooting, press <Del> to enter BIOS setup.
Choose "Load Setup Default".

Turn off the system and re-connect IDE cable.

Check if the system can
reboot successfully?

No

The problem should be caused by the IDE cable or HDD itself.

Yes

Re-install the operating system such as Windows XP.

End

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✚ Technical Support

Dear Customer,

Thanks for choosing AOpen products. To provide the best and fastest service to our customer is our first priority. However, we receive numerous emails and phone-calls worldwide everyday, it is very hard for us to serve everyone on time. We recommend you follow the procedures below and seek help before contact us. With your help, we can then continue to provide the best quality service to more customers.

Thanks very much for your understanding!

AOpen Technical Supporting Team

1 **Online Manual:** To download manual, please log on and then select your preferred language. Under "Type" directory, choose "Manuals" to go to our manual database. You can also find the manual and EIG in AOpen Bonus Pack.
http://download.aopen.com.tw/downloads

2 **Test Report:** We recommend you to choose board/card/device from the compatibility test reports for assembling your PC. It may prevent incompatibility problems.
http://english.aopen.com.tw/tech/report/default.htm

3 **FAQ:** Here we list problems that users often encounter and FAQ (Frequently Asked Questions). You may be able to find a solution to your problem.
http://club.aopen.com.tw/faq/

4 **Download Software:** After log on and having language selected, you may get the latest updated BIOS/utility and drivers you need under "Type" directory. In most case, newer versions of drivers and BIOS have solved earlier bugs or compatibility problems.
http://download.aopen.com.tw/downloads

5

eForum: AOpen eForum is provided to discuss our products with other users, in which your problem probably had been discussed before or will be answered. After log on, you may select your preferred language under "Multi-language".
http://club.aopen.com.tw/forum/

6

**Contact Distributors/Resellers:** We sell our products through resellers and integrators. They should know your system configuration very well and should be able to solve your problem efficiently and provide important reference for you.

7

Contact Us: Please prepare detail system configuration and error symptom before contacting us. The **part number**, **serial number** and **BIOS version** are also very helpful.

Part Number and Serial Number

The Part Number and Serial number are printed on bar code label. You can find this bar code label on the outside packing, or on component side of PCB. For example:

Part No.   Serial No.
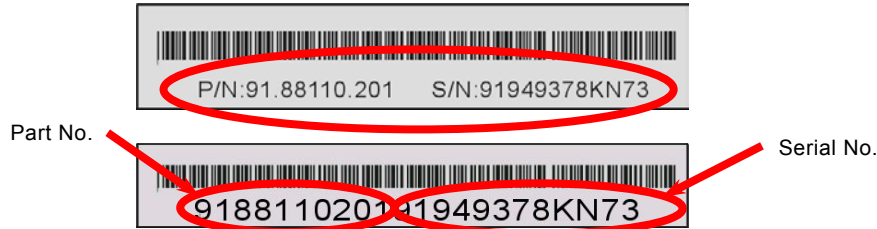
P/N: 91.88110.201 is part number, **S/N: 91949378KN73** is serial number.

Model name and BIOS version

Model name and BIOS version can be found on upper left corner of first boot screen (POST screen). For example:

AX4SG Max R1.00 Jun. 1. 2003 AOpen Inc.

Phoenix-Award Plug and Play BIOS Extension v1.0A

Copyright © 2003, Award Software, Inc.

AX4SG Max is model name of motherboard, **R1.00** is BIOS version.

Product Registration

Thank you for choosing AOpen product. AOpen encourages you to spend few minutes in completing the following product registration. To register your product will ensure the high quality of services from AOpen. After the registration, you will:

- Have opportunities to play online slot machine and win a prize from AOpen by accumulating your bonuses for later prize exchange.
- Be upgraded to gold membership of Club AOpen program.
- Receive email notification about product safety alerts. Its purpose is to alert consumers quickly and conveniently when products contain technical issues.
- Receive email notification about latest product's announcements.
- Be able to personalize your AOpen web pages.
- Receive e-mail notification about latest BIOS/Driver/Software release information.
- Have opportunities to participate special product promotional programs.
- Enjoy higher service priority to receive technical assistance provided by AOpen specialists worldwide.
- Be able to join the discussions of web-based news groups.

AOpen makes sure that the information you provide is encrypted, so that it cannot be read or intercepted by other people or companies. Further, AOpen will not disclose any of information you submitted under any conditions. Please consult our online privacy policy for further information on our company policy.

Note: If registering products purchased from different dealers/retails and/or purchased on different dates, please submit a separate form for each product.

How to Contact Us

Please do not hesitate contact us if you have any problem about our products. Any opinion will be appreciated.

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China 艾爾鵬國際貿易（上海）有限公司 Tel: 86-21-6225-8622 Fax: 86-21-6225-7926	**Germany** AOpen Computer GmbH. Tel: 49-2131-1243-710 Fax: 49-2131-1243-999	**Japan** AOpen Japan Inc. Tel: 81-048-290-1800 Fax: 81-048-290-1820

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