AX4C-G
AX4C Pro
AX4C Max
Online Manual

DOC. NO.: AX4CMAX-OL-E0303A

AOpen

Overview

Hardware

Drivers &

AMIPP

Glossary

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 4.0 for online viewing, it is included in Bonus CD disc 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 AX4C-G / AX4C Pro / AX4C Max motherboard. The AX4C-G / AX4C Pro / AX4C Max is Intel® Socket 478 motherboard (M/B) based on the ATX form factor featuring the Intel® 875P (Canterwood) chipset. As high performance chipset built in the M/B, the AX4C-G / AX4C Pro / AX4C Max motherboard supports Intel® Socket 478 Pentium® 4 and 800/533 MHz Front Side Bus (FSB) clock. In the AGP performance, it supports 1.5V AGP 8X interface and pipelined spilt-transaction long burst transfer up to 2.1GB/sec. According to different customer's requirements, the Intel 875P (Canterwood) chipset memory interface supports DDR400/DDR333 DDR DRAM devices with densities of 128, 256, 512MB and 1GB DDR SDRAM DIMM modules and the maximum memory size can be up to 4 GB. The onboard IDE controller supports Ultra DMA 33/66/100 and Promise (PDC20378) 133 mode with transfer rate up to 133MB/s (AX4C Max only).   With integrated Serial ATA in chipset, it aims to provide you an even faster transfer rate of 150 Mbytes/second (For AX4C Pro which supports RAID 0, and AX4C Max which supports, 0, 1, 0+1 RAID only). On the strength of Broadcom 10/100Mbps LAN Chip (For AX4C Pro only) and Broadcom Gigabit PCI LAN Chip (For AX4C Max only), which is an highly-integrated Platform LAN Connect device, it provides Gigabits or 10/100Mbps Ethernet for office and home use. Besides, the AX4C Pro / AX4C Max has an AC97 CODEC chipset onboard, providing high performance and magic surround stereo sound to let people enjoy working with it. More than that, this motherboard supports USB 2.0 function with a fancy speed of up to 480Mbps, and IEEE 1394 controller (AX4C Max only) to provides data transfer rate up to 400Mbps. Now, let's enjoy all features from AOpen AX4C-G / AX4C Pro / AX4C Max motherboard.
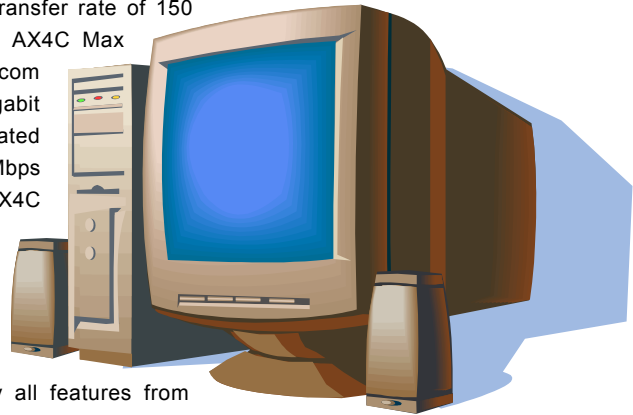
AX4C-G / AX4C Pro / AX4C Max Comparison Table

Following we list functions of all models.   "V" represents those functions that the model equips with and "X" represents functions that models don't have. Please always refer to this page to see the functions of your model.

	AX4C-G	AX4C Pro	AX4C Max
Chipset (NB, SB)	875P (Canterwood), ICH5	875P (Canterwood), ICH5R	875P (Canterwood), ICH5R
LAN Port	X	V	V
IEEE 1394	X	X	V
Serial ATA Ports	X2	x2	x4
RAID	X	V	V
S/PDIF	X	V	V
ATA133	X	X	V
Dr. Voice II	X	V	V
AC'97 CODEC	X	V	V

Feature Highlight

CPU

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

Chipset

With the Intel® 875P (Canterwood) chipset, Intel delivers a discrete graphics solution with all the performance, innovative features and proven reliability of the Intel® 875P (Canterwood) chipset. With its highly scalable design, the new 875P (Canterwood) chipset offers an ideal, leading-edge AGP graphics solution for Intel® Pentium® 4 processor platforms. Additionally, the smart integration in the Intel 875P (Canterwood) chipset's I/O Controller Hub features USB controllers supporting eight USB ports and integrated Serial ATA function (ICH5 for AX4C-G, ICH5R for AX4C Pro, AX4C Max) that offers faster transfer rate of 150Mbps, plus RAID functions of RAID 0 (AX4C Pro) and RAID 0, 1, 0+1 (AX4C Max). With support for 5.1 channels of AC'97 audio (AX4C Pro, AX4C Max only) and the ability to make the most of soft audio/modem technology, the 875P (Canterwood) chipset delivers an ideal solution for innovative new form factors.

Expansion Slots

Including five 32-bit/33MHz PCI, in which PCI 5 is named as Hercules, which is reserved especially for high power-consuming PCI cards, and one AGP 8X slot. The PCI local bus throughput can be up to 132MB/s. For AGP performance, it supports 1.5V AGP interface with 8x Data Transfer capability and pipelined spilt-transaction long burst transfer up to 2.1GB/sec.

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Memory

Provides ECC four 184-pin DDR RAM DIMM sockets that support up to 4GB of DDR400/333 compliant DDR RAM (Synchronous Dynamic Random Access Memory). You may install 128, 256, 512MB or 1GB DDR RAM DIMM modules into each socket.

LAN Port (AX4C Pro and AX4C Max only)

Broadcom 10/100Mbps LAN Chip (For AX4C Pro only) and Broadcom Gigabit PCI LAN Chip (For AX4C Max only), which is an highly-integrated Platform LAN Connect device, it provides Gigabits or 10/100Mbps Ethernet for office and home use.

Ultra DMA 33/66/100, Promise 133 IDE (AX4C Max only)

Comes with an on-board PCI Bus Master IDE controller with two connectors that supports 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. Besides, this motherboard comes with Promise controller (AX4C Max only) that supports 133 mode.

On-board AC'97 Sound (AX4C Pro and AX4C Max only)

AX4C Pro / AX4C Max uses the AC97 sound chip. This on-board audio includes a complete audio recording and playback system.

1MHz Stepping Frequency Adjustment

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

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Watch Dog ABS

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

Die-Hard BIOS II (For AX4C-G, and AX4C Max, and AX4C Pro - User Upgrade Optional)

The Die-Hard BIOS technology is a very effective hardware protection method that doesn't involve any software or BIOS coding. Hence, it is 100% virus free. This motherboard comes with BIOS 1 and BIOS 2 (User Upgrade Optional) that allow you to rescue BIOS 1 with BIOS 2.

S/PDIF Connectors (AX4C Pro and AX4C Max only)

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

IEEE 1394 ports (AX4C Max only)

This motherboard comes with IEEE 1394a controller onboard, which provides data transfer rate up to 400Mbps. to connect with the devices that need high data transferring performance, such as digital camera, scanner or others IEEE 1394 devices.

Eight USB Connectors (2.0)

Provides three ports, eight USB connectors for USB interface devices, such as mouse, keyboard, modem, scanner, etc. 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.

Dr. LED (User Upgrade Optional)

The Dr. LED has 8 LEDs on this AX4C-G / AX4C Pro / AX4C Max M/B to easily show what kind of problems you may encounter.

Power Management/Plug and Play

Supports the power management function that 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.

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) features.

Super Multi-I/O

Provides two high-speed UART compatible serial ports and one parallel port with EPP and ECP capabilities. UART can also be directed from COM1or COM2 to the Infrared Module for the wireless connections.

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 98)
11. Installing Driver and Utility

Motherboard Map

Broadcom 10/100Mbps LAN Chip (AX4C Pro only)

Broadcom Gigabit PCI LAN Chip (For AX4C Max only)

Die-Hard BIOS (BIOS1 & 2) (AX4C-G, AX4C Max) (AX4C Pro–User Upgrade Optional)

Onboard AC'97 CODEC (AX4C Pro, AX4C Max only)

S/PDIF Connector (AX4C Pro, AX4C Max only)

GAME Connector

CD-IN Connector (AX4C Pro, AX4C Max only)

AUX-IN Connector (AX4C Pro, AX4C Max only)

Front Audio Connector (AX4C Pro, AX4C Max only)

WOL Connector (AX4C Pro, AX4C Max only)

WOM Connector (AX4C Pro, AX4C Max only)

32-bit PCI Expansion Slot x5 (Slot 5: Hercules PCI card that supports high power-consuming PCI cards)

IEEE 1394 Connectors x 2 (AX4C Max only)

2nd USB (2.0) Connector

STBY LED

Serial ATA Ports x 4 (AX4C Max with RAID 0, 1, 0+1) (AX4C Pro with RAID 0 only)

Chassis Intrusion Connector

IrDA Connector

Dr. LED Connector (User Upgrade Optional)

Front Panel Connector

SYSFAN3 Connector

JP24 DieHard BIOS Rescue Jumper

JP2 Dr. Voice Output Select Jumper (AX4C Pro, AX4C Max only)

JP14 CMOS Clear Jumper

PC99 Colored Back Panel

Resetable Fuse

JP28 Keyboard/Mouse Wakeup Enable/Disable Jumper

CPUFAN1 Connector with H/W Monitoring Function

SYSFAN2 Connector

3300 μ F Low ESR Capacitors

AGP LED

AGP Slot (For 1.5V AGP card only)

478-pin CPU socket with Voltage and Frequency Auto-detection support Intel® Pentium® 4 CPU

Intel® 875P (Canterwood) and ICH5 chipsets ICH5R (AX4C Pro, AX4C Max)

BOOT LED

4-pin 12V. ATX Power Connector

184-pin DIMMx4 support DDR400/333 (Max. to 4GB)

ATX Power Connector

FDD Connector

ATA 33/66/100 IDE Connector x2

Promise ATA133 IDE Connector x1 (AX4C Max only)

AX4C Pro

Block Diagram

DDR400/333 DDR RAM Up to 4GB

Hercules PCI slot

32-bit PCI Slot x5

DIMM Socket x4

PCI Bus

Promise PDC20378

Serial ATA

SATA Drive x2

Socket 478 Intel Pentium 4 CPU

800/533MHz System Bus

Third Channel ATA 133

Intel 875P

ATA 33/66100

Primary Channel

Secondary Channel

IDE Drive x6

AGP 8x Slot

SATA Drive x2

Intel ICH5 (AX4C-G) Intel ICH5R (AX4C Pro, AX4C Max)

AC97 CODEC

(AX4C Pro and AX4C Max only)

LAN connect Component

Broadcom 10/100Mbps LAN (AX4C Pro) Broadcom Gigabit LAN (AX4C Max)

IEEE 1394

IEEE 1394 Connector x 2 (AX4C Max only)

(AX4C Pro and AX4C Max only)

USB 2.0 Connector x8

1st USB Port

Low Pin Count Super I/O

Firmware Hub

2nd USB Port

4Mbit Flash EEPROM

3rd USB Port

4th USB Port

Parallel Port

Floppy Disk Drive x2

Serial Port 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.*

About "Manufacturer Upgrade Optional" and "User Upgrade Optional"…

When you read this online manual and start to assemble your computer system, you may find some of functions are called "Manufacturer Upgrade Optional", and some are called "User Upgrade Optional". Though all AOpen motherboards include many amazing and powerful features, in some situations, these powerful features are not used to every user. Hence, we changed some key features as "Manufacturer Upgrade Optional" for you to choose. Some optional functions that can be upgraded by users, we call them "User Upgrade Optional". As for those optional functions that can't be upgraded by ourselves, we call them "Manufacturer Upgrade Optional". If needed, you can contact our local distributors or resellers for purchasing "User Upgrade Optional" components, and again you can visit AOpen official web site: http://english.aopen.com.tw/ for more 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 pins 1 & pin2.

5. Connect ATX power cable back to connector PWR2.

Pin 1

1   1

Clear CMOS   **Normal Operation**
(default)
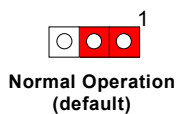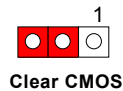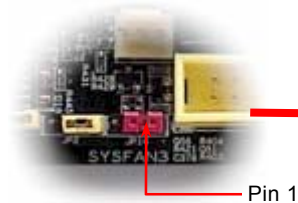
Tip: When should I Clear CMOS?

1. Boot fail because of overclocking…

2. Forget password…

3. Troubleshooting…

CPU Installation

This motherboard supports Intel® Pentium 4 Socket 478 series CPU. 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 a cut edge 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
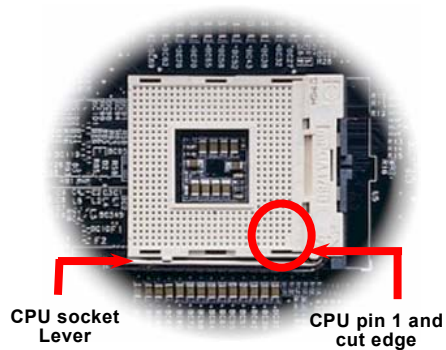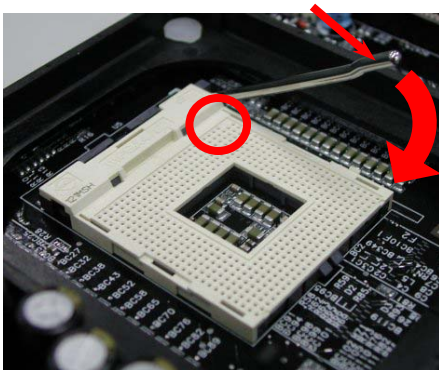
CPU cut edge

Note: These pictures are for example only, it may not exactly be the same motherboard.

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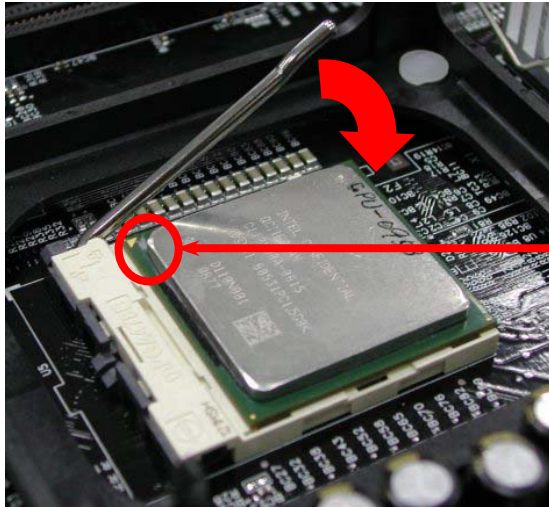
CPU cut edge

Note: If you do not match the CPU socket Pin 1 and CPU cut edge well, it 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 exactly be the same motherboard.

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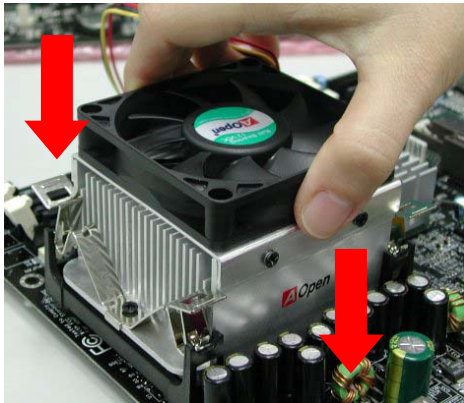
2. Pressing down the four clips with force one by one on the retention module.

Clip
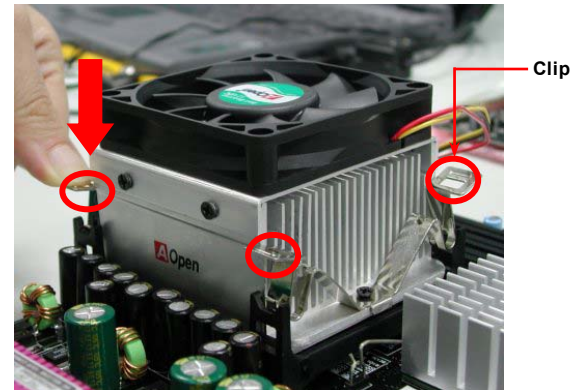
CPU Jumper-less Design

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 CPU

Clock Generator

BIOS Controlled Circuit

CPU Freq. Ratio

CPU VID signal

CPU voltage

Power Regulator

(Automatically generates CPU voltage)
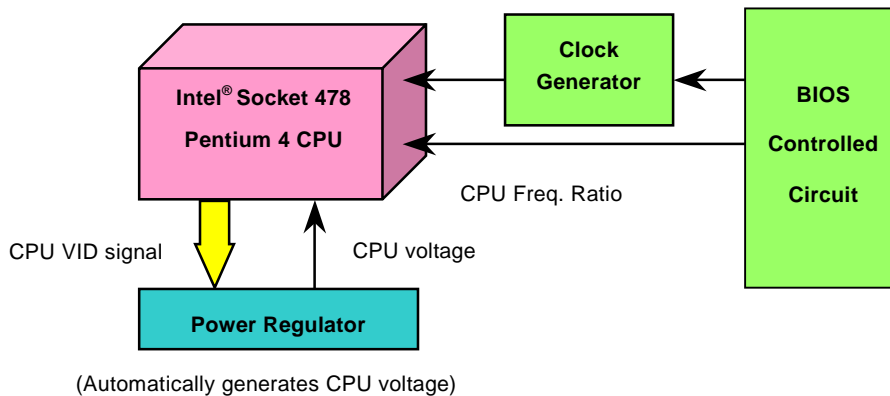
AOpen "Watch Dog ABS"

With this motherboard, AOpen provides a very special, useful feature 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 by user's setting that stored in the BIOS. If system failed in BIOS POST, the "Watch Dog ABS" 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 higher system performance, and without removing the cover of system housing to set the jumper to clear CMOS data when your system hanged.

Enable/Disable Signal
from BIOS

BIOS

Reset Signal

**AOpen
Watch Dog ABS**

Clock Generator

CPU ID Signal

Countdown about
5 seconds if fails
in POST

CPU
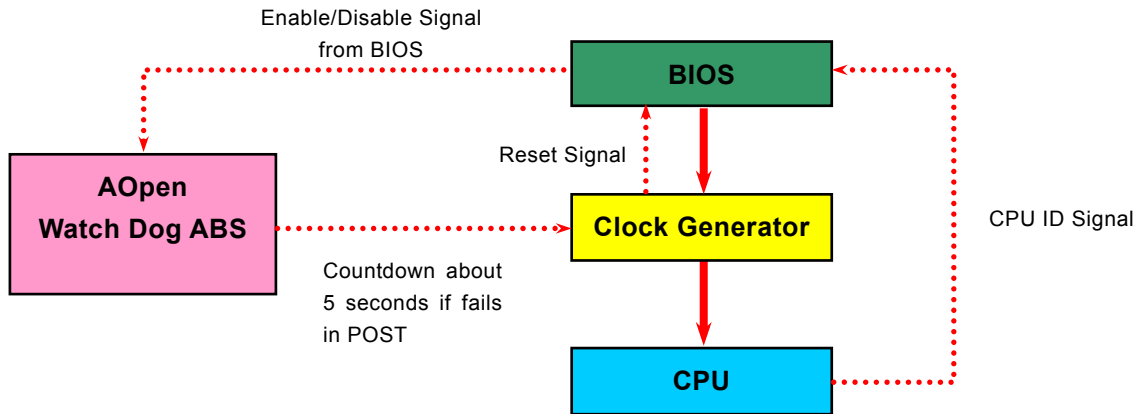
CPU Core Voltage Auto Detectable

This motherboard supports CPU VID function. The CPU core voltage will be automatically detected and the range is from 1.1V to 1.925V. It is not necessary to set CPU Core Voltage.

Setting CPU Frequency

BIOS Setup > Frequency/Voltage Control > CPU Clock Setting

This motherboard is CPU jumper-less design, you can set CPU frequency through the BIOS setup, and no jumpers or switches are needed.

CPU Ratio	8x, 9x, 10x,…22x, 23x…39x
CPU FSB	133~200MHz
1MHz Stepping CPU Overclocking	100~400MHz

Home

Tip: *If your system hangs or fails to boot because of overclocking, simply use <Home> key to restore the default setting or you can wait the AOpen "Watch Dog ABS" reset the system after five seconds and system will auto-detect hardware again.*

Tip: *The North Bridge of Canterwood does supports "Turbo mode", which is used to lower latency paths from FSB to system memory that enhances the system performance, when it is set at FSB800 and DDR400 mode.*

Core Frequency = CPU FSB Clock * CPU Ratio

PCI Clock = CPU FSB Clock / Clock Ratio

AGP Clock = PCI Clock x 2

Northwood CPU	CPU Core Frequency	FSB Clock	System Bus	Ratio
Pentium 4 1.6G	1600MHz	133MHz	533MHz	12x
Pentium 4 1.7G	1700MHz	133MHz	533MHz	13x
Pentium 4 2.26G	2260MHz	133MHz	533MHz	17x
Pentium 4 2.4G	2400MHz	133MHz	533MHz	18x
Pentium 4 2.53G	2530MHz	133MHz	533MHz	19x
Pentium 4 2.66G	2660MHz	133MHz	533MHz	20x
Pentium 4 2.80G	2800MHz	133MHz	533MHz	21x
Pentium 4 3.0G	3000MHz	200MHz	800MHz	15x
Pentium 4 3.06G	3060MHz	133MHz	533MHz	23x

Note: Since the latest processor, Northwood, would detect the clock ratio automatically, you may not be able to adjust the clock ratio in BIOS manually.

Warning: Intel[®]   875P (Canterwood)   chipset   supports maximum   800/533MHz (200/133MHz*4) system bus and 66MHz AGP clock; higher clock setting may cause serious system

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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.

GND
+12V
SENSOR

CPUFAN1 Fan Connector

GND
+12V
SENSOR

SYSFAN2 Connector

SENSOR   GND
      +12V

SYSFAN3 Connector
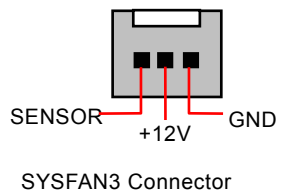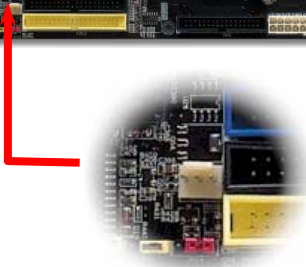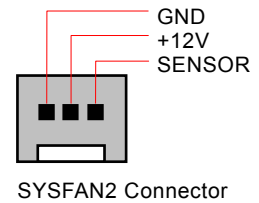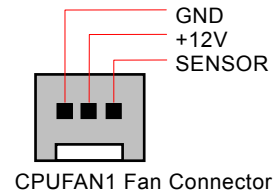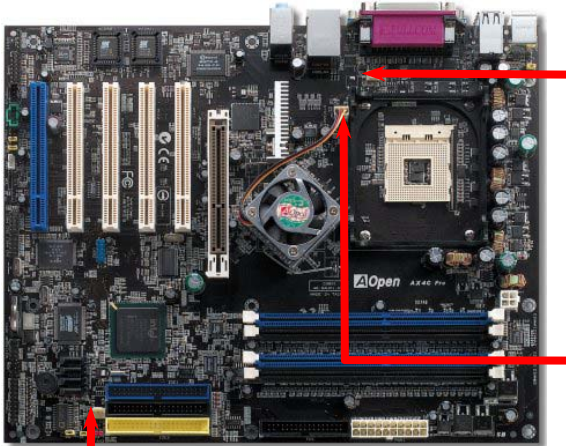
Note: Some CPU fans do not have sensor pin, so that cannot support hardware monitoring function.

JP28 Keyboard/Mouse Wake-up Enable/Disable Jumper

This motherboard provides 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 installed. The factory default setting is set to "Disable"(1-2), and you may enable this function by setting the jumper to 2-3.
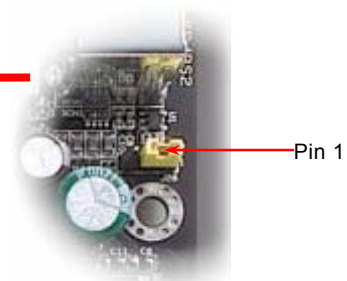
Pin 1

JP28

KB/Mouse Wake-up

Pin 1

Disable
(Default)

Enable

DIMM Sockets (128-Bit DDR Dual Channel)

This motherboard has four 184-pin DDR DIMM sockets that allow you to install DDR400 or DDR333 memory up to 4 GB. ECC DDR RAM is supported. Newly implemented function, the Voltage of memory on this motherboard is adjustable from 2.5V to 2.65V (such as 2.5V, 2.55V, 2.6V, 2.65V, 2.7V, 2.8V) for over clocking purpose.

In the past, we used to have 64-bit memory bandwidth for memory access. No matter how many memory modules have been installed, though capacity added, the speed of access remains the same. With 128-bit dual channel introduced, it doubles the memory bandwidth up to 5.4GB in advanced 128-bit mode. This motherboard supports DDR400/333 with Maximum capacity up to 4GB.

DIMM1
DIMM2
DIMM3
DIMM4
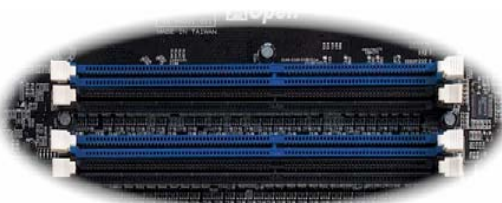
128-bit DDR Dual Channel Memory module
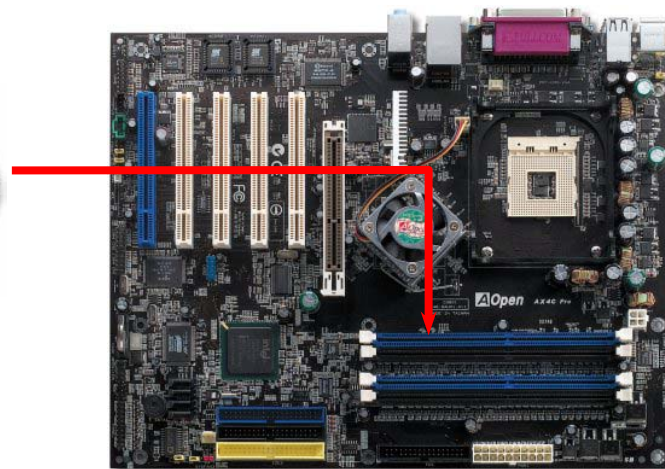
How to Install Memory Modules

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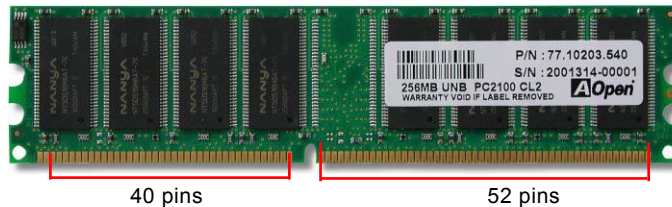
2. Insert the module straight down to the DIMM slot with both hands and press down firmly until the DIMM module is securely in place.

Tab →

Note: The tabs of the DIMM slot will close-up to hold the DIMM in place when the DIMM touches the slot's bottom.
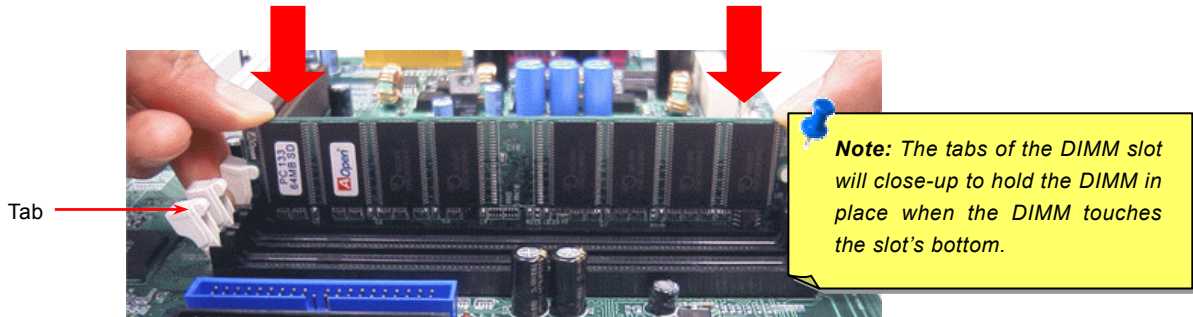
3. Repeat step 2 to finish additional DIMM modules installation.

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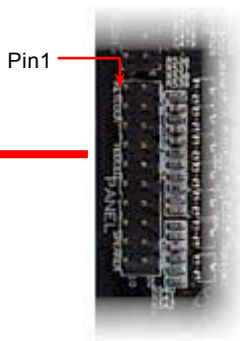
Attach the power LED, speaker, power and reset switch connectors to the corresponding pins. If you enable "Suspend Mode" item in BIOS Setup, the ACPI & Power LED will keep flashing while the system is in suspend mode.

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)	Blinking between green and red.
Suspend to Disk (S4)	The LED will be turned off

Pin1

1

SPWR

IDE LED

ACPI & PWR LED

ACPI LED (BLUE)

Speaker

Reset

1

NC			SPWR
NC			GND
+5V			ACPI LED-
IDE LED			GND
IDE LED			ACPILED
+5V			NC
+5V			ACPI_B
GND			GND
NC			RESET
SPEAKER			GND
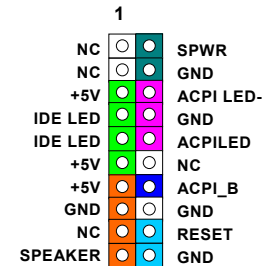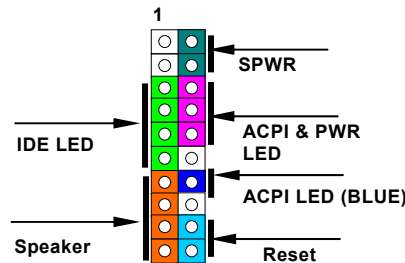
ATX Power Connector

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.

20-Pin Power Connector

COM	+5V
+5V	COM
COM	PW-OK
+3.3V	5VSB
+3.3V	+12V
+3.3V	+5V
-12V	+5V
COM	-5V
PS-ON	COM
COM	COM

Ground
+12V
+12V
Ground
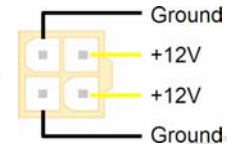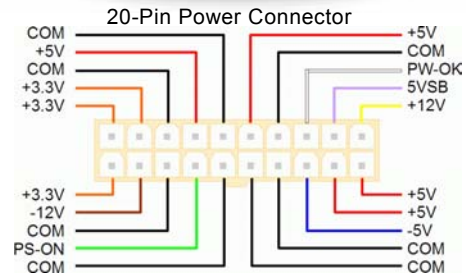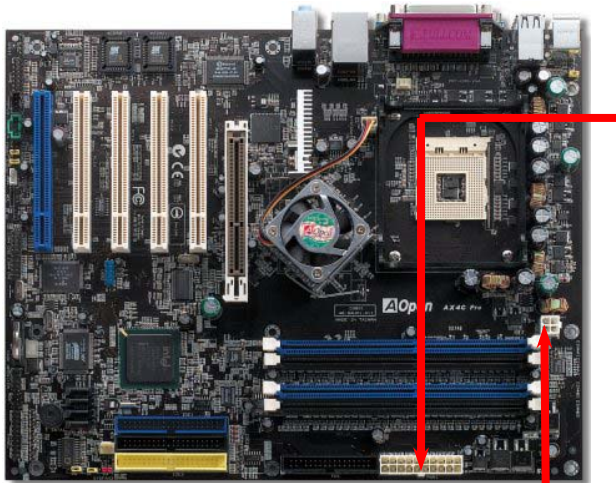
4-Pin 12V ATX Power Connector

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.

STBY LED and BOOT LED

Both STBY LED and BOOT LED are AOpen's considerate designs that 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.

BOOT LED will keep blinking when you power the system on and when your system is under POST (Power-On Self Test). After POST diagnoses everything alright and finishes the booting, the LED will stay on otherwise it will remain flashing to warn you that mistakes have occurred during POST.

BOOT LED

STBY LED

Warning: Do not install or remove the DIMM module or others devices when the STBY LED lights on.
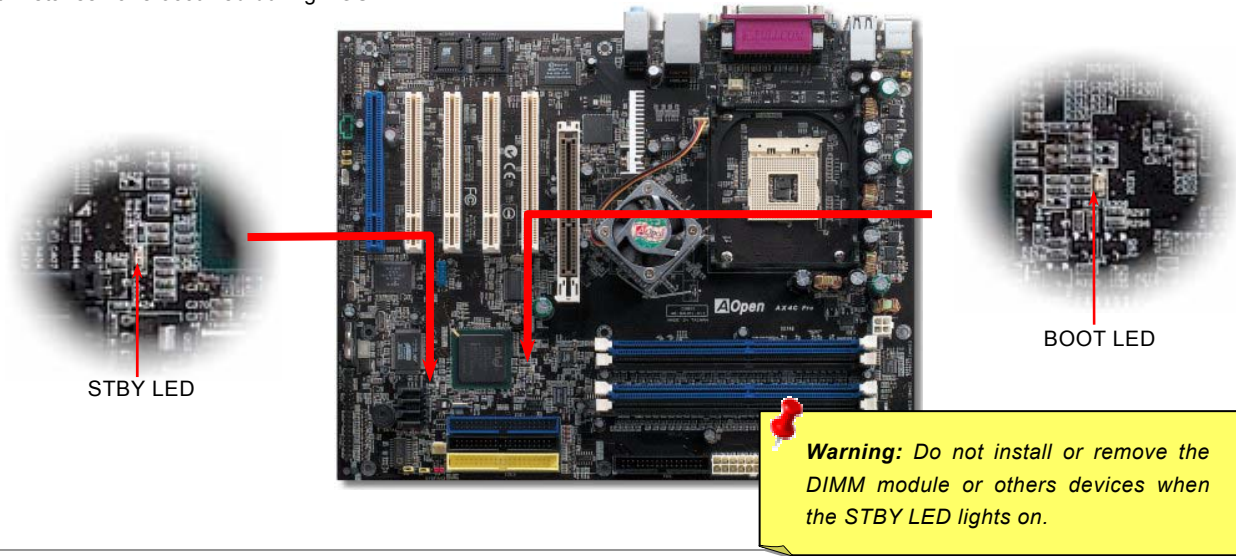
IDE and Floppy Connector

Connect 34-pin floppy cable and 40-pin IDE cable to floppy connector FDC and IDE connector. The blue connector is IDE1 for clear identification. Be careful of the pin1 orientation. Wrong orientation may cause system damage.

Primary Slave (2nd)

Primary Master (1st)

IDE 1 (Primary)
IDE 2 (Secondary)

Pin 1

Secondary Slave (4th)

Secondary Master (3rd)

ATA 33/66/100
IDE Connector

ATA133
IDE Connector
(AX4C Max only)

Pin 1

Pin 1

FDD Connector

AOpen
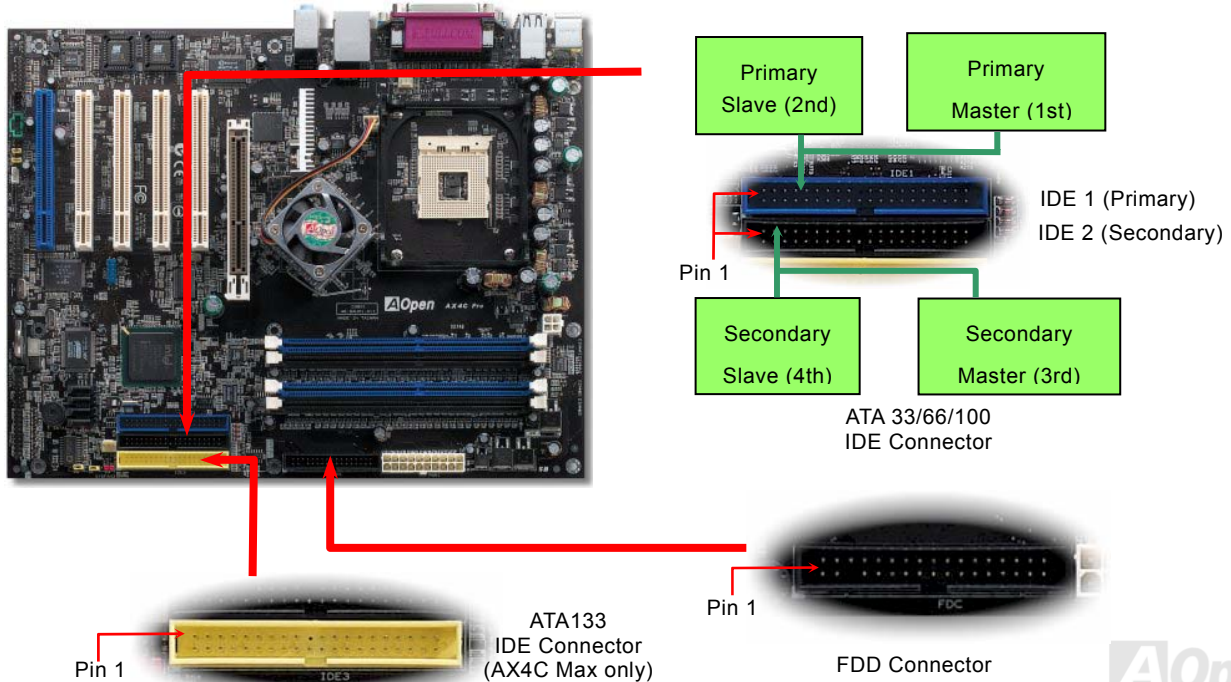
IDE1 is also known as the primary channel, IDE2 and IDE3 are known as the secondary and third channel. Each channel supports two IDE devices that make a total of six devices. In order to work together, the two devices on each channel must be set differently to **Master** and **Slave** mode. Either one 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.

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

Tip for ATA133 IDE:

1. *It is not recommend using CD-ROM for ATA133 IDE.*

2. *Please set it to Master when there is only ONE device connected.*

Tip:

3. *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*

4. *To achieve the best performance of Ultra DMA 66/100/133 hard disks, a special **80-wires IDE cable** for Ultra DMA 66/100/133 is required.*

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ATA/133 Supported (AX4C Max only)

This motherboard supports ATA66, ATA100 or ATA133 IDE devices. Following table lists the transfer rate of IDE PIO and DMA modes. The IDE bus is 16-bit, which means every transfer is two bytes. As the hard drive industry introduces faster and higher capacity hard drives, the current Ultra ATA/100 interface causes a data bottleneck between the drive and the host computer. To avoid this problem, hard disk manufacturers have introduced the new Ultra ATA-133 interface technology. Compared to traditional ATA/100, ATA/133 has up to 33 percent increase in interface speed with transfer rate of 133MB/s. ATA/133 performance is ideal for new operating systems, such as Window XP, that demand more storage space and faster data transfer rates from more responsive computing experiences.

To make good use of this new technology and enjoy its best performance, we recommend you to pair your system with a hard disk equipped with ATA/133 technology so that your system's need for speeding on this motherboard can be satisfied.

Mode	Clock Period	Clock Count	Cycle Time	Data Transfer Rate
PIO mode 0	30ns	20	600ns	(1/600ns) x 2byte = 3.3MB/s
PIO mode 1	30ns	13	383ns	(1/383ns) x 2byte = 5.2MB/s
PIO mode 2	30ns	8	240ns	(1/240ns) x 2byte = 8.3MB/s
PIO mode 3	30ns	6	180ns	(1/180ns) x 2byte = 11.1MB/s
PIO mode 4	30ns	4	120ns	(1/120ns) x 2byte = 16.6MB/s
DMA mode 0	30ns	16	480ns	(1/480ns) x 2byte = 4.16MB/s
DMA mode 1	30ns	5	150ns	(1/150ns) x 2byte = 13.3MB/s
DMA mode 2	30ns	4	120ns	(1/120ns) x 2byte = 16.6MB/s
ATA33	30ns	4	120ns	(1/120ns) x 2byte x 2 = 33MB/s
ATA66	30ns	2	60ns	(1/60ns) x 2byte x 2 = 66MB/s
ATA100	20ns	2	40ns	(1/40ns) x 2byte x 2 = 100MB/s
ATA133	15ns	2	30ns	(1/30ns) x 2byte x 2 = 133MB/s

AOpen

Serial ATA Supported (with RAID function)

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.
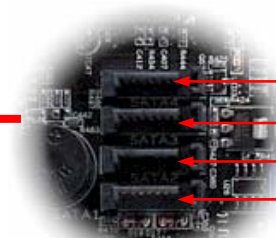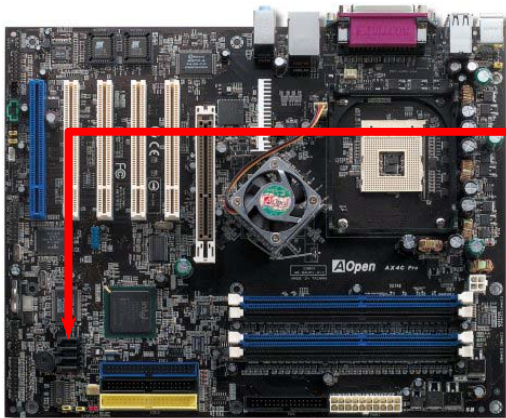
SATA 4 port (PDC20378)
SATA 3 port (PDC20378)
SATA 2 port1 (ICH5, ICH5R)
SATA 1 port0 (ICH5, ICH5R)

Serial ATA Ports

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 connecting two serial ATA disks, the system will automatically take the one connected to "Serial ATA 1" header as a master disk. Please be noted that it doesn't support Hot-Plug in function.
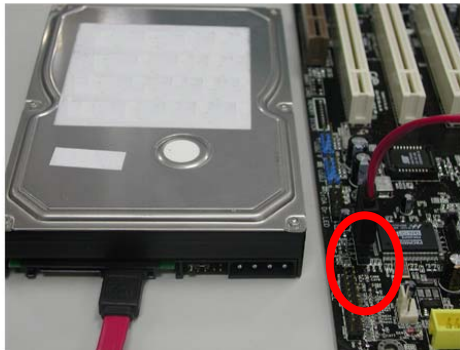
Comparison between Parallel ATA and Serial ATA

	Parallel ATA	**Serial ATA**
Bandwidth	100/133 MB/Secs	150/300/600 MB/Secs
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

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NEW!

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 → OnChip 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
```
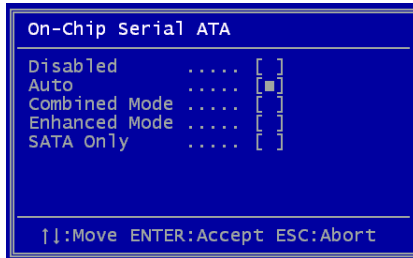
1. **Disabled**: You may choose this item if you're sure that only traditional IDE hard disks had been installed on your system. Disabling this item may also cancel the detection to Serial ATA hard disk during POST, which theoretically, could speed up your boot-up timing for a little bit; however, please 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, WindowsXP, 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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IrDA Connector

The IrDA connector can be configured to support wireless infrared module, with this module and application software such as Laplink or Windows 95 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 ————

```
            1
    NC  ⊙ ▢  KEY
   +5V  ⊙ ⊙  GND
 IR_TX  ⊙ ⊙  IR_RX
```
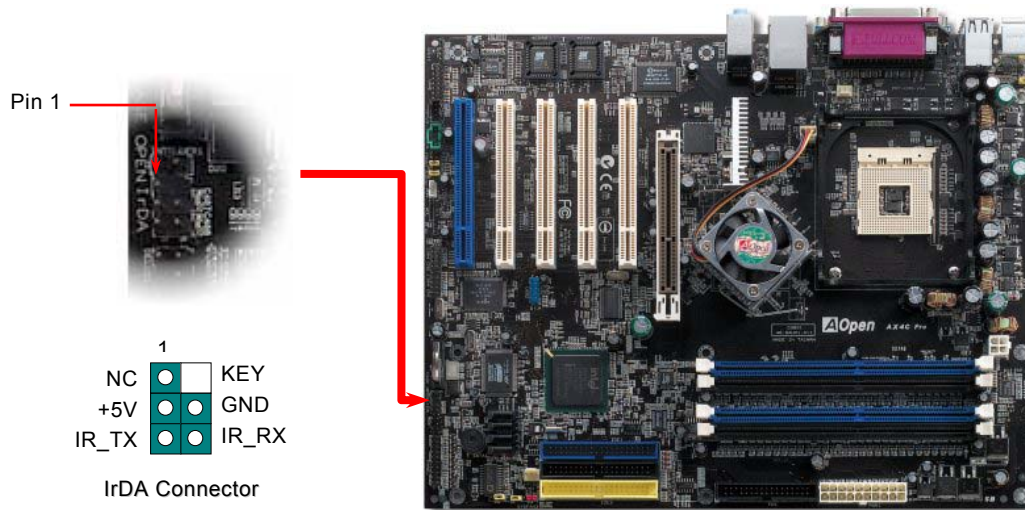
IrDA Connector

S/PDIF (Sony/Philips Digital Interface) Connector (AX4C Pro, AXC Max only)

S/PDIF (Sony/Philips Digital Interface) is a newest audio transfer file format, which provides impressive audio quality through optical fiber and allows you to enjoy digital audio instead of analog audio. 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 better audio quality. Through a specific audio cable, you can connect the S/PDIF connector to other end of the S/PDIF audio module, which bears S/PDIF digital output. However, you must have a S/PDIF supported speaker/amplifier/decoder with S/PDIF digital input to connect to the S/PDIF digital output to make the most out of this function.

(RCA)
S/PDIF OUT
S/PDIF IN
S/PDIF OUT
S/PDIF IN
(Optical)

S/PDIF Cable

S/PDIF Module
(User Upgrade Optional)

Pin 1

S/PDIF Connector

1 +5V
   NC
   S/PDIFOUT
   GND
   S/PDIFIN
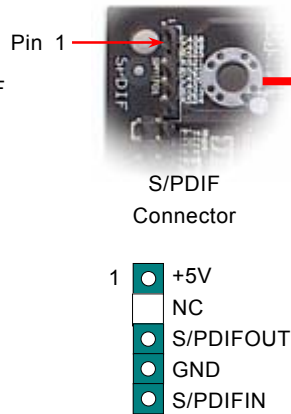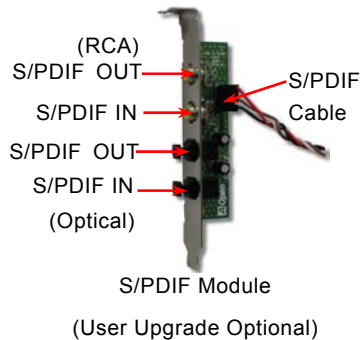
Super 5.1 Channel Audio Effect (AX4C Pro, AX4C Max only)

This motherboard comes with an ALC650 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 5.1Channel sound track. 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.
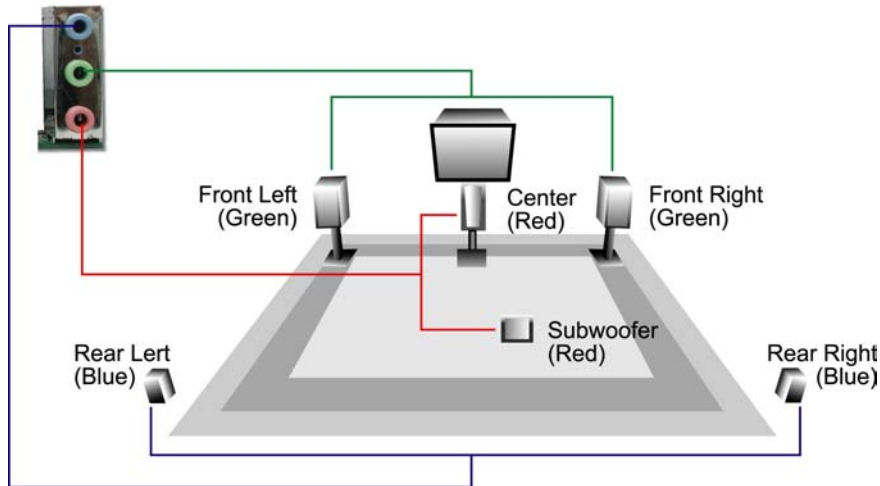
AGP 8X Slot

With Intel 875P (Canterwood) chipset implemented, this motherboard supports AGP function of 8X, it supports 1.5V AGP card only (adjustable by 0.033 steps, such as 1.5V, 1.55V, 1.6V, 1.65V and 1.7V), please do not insert 3.3V AGP card, otherwise, it could cause serious damage to the motherboard. Other than that, you could even adjust frequency between variations from 64MHz to 100MHz through BIOS.

Additionally, AOpen provide sets of AGP/PCI frequencies for overclockers to manually overclock AGP/PCI frequency while taking care of the system stability at the same time (but will be automatically disabled when connecting any Serial ATA device).
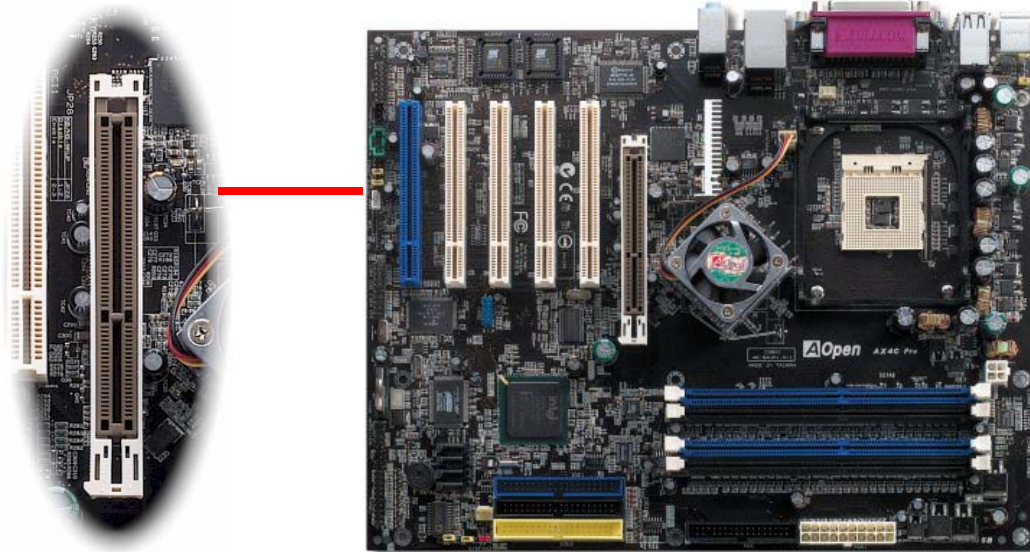
AGP Protection Technology and AGP LED

With the outstanding R&D ability of AOpen and its specially developed circuit, this model 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, 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.
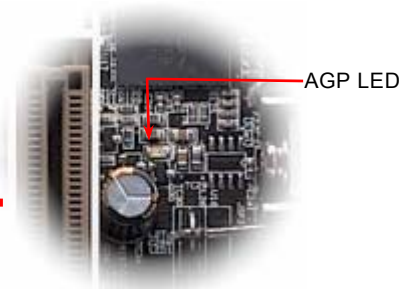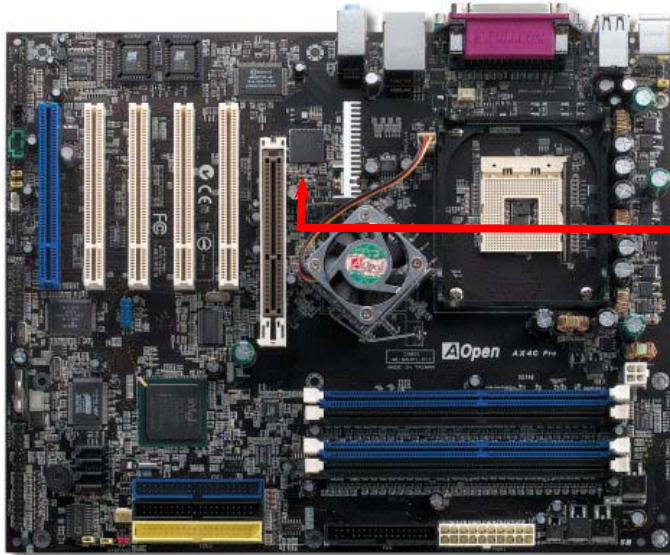
AGP LED

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

Hercules PCI Slot

Spotted easily among other PCI slots onboard, this Hercules PCI slot comes in a special BLUE color to illustrate its uniqueness and usefulness.

As independent as Hercules is, it comes in a separate set of 3.3 volt power circuitry which supplies needed current and making it virtually free from the "loading issue" of traditional PCI slot. In addition, traces around this specially designed slot power delivery are upgraded in terms of their trace thickness, making its signals much more robust than their fellow PCI slots onboard.

When building machines with PCI cards which requires higher power, such as SCSI and RAID cards, the card installed on this slot will never be affected under heavy loading conditions such as all onboard PCI slots being fully populated. Hercules PCI keeps supplying you best performance and stability.

Last but not least, if your computer comes with an ordinary SPS (Switching Power Supply), Hercules PCI Slot demonstrates superior compatibility and reliability.
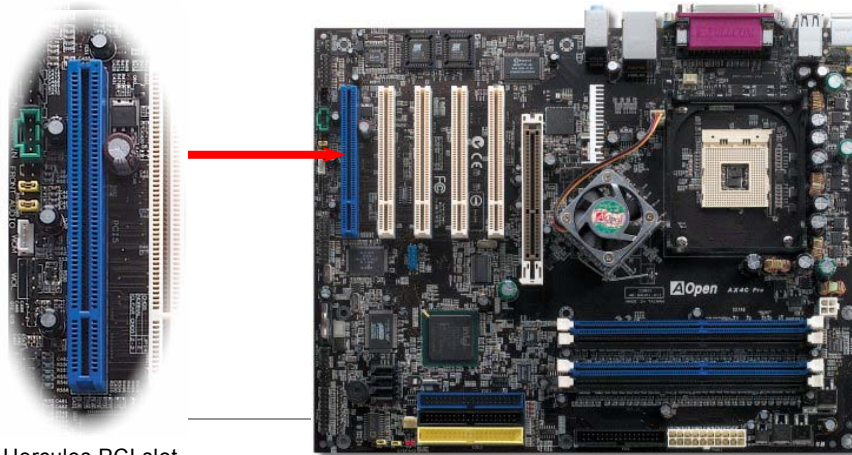
Hercules PCI slot

WOM (Zero Voltage Wake on Modem) Connector

This motherboard implements special circuit to support Wake On Modem, both internal modem card and external box modem are supported. Since internal modem card consumes no power when system power is off, it is recommended to use an internal modem. To use internal modem, connect 4-pin cable from **RING** connector of modem card to the **WOM** connector on the motherboard.
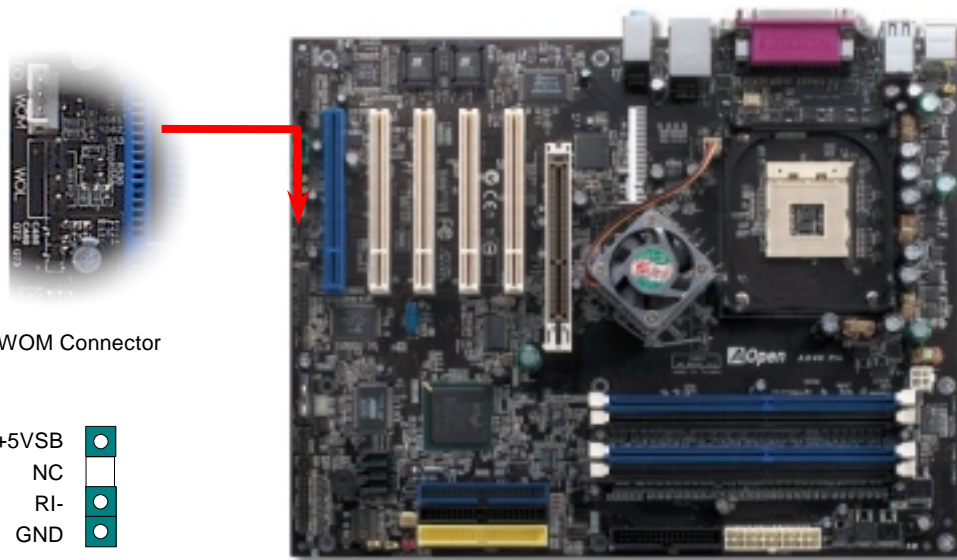
WOM Connector

+5VSB
NC
RI-
GND

WOM by External Box Modem

Traditional Green PC suspend mode does not really turn off the system power supply, it uses external box modem to trigger MB COM port and resume back to active.

Serial Port
(Modem Side)

Serial Port
(Motherboard Side)
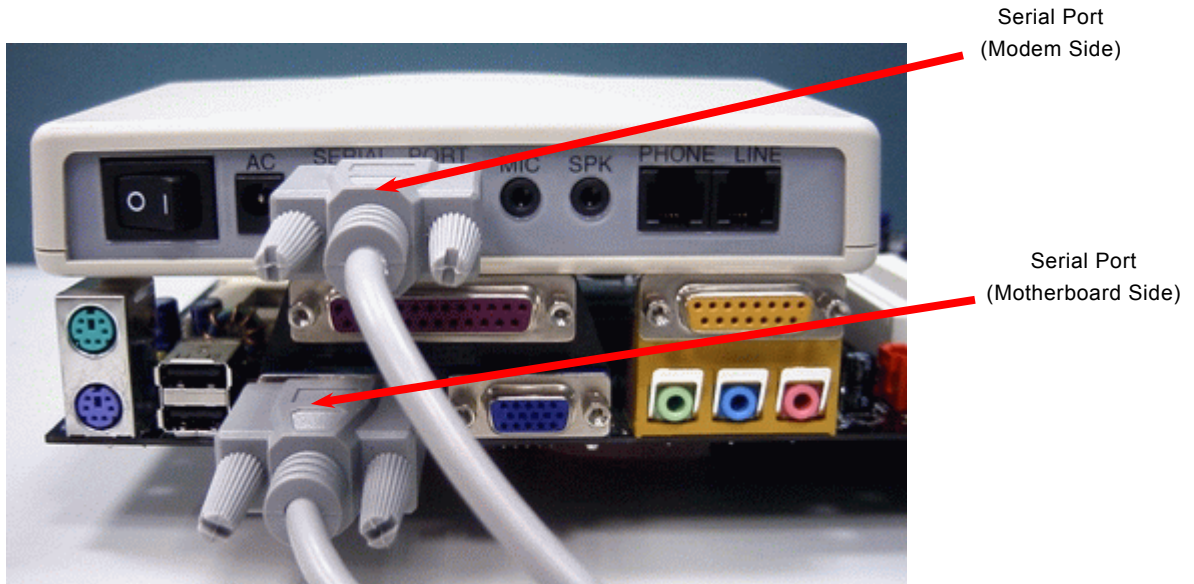
Note: This picture is for example only; it may not exactly be the same motherboard.

WOM by Internal Modem Card

With the help of the ATX soft power On/Off, it is possible to have a system totally power off, and wakeup to automatically answer a phone call as an answering machine or to send/receive a fax. You may identify whether or not your system is in true power off mode by checking to see if the fan of your power supply is off. Both an external box modem and an internal modem card can be used to support Modem Wake Up, but if you use an external modem, you have to leave your box modem on.
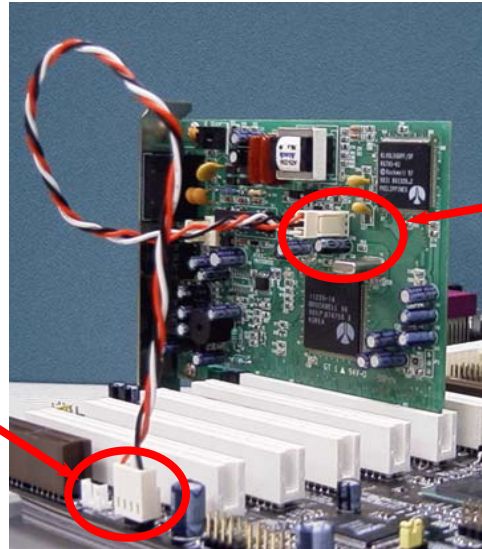
WOM Connector
(Modem Card
Side)

WOM Connector
(Motherboard Side)

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

WOL (Wake on LAN)

This feature is very similar as Wake On Modem, but it goes through local area network. 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.
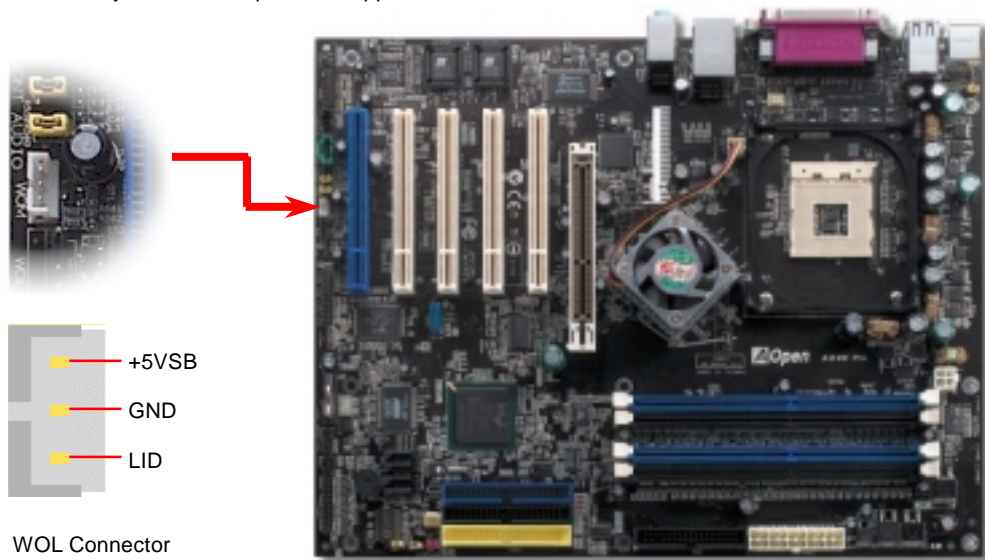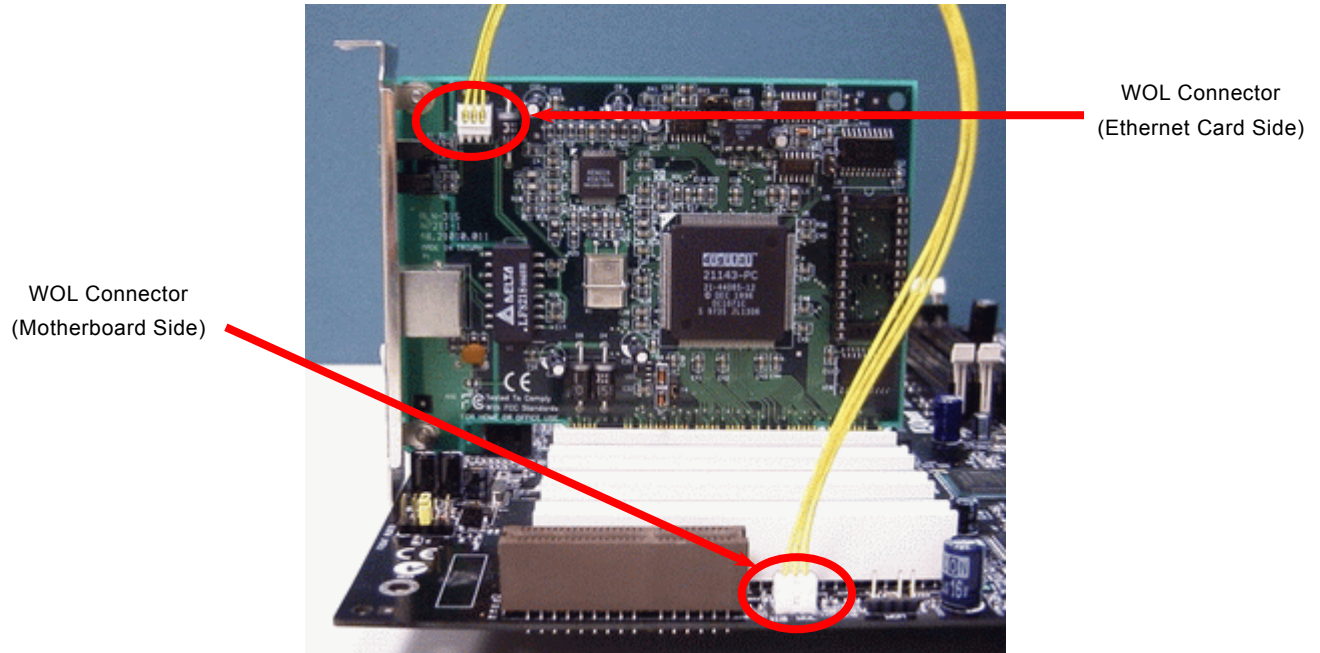
+5VSB

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.

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PC99 Color Coded Back Panel

The onboard I/O devices are PS/2 Keyboard, PS/2 Mouse, COM1 and COM2, RJ45 LAN (AX4C Pro, AX4C Max only), Printer, USB2.0, AC97 sound   (AX4C Pro, AX4C Max only) and game ports. The view angle of drawing shown here is from the back panel of the housing.
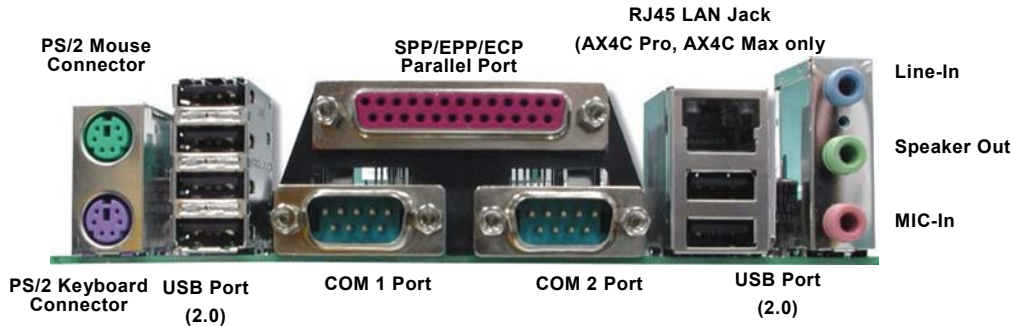
PS/2 Keyboard: For standard keyboard, which is using a PS/2 plug.
PS/2 Mouse: For PC-Mouse, which is using a PS/2 plug.
USB Port: Available for connecting USB devices.
Parallel Port: To connect with SPP/ECP/EPP printer.
COM1/COM2 Port: To connect with pointing devices, modem or others serial devices.
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.

Support Gigabit or 10/100Mbps LAN onboard (AX4C Pro, AX4C Max only)

On the strength of Broadcom Gigabit LAN controller (AX4C Max) or Broadcom 10/100Mbps LAN controller (AX4C Pro) on board, which is a highly-integrated Platform LAN Connect device, it provides Gigabits or 10/100Mbps Ethernet for office and home use, the Ethernet RJ45 connector is located on top of USB connectors. The right-hand side LED indicates the link mode, it blinks in orange whenever linking to network. The left-hand side LED indicates the Connecting mode, and it lights in green when 100Mbps LAN is connected (never lights while 10Mbps is connected), but lights in orange when Gigabits LAN is connected. To enable or disable this function, you may simply adjust it through BIOS.

Connecting (Left)
Green (100Mbps)
Orange (Gigabit)

Linking (Right)
Orange
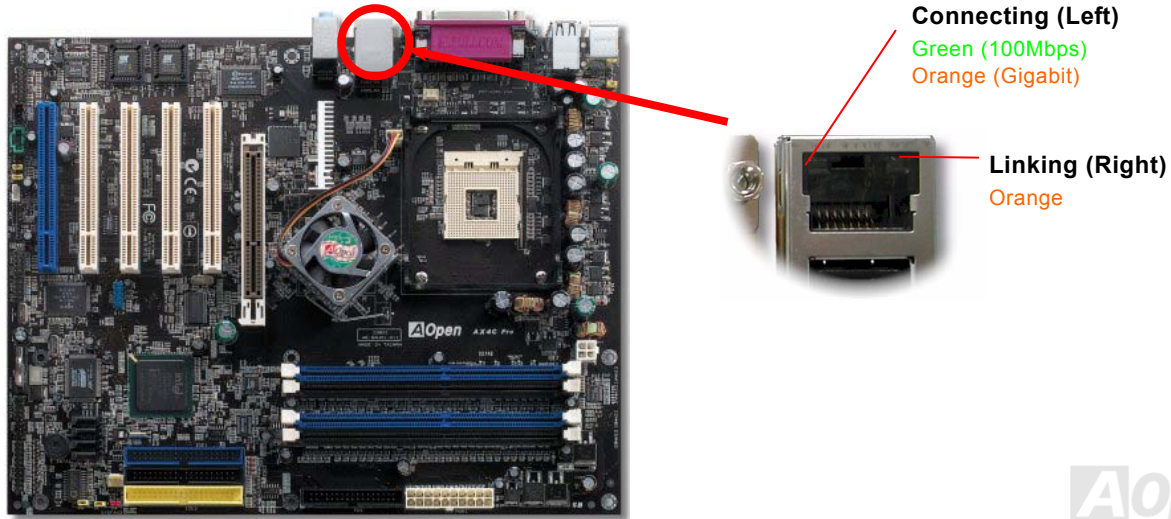
Support Eight USB2.0 Connectors NEW!

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 USB connectors support USB 2.0 function. To connect those two headers, you have to use proper USB cables and connect them to any USB models.
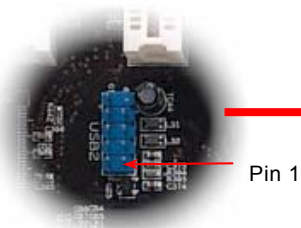
Pin 1

USB2 Connector

NC		KEY
GND-		GND
SBD3+		SBD2+
SBD3-		SBD2
+5V		+5V

1
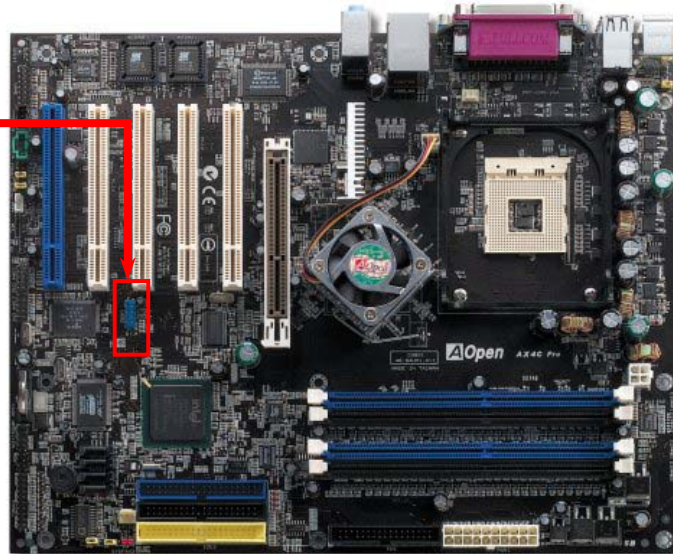
Onboard IEEE 1394 Controller (AX4C Max only)

This motherboard comes with AGERE 1394 Control Chip (FW323) onboard. The IEEE 1394 provides data transfer rate up to 400Mbps, and USB 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.

Pin 1

IEEE 1394
Port 1 & 2

```
              10   9
Shielding GND [ o | ] KEY
   1394_PWR   [ o | o ] 1394_PWR
      TPB-    [ o | o ] TPB+
      GND     [ o | o ] GND
      TPA-    [ o | o ] TPA+
               2    1
```
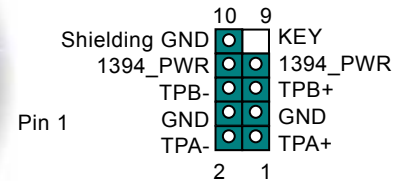
Warning: Please be noted that Hot-Plug in is not allowed on IEEE 1394 header, because it will burn the IC of the controller and damage the motherboard.

Chassis Intrusion 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 the opening of the chassis, the system will send out beep sound 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
SENSOR [O O] GND
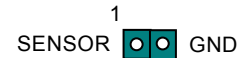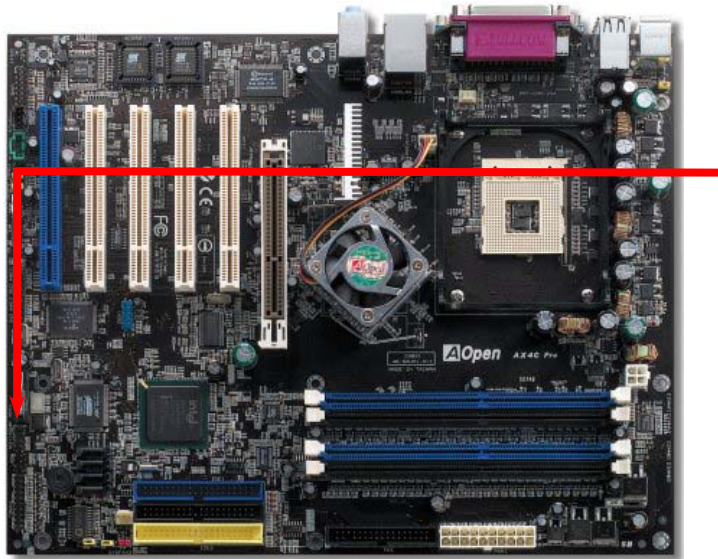
Chassis Intrusion
Connector

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 version 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 insert audio cable to CD-IN connector on the motherboard.*
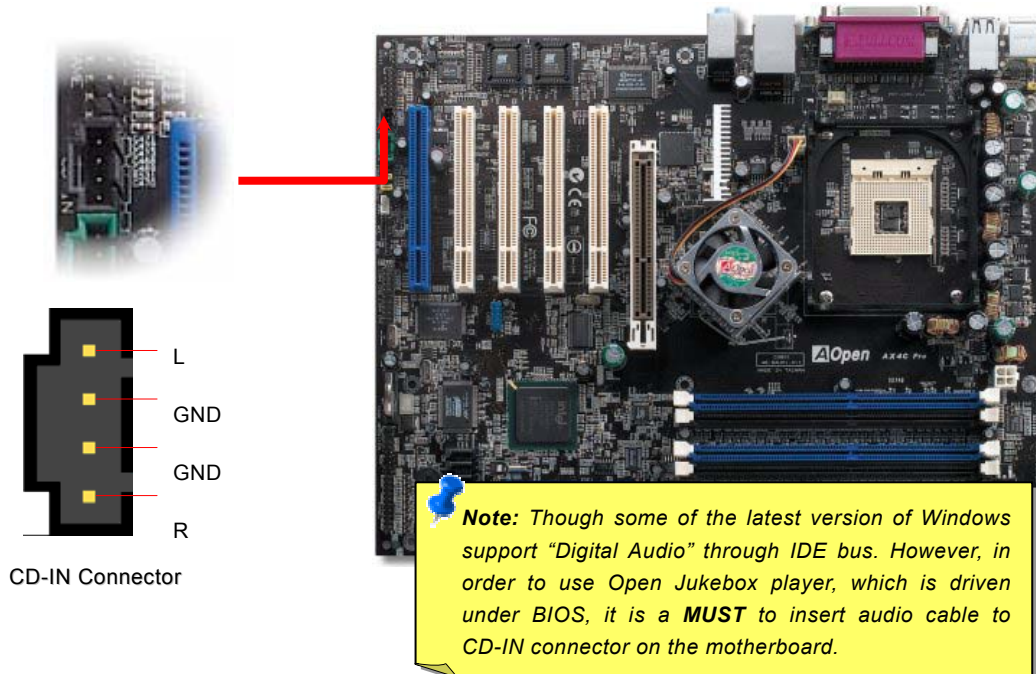
AUX-IN Connector

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

L

GND

GND

R

AUX-IN Connector
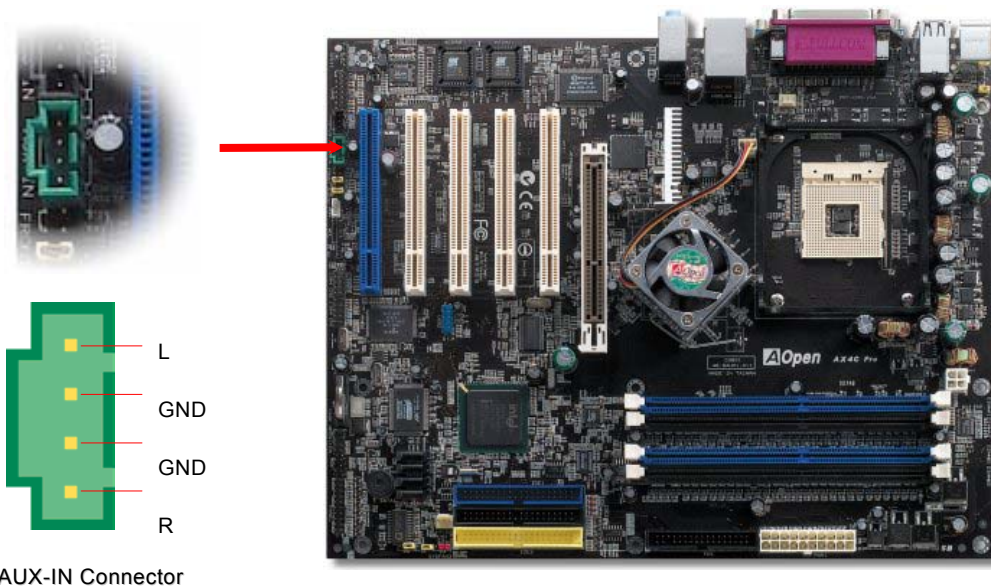
Front Audio Connector

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 5-6 and 9-10 jumper caps from the Front Audio Connector before connecting the cable. Please do not remove these 5-6 and 9-10 yellow jumper caps if there's no audio port on the front panel.

Pin 1

	1	2	
AUD_MIC	○	○	AUD_GND
AUD_MIC_BIAS	○	○	AUD_VCC
AUD_FPOUT_R	○	○	AUD_RET_R
NC	○		KEY
AUD_FROUT_L	○	○	AUD_RET_L
	9	10	
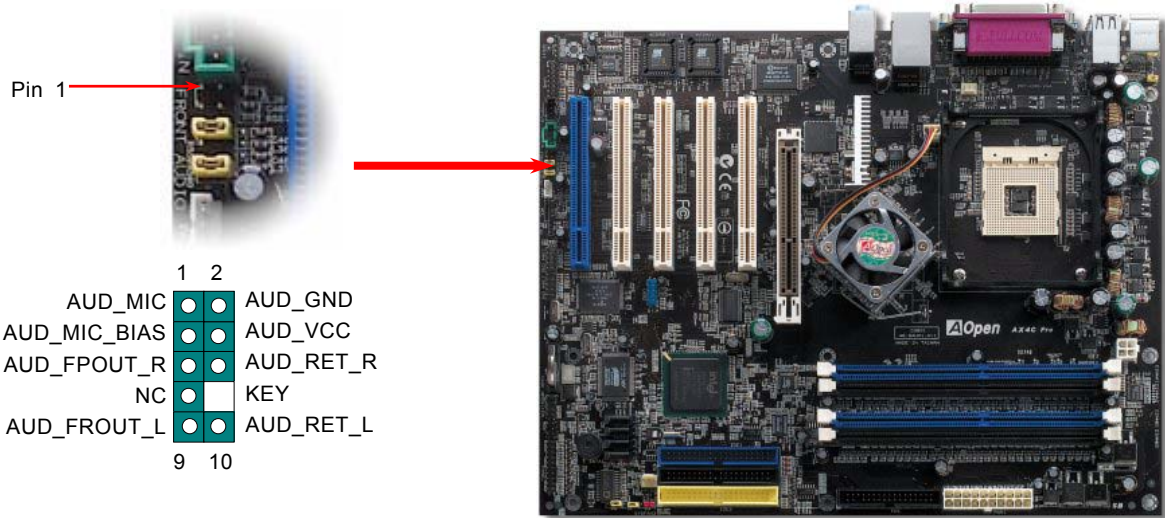
Note: Please remove the jumper cap from the Front Panel Audio Connector before you connect the cable. Do not remove this yellow jumper cap if housing without an audio port on the front panel.

Die-Hard BIOS II (AX4C-G, AX4C Max, AX4C Pro - User Upgrade Optional)

Many viruses have been found that they may destroy bios code and data area lately. This motherboard implements a very effective hardware protection method without any software or BIOS coding involved, therefore it is 100% virus free. You may restore the originally mounted BIOS with 2nd BIOS ROM by setting JP24 to pin 2-3 if it fails to work properly.

BIOS 2

BIOS 1

JP24
Pin 1

JP24
BIOS Rescue Jumper

Normal
(Default)

Rescue
(BIOS 2)

AOpen
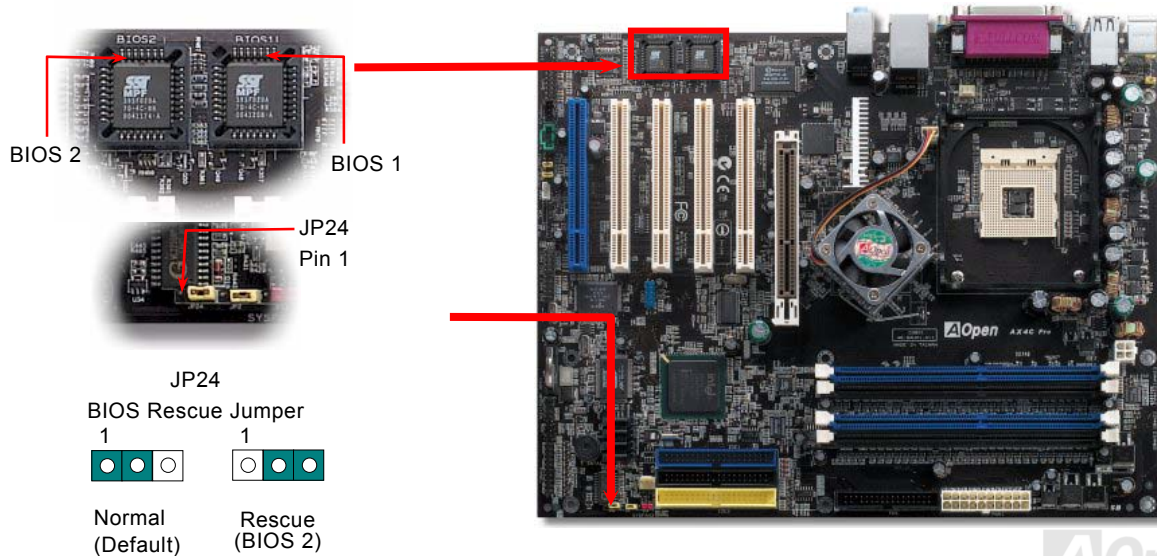
External Controller for DIE-HARD BIOS (AX4C-G, AX4C Max, AX4C Pro - User Upgrade Optional)

External Controller provides you a better and convenience way to switch the BIOS status between "**Rescue**" and "**Normal**" without opening the case of your computer. You have to plug the jumper cable to the connector pin (**JP30**) on the motherboard. Be careful of the orientation when you connect, the red wire should correspond to Pin1.

To / From CPU

Manual Switch

Read Only

Read/Write

Normal Flash ROM

Rescue ROM

AOpen
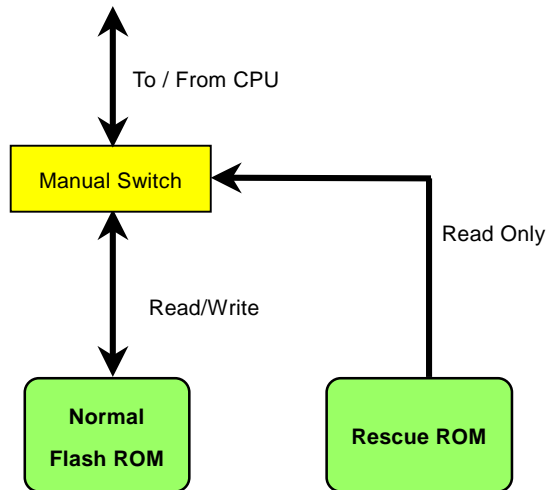
Note: If you suspect your BIOS is infected by virus, just rescue your bios by following steps:

1.   Turn off the system, set the External Controller to "**Rescue**" to read from rescue ROM.

2.   Boot the system and set the switch back to "**Normal**".

3.   Follow the BIOS upgrade procedure to rehabilitate BIOS.

Reboot the system, and you should be able to go back to normal mode.

Normal
(Read from normal
Flash ROM)

Rescue
(Read from
Rescue ROM)

Lock
(Lock your computer
to protect your data)
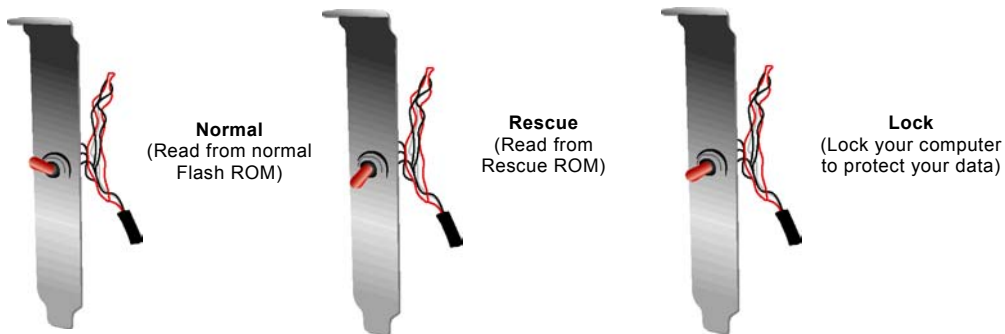
Tip: If you place the switch to the middle (as 3rd picture shows), you will not be able to boot your system, thus you can protect your data from molesting.

AOpen

JP2 Dr. Voice Output Select Jumper (AX4C Pro, AX4C Max only)

This motherboard comes with another considerate function, which allows you to select the voice coming out from buzzer or speaker, if Dr. Voice detects any errors that occurred in the operating system. If you want to enable buzzer, you may set JP2 to pin 1-2, or pin 2-3 to enable speaker. For enabling different language versions of Dr Voice, please go to BIOS settings for adjustment.

Pin 1

JP2 Dr. Voice Output
Select Jumper

Speaker

Buzzer
(Default)
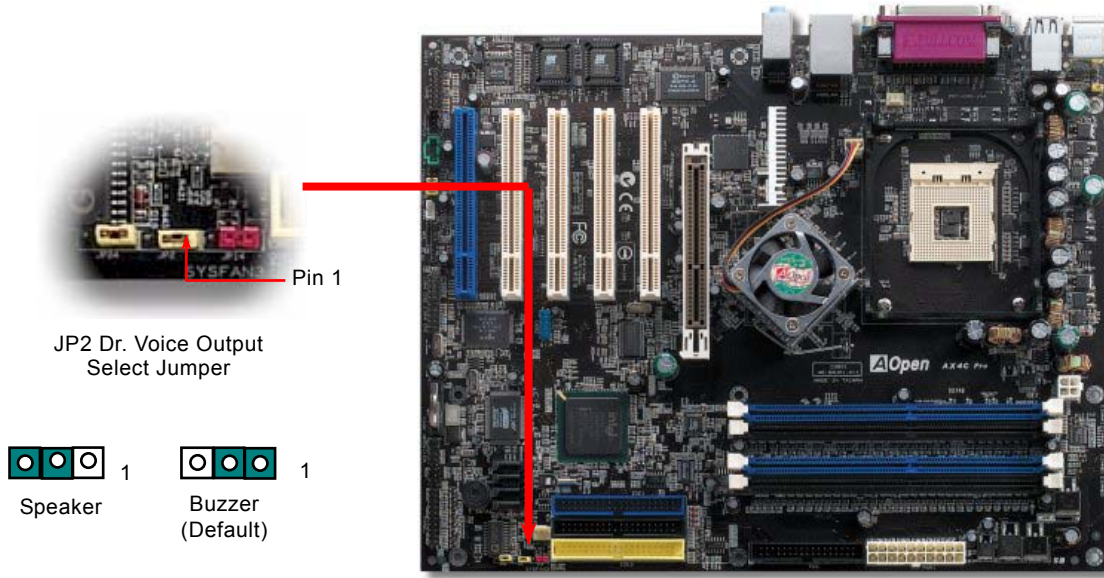
Dr. LED Connector

In conjunction with Dr. LED (Upgrade Optional), which can easily shows what kind of problems may occur on your system during assembly. It can clearly indicate whether there is a component issue or an installed issue by the 8 LEDs on the front panel of Dr. LED. This can helps you to have a self-diagnostic to your system status quickly.

Pin 1

```
        1   2
3.3V   [O][O]  S1
KEY    [ ][O]  S2
GND    [O][O]  S3
        5   6
```
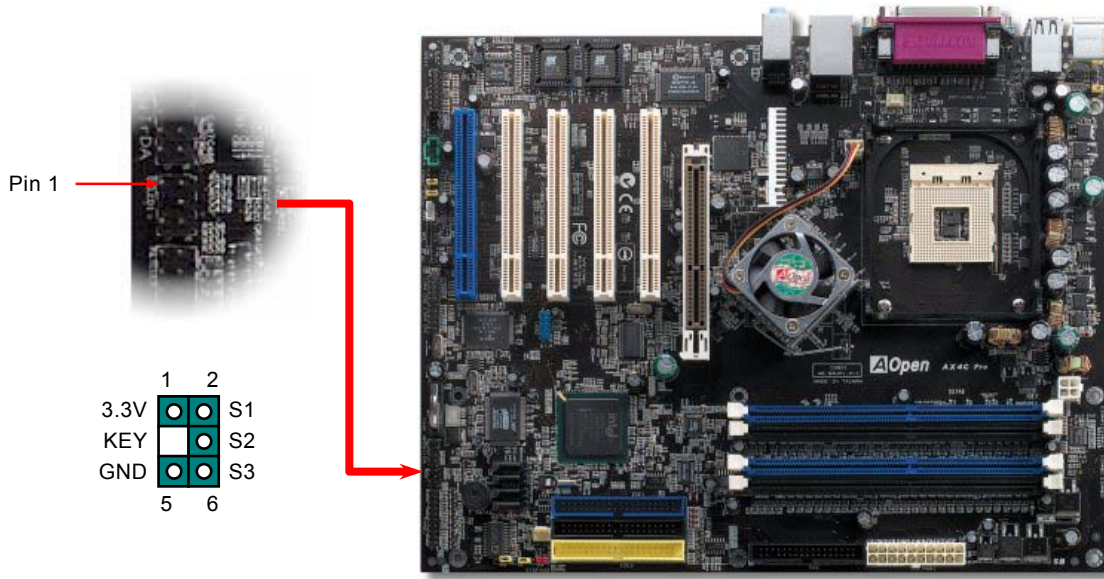
Dr. LED is a CD disc storage box with 8 LEDs on its front panel, the size of Dr. LED is exactly the same as 5.25 in floppy drive, so that it can be mount into normal 5.25 in drive bay of any housing.

7	6	5	4	3	2	1	0
○	○	○	○	○	○	○	○
Boot O.K.	KB	HDD	Floppy	PCI	Video	Memory	CPU
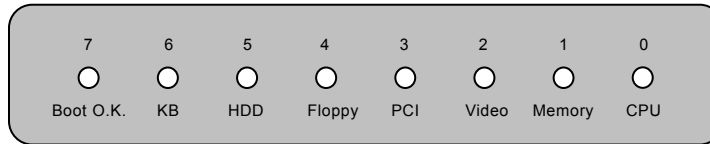
The total 8 LEDs light up alternatively if the system fails in one of eight stages. Once the LED7 (latest LED) is lit, this indicates that the system has completed its boot-up procedure.

The 8 LEDs indicate the following messages when lit:

LED 0 - Indicates that the CPU may have been installed incorrectly or is damaged.

LED 1 - Indicates that the memory may have been installed incorrectly or is damaged.

LED 2 - Indicates that the AGP may have been installed incorrectly or is damaged.

LED 3 - Indicates that the PCI card may have been installed incorrectly or is damaged.

LED 4 - Indicates that the floppy disk drive may have been installed incorrectly or is damaged.

LED 5 - Indicates that the HDD may have been installed incorrectly or is damaged.

LED 6 - Indicates that the keyboard may have been installed incorrectly or is damaged.

LED 7 - Indicates that the system is OK.

> *Note: During POST (**P**ower **O**n **S**elf **T**est) procedure, the Debug LED will light on sequentially from LED0 to LED7 until the system boot O.K*

AOpen

Battery-less and Long Life Design

This Motherboard implements Flash ROM and a special circuit that allows you to save your current CPU and CMOS Setup configurations without the need of a battery. 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 switching 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
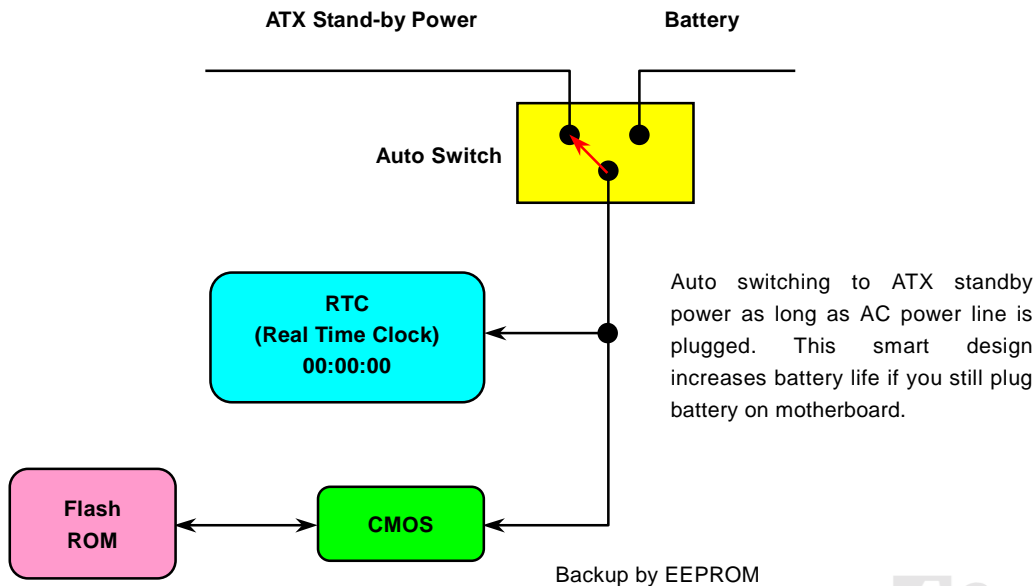
CPU Over-current Protection

Over Current Protection has been popularly implemented on ATX 3.3V/5V/12V switching power supply for a while. However, new generation CPU is able to use regulator of different voltages to transfer 12V to CPU voltage (for example, to 2.0V). This motherboard is with switching regulator onboard that supports CPU over-current protection, and it applies to 3.3V/5V/12V power supply for providing full line over-current protection.
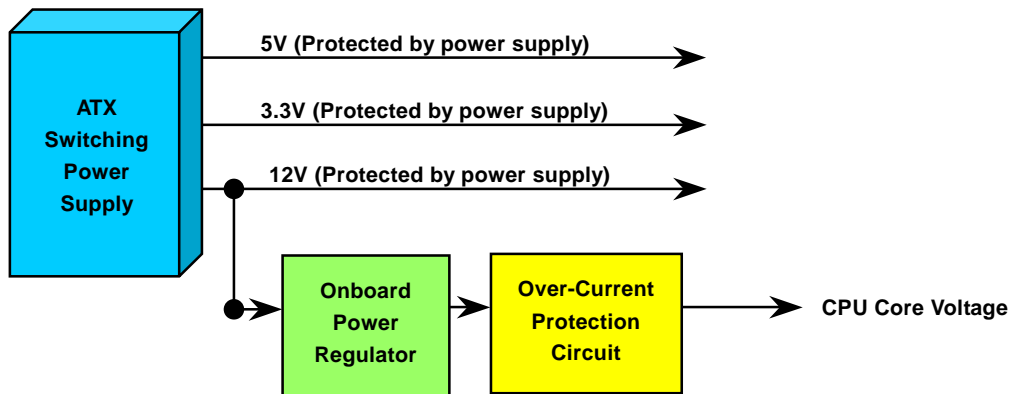
*Note: Although we have implemented protection circuit try to prevent any human operating mistake, there is still certain risk that CPU, memory, HDD, add-on cards installed on this motherboard may be damaged because of component failure, human operating error or unknown nature reason. **AOpen cannot guaranty the protection circuit will always work perfectly.***

AOConfig Utility **NEW!**

AOpen always dedicated to provide users a much friendlier computer environment. We now bring you a comprehensive system detective 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 further diagnosis of system problem.
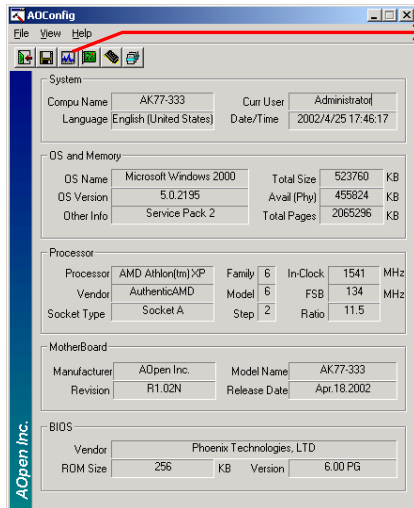
1. The system page shows the detail information of the motherboard, the operating system, the processor, and BIOS version.

2. The PCI device page shows the configurations of all PCI devices installed on your motherboard.
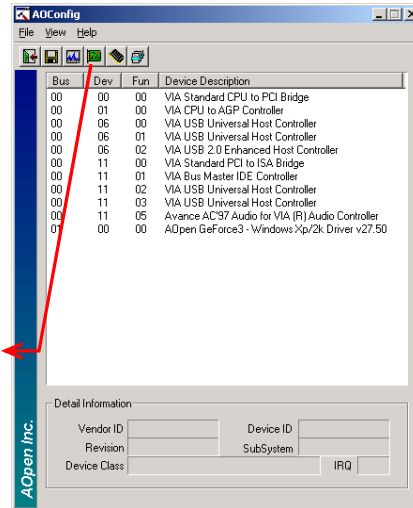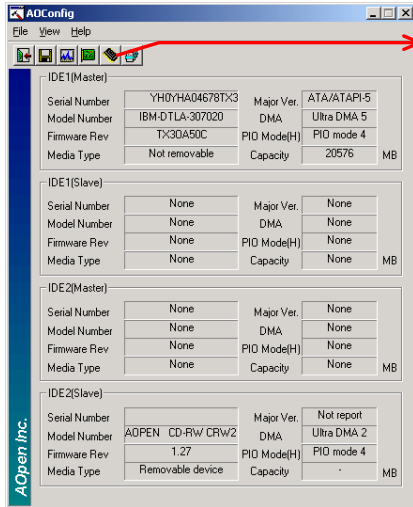
3. This page presents the IDE devices information, such as the serial number, the manufacturer, the firmware version, and capacity.

4. From this page, users may obtain the technical support information of AOpen. Moreover, detailed information could be saved in .bmp or .txt format.
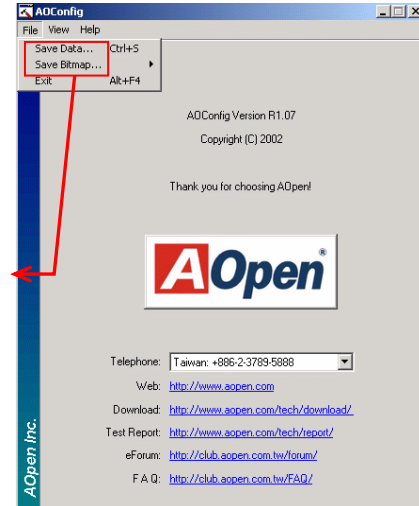
NOTE: *AOconfig can be used in Windows 98SE/ME, NT4.0/2000, or even the latest Windows XP. Please be informed that AOconfig can only be operated in a system equipped with an AOpen motherboard. Meanwhile, all applications must be closed before starting AOconfig.*

Resetable Fuse

Traditional motherboard has fuse for Keyboard and USB port to prevent over-current or shortage. These fuses are soldered onboard that when it is broken (function as protecting the motherboard), user still cannot replace it and the motherboard is still malfunctioning.

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

Resetable
Fuse
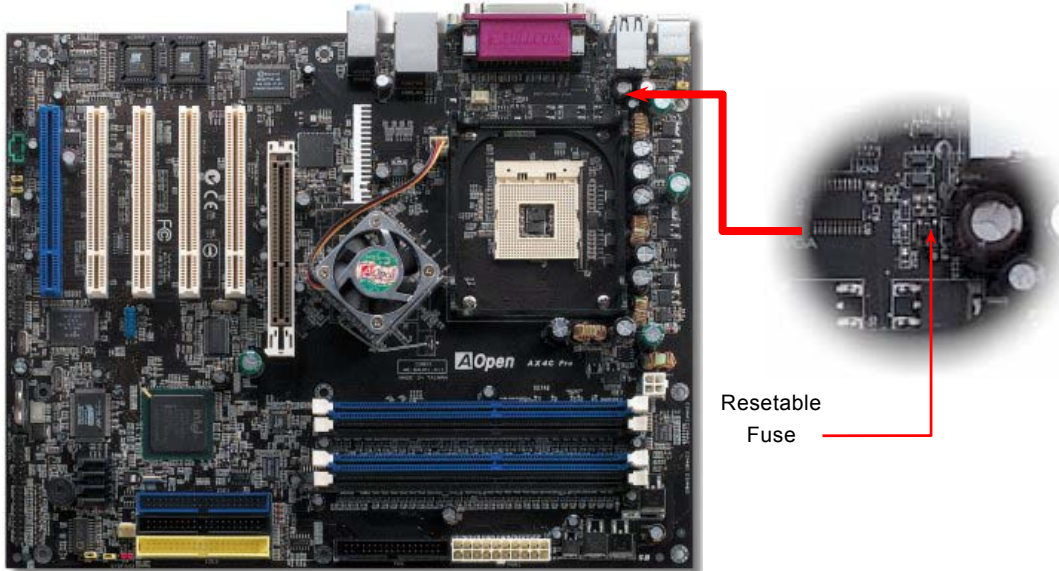
3300 μF Low ESR Capacitor

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, AX4C-G / AX4C Pro / AX4C Max implements 3300 μF capacitors, which is much larger than normal capacitor (1500 and 2200 μf) and it provides better stability for CPU power.
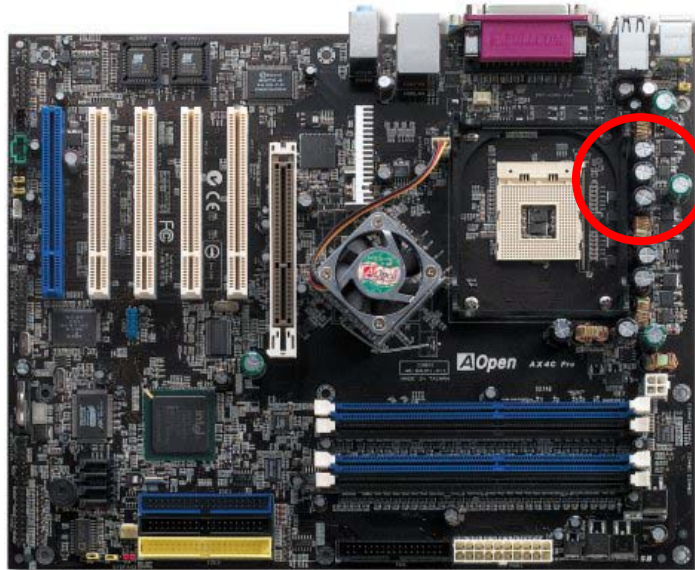
Fansink on North Bridge

In order to provide a better effect of cooling and make the chipset work more stable, we especially design a fansink on the north bridge. After locating the fansink on the north bridge, plug the connector to the header marked FAN3 (AUX Fan) on the motherboard.

Open JukeBox Player

Here we are pleased to provide you a brand-new powerful interface—Open JukeBox. Without any cost you can have your PC turn into a fashionable CD player! This latest Open JukeBox motherboard aims at helping you directly operate your CD player on the PC without any hassle of entering Windows operation system.

How Your Open JukeBox Works

The operation of Open JukeBox Player is the same as other CD players. By pressing specific keys on the keyboard you will find playing Open JukeBox Player couldn't be easier than the traditional CD Players. Below is the function description of respective buttons.

Power-Off Button

Boot to Operation System

Display Screen

Function Key

Power: Pressing **O**, to directly power off your computer with no hassle of entering Windows Operation System.
Boot: Pressing **B**, to intelligently boot to Windows Operation System for you.
Play: Pressing **A,** to start playing CD music.
Stop: Pressing **S**, to stop the music playing.
Pause: Pressing **P**, to pause the music playing temporarily.
Eject: Pressing **E**, to eject CD tray for you to change CD disc.
Repeat: Like other CD Players, pressing **R**, to shift the repeat mode.
Volume +/-:   Pressing **+** or **–** to adjust the volume of playing music.
Rewind/Forward ← / →: Pressing **arrow keys**, to rewind or forward the music.

Note: Though some of the latest version 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 insert audio cable to CD-IN connector on the motherboard.

Your Open JukeBox Settings in BIOS

There are three Open JukeBox settings in BIOS as follows.

```
                Phoenix - AwardBIOS CMOS Setup Utility
                        Advanced BIOS Features

     Virus Warning              Disabled     ▲  │      Item Help
     CPU L1 & L2 Cache          Enabled         │
     Quick Power On Self Test   Enabled         │  Menu Level   ▶
     First Boot Device          CDROM           │
     Second Boot Devic ┌───────────────────────────────────────┐
     Third Boot Device │   Enter AOpen CD Player               │
     Boot Other Device │                                       │
     Swap Floppy Drive │  Auto           ..... [■]             │
     Boot Up Floppy Se │  Press Insert Key ..... [ ]           │
     Boot Up NumLock S │  CD Player       ..... [ ]            │
     Typematic Rate Se │                                       │
   x Typematic Rate (C │                                       │
   x Typematic Delay ( │                                       │
     Security Option   │                                       │
     APIC Mode         │                                       │
     MPS Version Contr │                                       │
     OS Select For DRA │  ↑↓:Move ENTER:Accept ESC:Abort       │
     Enter Aopen CD Pl └───────────────────────────────────────┘
     Show Logo On Screen        Enabled     ▼  │

   ↑↓→←:Move   Enter:Select  +/-/PU/PD:Value  F10:Save   ESC:Exit  F1:General Help
   F2:Item Help F3:Language F5:Previous Values F6:Setup Defaults F7:Turbo Defaults
```

Auto: The default setting is "**Auto**" with which the Open JukeBox will automatically check the CD player every time you power on. The Open JukeBox will automatically be launched when it detects a music CD in your CD player.

Press Insert Key: Choosing this setting will allow a reminder message popped up on the screen during BIOS POST. It reminds you of pressing "Ins" key on your keyboard to start Open JukeBox Player; otherwise the system will launch the Windows Operation System.

CD Player: Choosing this setting allows the system to launch Open JukeBox Player every time you power on. However, by pressing **B** on your keyboard the Windows Operation System will be launched.

Your Open JukeBox EzSkin

Except these powerful functions above, Open JukeBox Player is also equipped with another fancy feature for you to change its "skin". You can download as many skins as you want from AOpen Website, and changing them whenever you want by using this useful utility – **EzSkin** – which may also be downloaded from our website.

Even more, you may design your own skins with innovative idea and sharing them to users around the world by uploading to our website. For further technical information, we welcome you to visit our website at http://english.aopen.com.tw/tech/download/skin

NEW!

Vivid BIOS technology

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 colorful 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 colors 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 favorite Open JukeBox skin. If you see this little logo [Skin] 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!

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
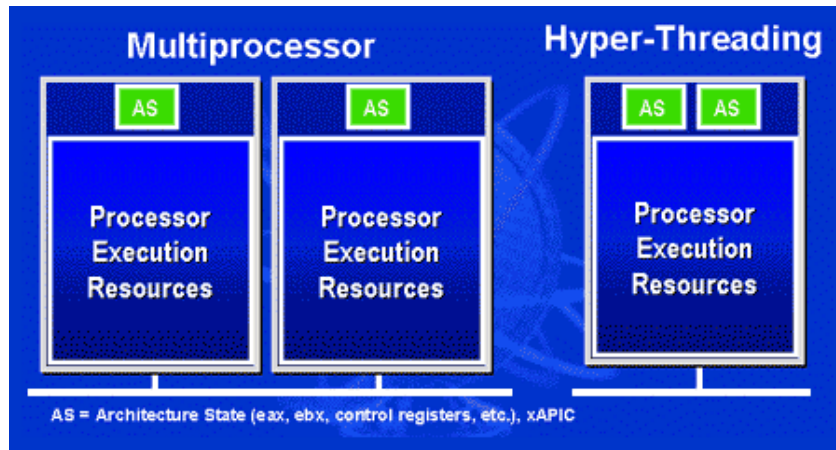
processor. You can see that the architectural state for each processor is duplicated, while the execution resources is shared.

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.

Note: Each box represents a processor execution unit
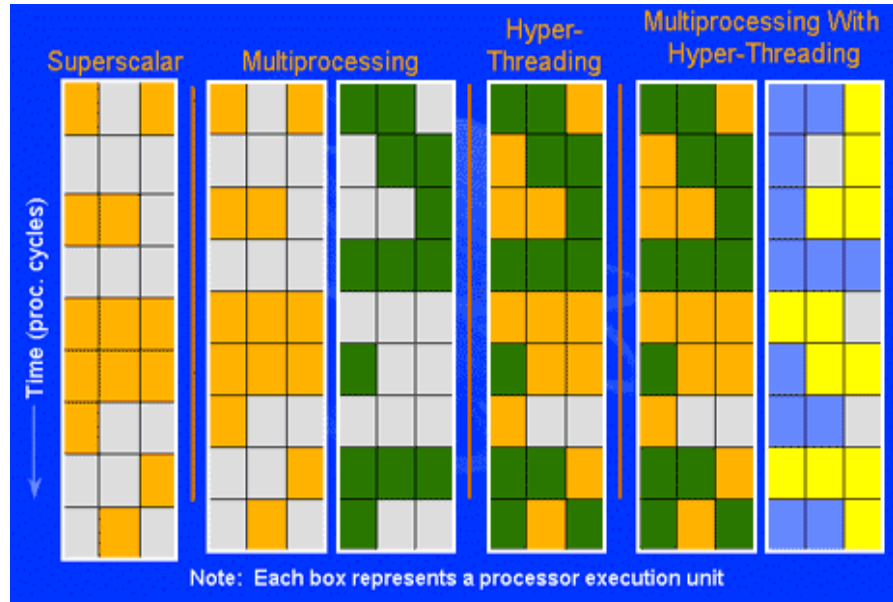
The figure below represents how Hyper-Threading saves time when it works. With two logical processors available on every single physical processor, multi-threaded applications can now take advantage of thread-level parallelism on each physical processor for additional performance. As software applications 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.

RAID Introduction NEW!

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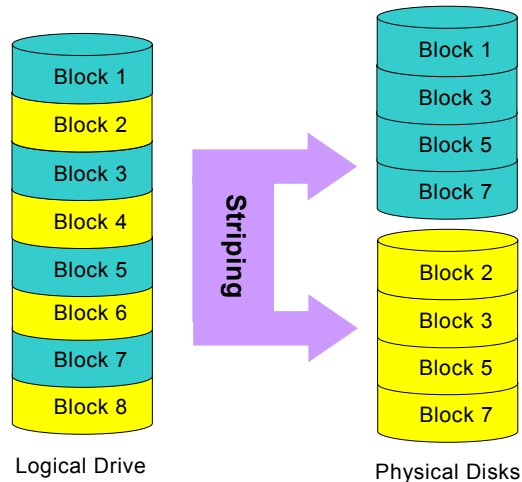
Mirroring (RAID 1)

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.

Block 1
Block 2
Block 3
Block 4
Block 5
Block 6
Block 7
Block 8

Logical Drive

Mirroring

Block 1
Block 2
Block 3
Block 4
Block 5
Block 6
Block 7
Block 8

Block 1
Block 2
Block 3
Block 4
Block 5
Block 6
Block 7

Physical Disks
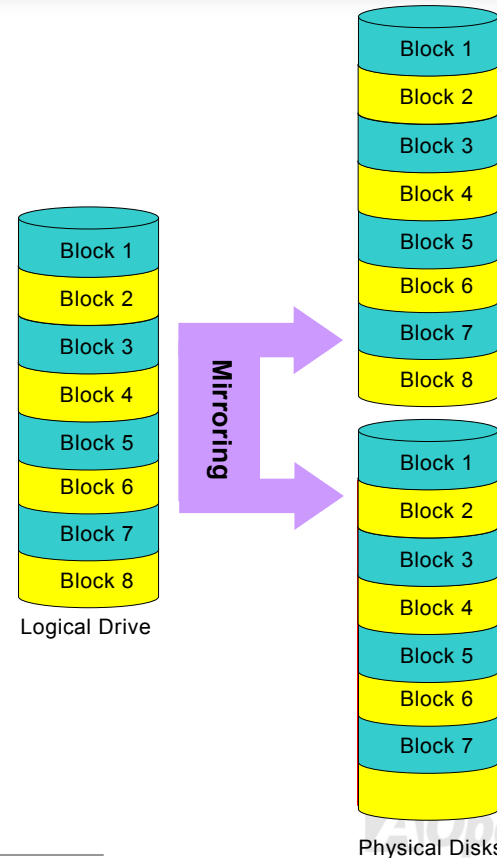
Striping with Mirroring (RAID 0+1)

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 are other RAID configurations in addition to those described here, but these are the types most commonly used in the industry.

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

AOpen
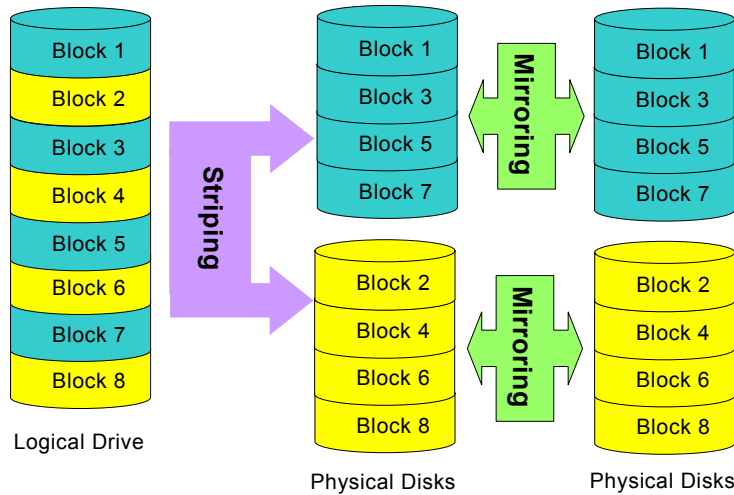
HDD Capacity of RAID Levels

Striping / Span (RAID 0)

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

Mirroring (RAID 1)

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

AOpen
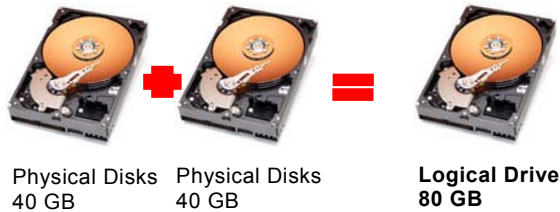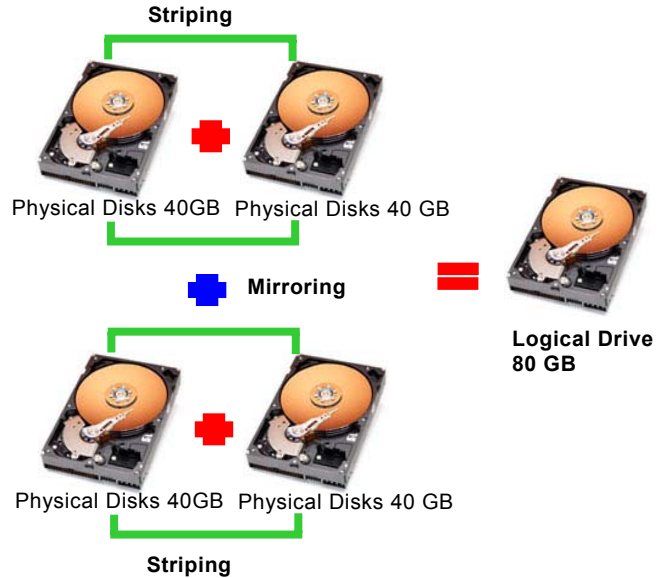
Serial ATA RAID for Intel ICH5R

With the latest chipsets implemented, Intel ICH5R provides RAID0 function 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 → OnChip 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.
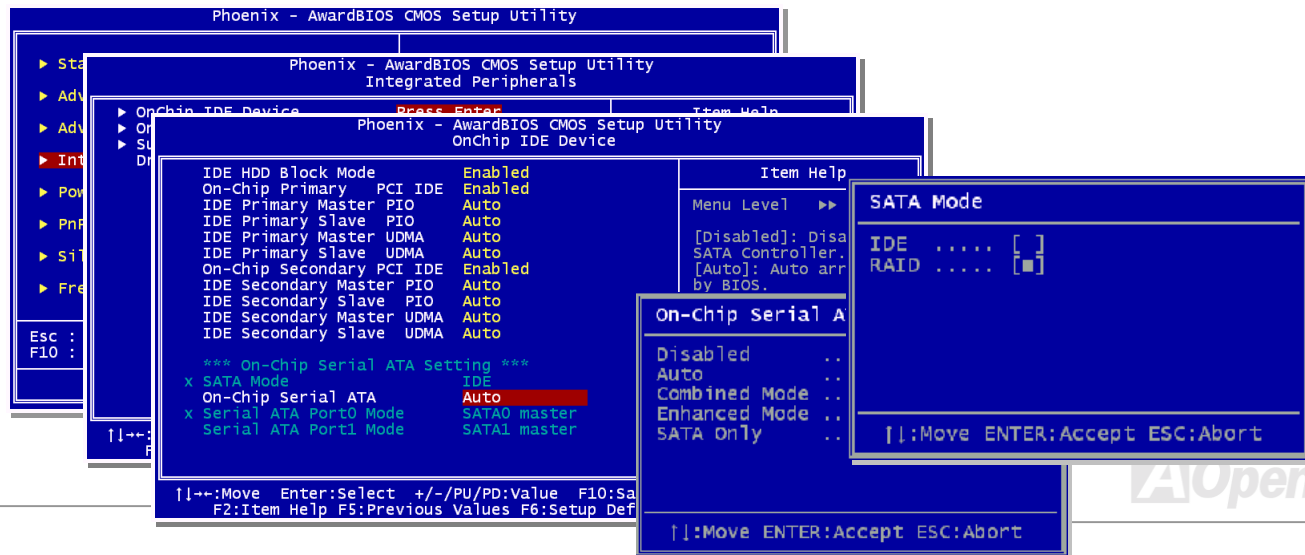
RAID Configuration Utility

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.

Installing IAA Driver (Intel Application Accelerator RAID Edition)

You can install Intel IAA RAID Edition Driver to increase the performance of software applications and reduce PC boot times. The IAA RAID Edition is designed to provide functionality for the Intel (R) 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 XP. Software installation is flexible and fully automated for Windows XP.   You can find it in the AOpen Bonus Pack.
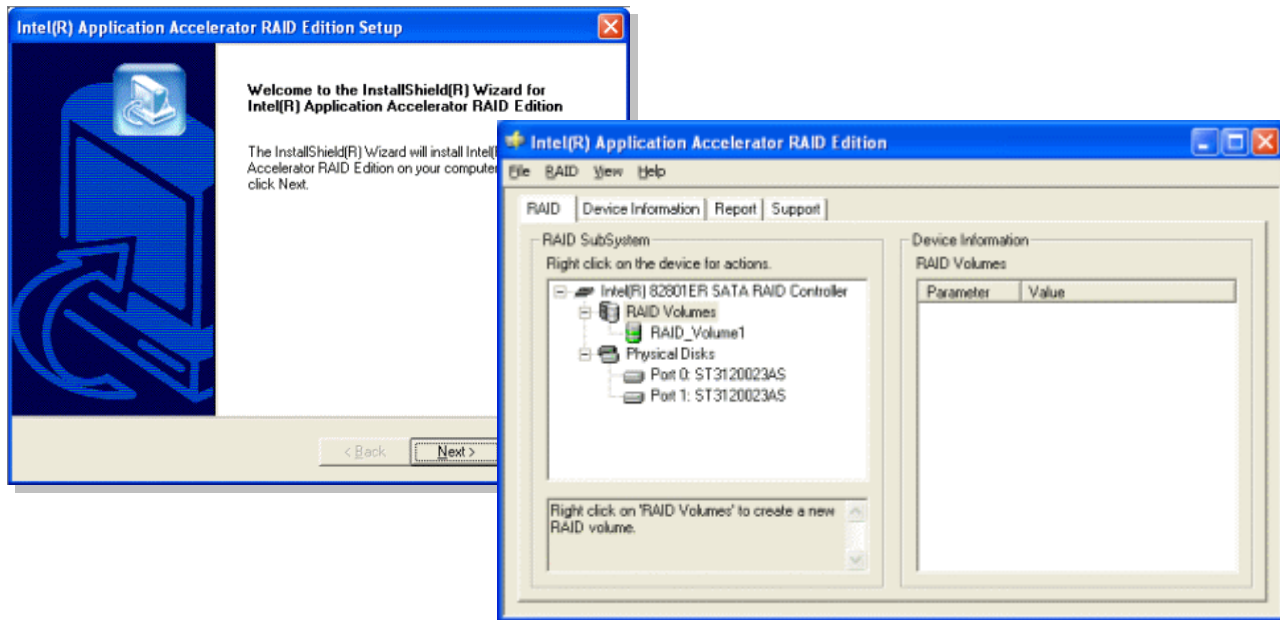
Serial ATA RAID for Promise PDC20378

Integrated in ICH5 (AX4C-G) and ICH5R (AX4C Pro and AX4C Max only), this motherboard comes with the function of additional RAID 0 function. Beside RAID 0, this motherboard is designed with Promise Serial ATA (PDC20378) controller onboard, which is capable of providing you additional RAID 0, 1, 0+1 function by ATA133 IDE Connector.

SATA 4 port (PDC20378)
SATA 3 port (PDC20378)
SATA 2 port1 (ICH5, ICH5R)
SATA 1 port0 (ICH5, ICH5R)
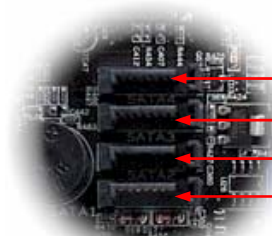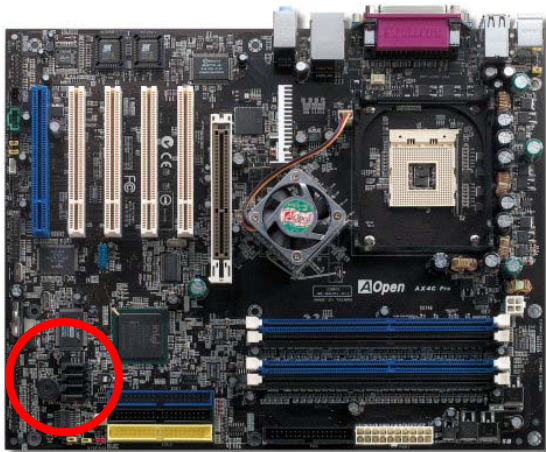
Serial ATA Ports

Motherboard	SATA 1 & 2	SATA 3 & 4
AX4C-G	RAID 0	
AX4C Pro	RAID 0	
AX4C Max	RAID 0	RAID 0, 1, 0+1 (With ATA133)

Note: Please be noted that "1MHz stepping AGP/PCI Overclocking" will be automatically disabled when SATA device is being connected, for preventing any system instability.

RAID Configuration Utility

Promise PDC29378 is capable of creating RAID function of 0, 1, 0+1 (by IDE3). Briefly shows you how FASTBUILD Utility creates disk array for your different arrangement (For details, please refer to the RAID Utility Guide in Bonus CD).

1. To create the disk array for **RAID 0** with 2 hard disks:

```
FastBuild (tm) Utility 2.00 (c) 2002-2005 Promise Technology, Inc.
                        [ Auto Setup Options Menu ]
    Optimize Array for:              Performance

                        [ Array Setup Configuration ]

    Mode ........................................ Stripe
    Spare Drive ................................. 0
    Drive(s) Used in Array ...................... 2
    Array Disk Capacity (size in MB)............. 122985




                        [ Keys Available ]
    [↑] Up  [↓] Down  [-,-,Space] Change Option  [ESC] Exit  [CTRL-Y] Save
```

2. To create the disk array for **RAID 1** with 2 hard disks:

```
FastBuild (tm) Utility 2.00 (c) 2002-2005 Promise Technology, Inc.
                        [ Auto Setup Options Menu ]
    Optimize Array for:              Security

                        [ Array Setup Configuration ]

    Mode ........................................ Mirror
    Spare Drive ................................. 0
    Drive(s) Used in Array ...................... 2
    Array Disk Capacity (size in MB)............. 61000




                        [ Keys Available ]
    [↑] Up  [↓] Down  [-,-,Space] Change Option  [ESC] Exit  [CTRL-Y] Save
```

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3. To create the disk array for **RAID 0, 1, 0 + 1** with 4 hard disks:

If this is the first time booting and drives installed, the Promise onboard BIOS will display the following screen.

FastBuild™ Utility Main Menu
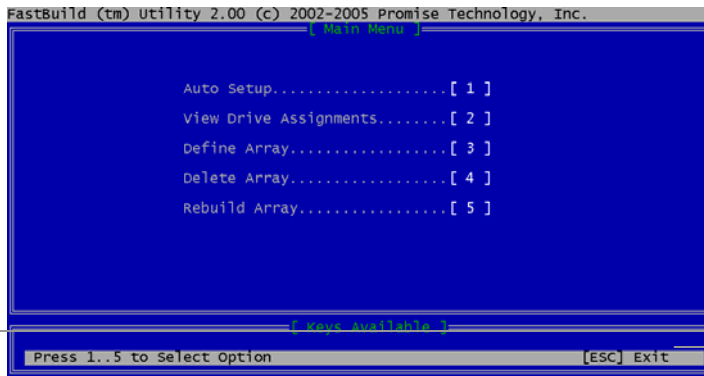
Press "**1**" to display the Auto Setup Menu below. This is the fastest and easiest method to creating your first array.

```
FastBuild (tm) Utility 2.00 (c) 2002-2005 Promise Technology, Inc.
┌══════════════════[ Auto Setup Options Menu ]═══════════════════┐
│                                                                │
│   Optimize Array for:              Performance                 │
│                                                                │
├═════════════════[ Array Setup Configuration ]══════════════════┤
│                                                                │
│                                                                │
│   Mode ....................................... Stripe          │
│                                                                │
│   Spare Drive .................................. 0             │
│                                                                │
│   Drive(s) Used in Array ....................... 4             │
│                                                                │
│   Array Disk Capacity (size in MB)..............  82306        │
│                                                                │
│                                                                │
│                                                                │
├════════════════════[ Keys Available ]═════════════════════════┤
│                                                                │
│ [↑] Up  [↓] Down  [←,→,Space] Change Option  [ESC] Exit  [CTRL-Y] Save │
└════════════════════════════════════════════════════════════════┘
```

For **viewing Drive Assignmen**t, **Define Array**, **Delete Array**, or **Rebuild Array**, please select the respective item for settings.

(For details, please refer to the RAID Utility Guide in Bonus CD)

Intel(R) Application Accelerator (AX4C Pro, AX4C Max only)

The Intel(R) Application Accelerator is designed to improve performance of the storage sub-system and overall system performance. This software delivers improved performance through several ingredient technologies (components). Installation of the Intel(R) Chipset Software Installation Utility prior to loading the Intel(R) Application Accelerator.
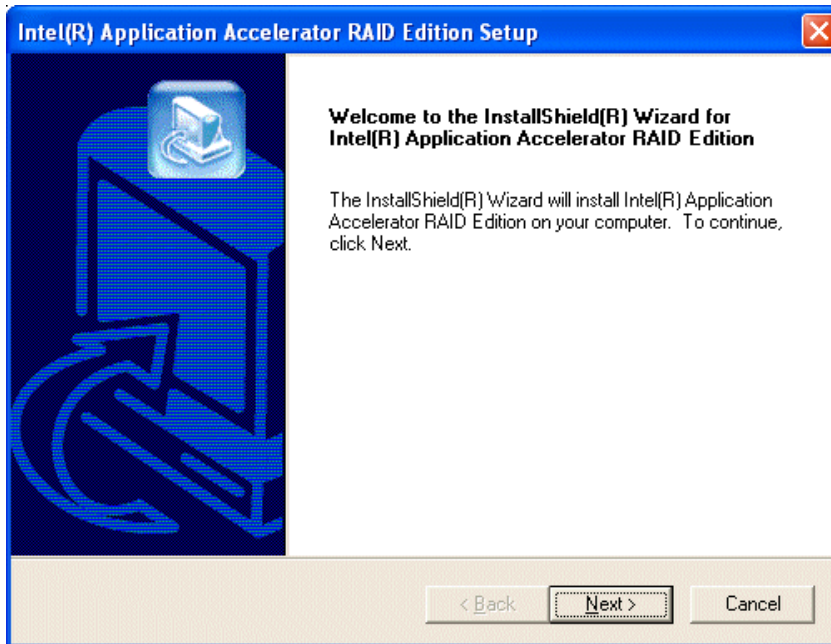
Installing Driver (AX4C Max only)

(For details, please refer to the RAID Utility Guide in Bonus CD)

Promise FastTrak 378 Windows XP Installation

****
New Windows XP Installation
****

The following details the installation of the FastTrak 378 drivers while installing Windows XP.

1. Start the installation:
    * Floppy Install: Boot the computer with the Windows XP installation diskettes.
    * CD-ROM Install: Boot from the CD-ROM. Press F6 after the message "Press F6 if you need to install third party SCSI or RAID driver" appears.

2. When the "Windows XP Setup" window is generated, press "S" to Specify an Additional Device(s)

3. Insert the Promise Technology driver diskette into drive A: and press "Enter" key.

4. Choose "WinXP Promise FastTrak 378 (tm) Controller" from the list that appears on screen, then press the "Enter" key.

5. Press Enter to continue with installation or if you need to specify any additional devices to be installed, do so at this time. Once all devices are specified, Press Enter to continue with installation.

6. From the Windows XP Setup screen, press the Enter key. Setup will now load all device files and then continue the Windows XP installation.

****
Existing Windows XP Installation
****

After installing the FastTrak 378 and rebooting your system, Under Windows XP, "Mass Storage Controller" will be displayed.

1. In the A: drive, insert the FastTrak 378 driver diskette.
2. Click on "Next," and from the generated list box, choose "Install from a list or special location (Advanced)". Click on "Next," and from the generated choices, choose "Include this location in the search:"

     1a. Insert the Bonus CD in CD-ROM.
     2a. Choose "Specify a location." and then press "Next".
        Type "[CD-ROM]:\Driver\Promise\PDC20378\Driver\WinXP" in the text box that appears. Press " OK ".

3. Choose "WinXP Promise FastTrak 378 (tm) Controller" from the list that appears on screen, then press the "Enter" key.
4. The Windows XP Setup screen will appear again saying "Setup will load support for the following mass storage devices - WinXP Promise FastTrak 378 (tm) controller". The FastTrak 378 driver will now be copied on to the system and entered into the Windows XP driver database.
5. When the "System Settings Change" dialog box appears, remove the floppy diskette and click on "Yes" to restart the system. Windows XP will then restart for the driver installation to take effect.
6. Power off your system, then attach your hard drives to the FastTrak 378 controller.

****
Confirming Windows XP Installation
****

1. From Windows XP, open the Control Panel from "My Computer" followed by the System icon.
2. Choose the "Hardware" tab, then click the "Device Manager" tab.
3. Click the "+" in front of "SCSI & RAID Controllers" hardware type. The driver "WinXP Promise FastTrak 378 (tm) Controller" should appear.

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Promise FastTrak 378 Windows 2000 Installation

****

New Windows 2000 Installation
****

The following details the installation of the FastTrak 378 drivers while installing Windows 2000.

1. Start the installation:
   * Floppy Install: Boot the computer with the Windows 2000 installation diskettes.
   * CD-ROM Install: Boot from the CD-ROM. Press F6 after the message "Press F6 if you need to install third party SCSI or RAID driver" appears.

2. When the "Windows 2000 Setup" window is generated, press "S" to Specify an Additional Device(s)

3. Insert the Promise TechnologyO driver diskette into drive A: and press "Enter" key.

4. Choose "Win2000 Promise FastTrak 378 (tm) Controller" from the list that appears on screen, then press the "Enter" key.

5. Press Enter to continue with installation or if you need to specify any additional devices to be installed, do so at this time. Once all devices are specified, Press Enter to continue with installation.

6. From the Windows 2000 Setup screen, press the Enter key. Setup will now load all device files and then continue the Windows 2000 installation.

****

Existing Windows 2000 Installation
****

After installing the FastTrak 378 and rebooting your system, Windows 2000 setup will show a "Found New Hardware" dialog

box.

1. In the A: drive, insert the FastTrak 378 driver diskette.
2. Choose Install the software automatically and press the Enter key.

     1a. Insert the Bonus CD in CD-ROM.
     2a. Choose "Specify a location." and then press "Next".
        Type "[CD-ROM]:\Driver\Promise\PDC20378\Driver\Win2000" in the text box that appears. Press " OK ".

3. Choose "Win2000 Promise FastTrak 378 (tm) Controller" from the list that appears on screen, then press the "Enter" key.
4. The Windows 2000 Setup screen will appear again saying "Setup will load support for the following mass storage devices - Win2000 Promise FastTrak 378 (tm) controller". The FastTrak 378 driver will now be copied on to the system and entered into the Windows 2000 driver database.
5. When the "System Settings Change" dialog box appears, remove the floppy diskette and click on "Yes" to restart the system. Windows 2000 will then restart for the driver installation to take effect.
6. Power off your system, then attach your hard drives to the FastTrak 378 controller.

****
Confirming Windows 2000 Installation
****

1. From Windows 2000, open the Control Panel from "My Computer" followed by the System icon.
2. Choose the "Hardware" tab, then click the "Device Manager" tab.
3. Click the "+" in front of "SCSI & RAID Controllers" hardware type. The driver "Win2000 Promise FastTrak 378 (tm) Controller" should appear.

AOpen

Promise FastTrak 378 Windows 98 Installation

****
New Windows 98 Installation
****

1. After installing the FastTrak 378 controller and configuring the hard drive(s), partition and format your hard drive(s), if necessary.
2. Install Windows 98 normally.
3. After installation, go the "Start" menu and choose "Settings."
4. From the "Settings" menu, choose "Control Panel."
5. In the "Control Panel" window, double-click on the "System" icon.
6. In the "System" window, choose the "Device Manager" tab.
7. In the hierarchical display under "Other Devices" is a listing for "PCI RAID Controller." Choose it and then press the "Properties" button.
8. Choose the "Driver" tab in the "Properties" window, choose "Update Driver," and then press "Next."
9. Choose "Search for a better driver than the one your device is using now (recommended)," then press "Next."
10. Choose "Specify Location," and then type "A:\98-me" in the text box.
11. Insert the "FastTrak 378 Driver" diskette into the A: drive.

> 10a. Choose "Specify a Location," and then type
> "[CD-ROM]:\Driver\Promise\PDC20378\Driver\98-me" in the text box.
> 11a. Insert the "Bonus CD" in CD-ROM.

12. Press the "Next" button. A message informing you that Windows 98 has found "Win98-ME Promise FastTrak 378 (tm) Controller" should appear.
13. Press "Next," then "Finish," then "Yes" when asked if you want to restart your computer. Be sure to remove the diskette from drive A:.

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****

Existing Windows 98 Installation

****

1. After installing the FastTrak 378 controller and configuring the hard drives, power up the system and boot Windows.
2. The "Add New Hardware Wizard" will appear, informing you that it has found a "PCI RAID Controller."
3. Check the "Search for the best driver for your device" box and click the Next button.
4. Check the "Specify a Location" box and click Next button.
5. Type "A:\98-me" in the text box that appears.
6. Insert the "FastTrak 378 Driver" diskette in drive A:.

> 5a. Choose "Specify a Location," and then type
>   "[CD-ROM]:\Driver\Promise\PDC20378\Driver\98-me" in the text box.
> 6a. Insert the "Bonus CD" in CD-ROM.

7. Click on "Next." The Add New Hardware wizard will say it has found "Win98-ME Promise FastTrak 378 (tm) controller".
8. Click on "Next," and then on "Finish."
9. Choose "Yes" when asked if you want to restart your computer. Be sure to eject the diskette from drive A:.

****

Confirming Driver Installation in Windows 98

****

To confirm that the driver has been properly loaded in Win98, 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 "SCSI & RAID controllers." "Win98-ME Promise FastTrak 378 (tm) controller" should appear.

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Promise FastTrak 378 Windows ME Installation

****

New Windows ME Installation

****

1. After installing the FastTrak 378 controller and configuring the hard drive(s), partition and format your hard drive(s), if necessary.
2. Install Windows ME normally.
3. After installation, go the "Start" menu and choose "Settings."
4. From the "Settings" menu, choose "Control Panel."
5. In the "Control Panel" window, double-click on the "System" icon.
6. In the "System" window, choose the "Device Manager" tab.
7. In the hierarchical display under "Other Devices" is a listing for "PCI RAID Controller." Choose it and then press the "Properties" button.
8. Choose the "Driver" tab in the "Properties" window, choose "Update Driver," and then press "Next."
9. Choose "Search for a better driver than the one your device is using now (recommended)," then press "Next."
10. Choose "Specify Location," and then type "A:\98-me" in the text box.
11. Insert the "FastTrak 378 Driver" diskette into the A: drive.

> 10a. Choose "Specify a Location," and then type
> 　　"[CD-ROM]:\Driver\Promise\PDC20378\Driver\98-me" in the text box.
> 11a. Insert the "Bonus CD" in CD-ROM.

12. Press the "Next" button. A message informing you that Windows 98 has found "Win98-ME Promise FastTrak 378 (tm) Controller" should appear.
13. Press "Next," then "Finish," then "Yes" when asked if you want to restart your computer. Be sure to remove the diskette from drive A:.

****
Existing Windows ME Installation
****

1. After installing the FastTrak 378 controller and configuring the hard drives, power up the system and boot Windows.
2. The "Add New Hardware Wizard" will appear, informing you that it has found a "PCI RAID Controller."
3. Check the "Search for the best driver for your device" box and click the Next button.
4. Check the "Specify a Location" box and click Next button.
5. Type "A:\98-me" in the text box that appears.
6. Insert the "FastTrak 378 Driver" diskette in drive A:.

      5a. Choose "Specify a Location," and then type
         "[CD-ROM]:\Driver\Promise\PDC20378\Driver\98-me" in the text box.
      6a. Insert the "Bonus CD" in CD-ROM.

7. Click on "Next." The Add New Hardware wizard will say it has found "Win98-ME Promise FastTrak 378 (tm) controller".
8. Click on "Next," and then on "Finish."
9. Choose "Yes" when asked if you want to restart your computer. Be sure to eject the diskette from drive A:.

****
Confirming Driver Installation in Windows ME
****

To confirm that the driver has been properly loaded in WinME, 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 "SCSI & RAID controllers." "Win98-ME Promise FastTrak 378 (tm) controller" should appear.

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Promise FastTrak 378 Windows NT 4.0 Installation

****
New Windows NT 4.0 Installation
****

1. Start the system installation by booting from the Windows NT disk:

    a) Floppy install: boot the system with the Windows NT installation diskettes.

    b) Floppyless install: boot from floppy and type "WINNT /B". After files have been copied, the system will reboot. On the reboot, press the "F6" key when the message "Setup is inspecting your computer's hardware configuration…" appears.

    c) CD-ROM disk install: boot from the CD-ROM disk and press the "F6" key when the message "Setup is inspecting your computer's hardware configuration…" appears.

2. When the "Windows NT Setup" window is generated, press "S" to Specify an Additional　Device(s).
3. Press "O" to select "Other" and press the "Enter" key.
4. Insert the Promise Technology FastTrak 378 driver diskette into drive A: and press the "Enter" key.

    4a. Insert the Bonus CD in CD-ROM.
      Type "[CD-ROM]:\Driver\Promise\PDC20378\Driver\nt4" in the text box that appears. Press " OK ".

5. Choose "Win NT Promise FastTrak 378 (tm) Controller" from the list that appears on screen, then press the "Enter" key.
6. The Windows NT Setup screen will appear again saying "Setup will load support for the following mass storage devices:" The list will include "Win NT Promise FastTrak 378 (tm) controller".

   NOTE: If you need to specify any additional devices to be installed, do so at this time. Once all devices are specified, continue to step 7.

7. From the Windows NT Setup screen, press the Enter key. Setup will now load all device files and then continue the Windows

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NT installation.
8. After a successful installation, the "SCSI Adapter Setup" box will show that the "Win NT Promise FastTrak 378 (tm) Controller" driver has been installed.

****
Existing Windows NT 4.0 Installation
****

1. Choose "Settings" from the "Start" menu.
2. Choose "Control Panel" from the "Settings" menu.
3. Double-click on the "SCSI Adapters" icon, which generates the "SCSI Adapters" dialog box.
4. Choose "Drivers," and then press "Add."
5. In the "Install Drivers" dialog box, press "Have Disk…"
6. When the "Install From Disk" appears, insert the "FastTrak 378 Driver" diskette in drive A:.
7. Type "A:\NT4" in the text box window, then choose "OK."

      6a. Insert the Bonus CD in CD-ROM.
      7a. Type "[CD-ROM]:\Driver\Promise\PDC20378\Driver\nt4" in the text box that appears. Press " OK ".

8. When the "Install Driver" dialog box appears, select "Win NT Promise FastTrak 378   (tm)
   Controller" and then press "OK."
9. When the "Select SCSI Adapter Option" dialog box appears, press "Install."
10. After a successful installation, the "SCSI Adapter Setup" box will show that the "Win NT Promise FastTrak 378 (tm) Controller" has been installed.
11. Power off your system.
12. If moving the boot drive to the FastTrak 378, now attach the hard drives otherwise reboot.

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****

Removing the Driver from Windows NT 4.x

****

1. In "Start" Button choose "Control Panel" in "Setup" group.
2. In "Control Panel," select "SCSI Adapter," next choose "Drivers" label
3. Choose "Remove" button.
4. After successful removing, the "SCSI Adapter Setup" box will show that "Win NT FastTrak 378 RAID Controller" has been removed.

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Promise Array Management Utility (AX4C Max only)

After installing Promise driver for respective operating system, please install this Promise Array Management Utility for managing your RAID arrays. (For details, please refer to the RAID Utility Guide in Bonus CD)

Driver and Utility

There are motherboard drivers and utilities included in AOpen Bonus CD disc. You don't need to install all of them in order to boot your system. But after you finish the hardware installation, you have to install your operation system first (such as Windows 98) before you can install any drivers or utilities. Please refer to your operation system's installation guide.

Auto-run Menu from Bonus CD Disc

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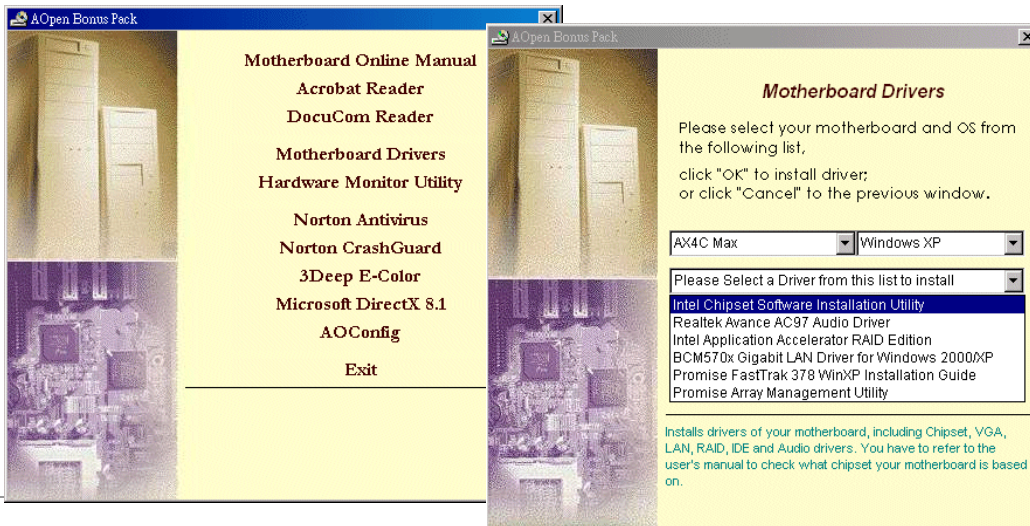
Installing Intel® Chipset Software Installation Utility

The Intel(R) Chipset Software Installation Utility installs to the target system the Windows* INF files that outline to the operating system how the chipset components will be configured. It is recommended that the Intel(R) Chipset Software Installation utility be installed onto the target system prior to the installation of other drivers.
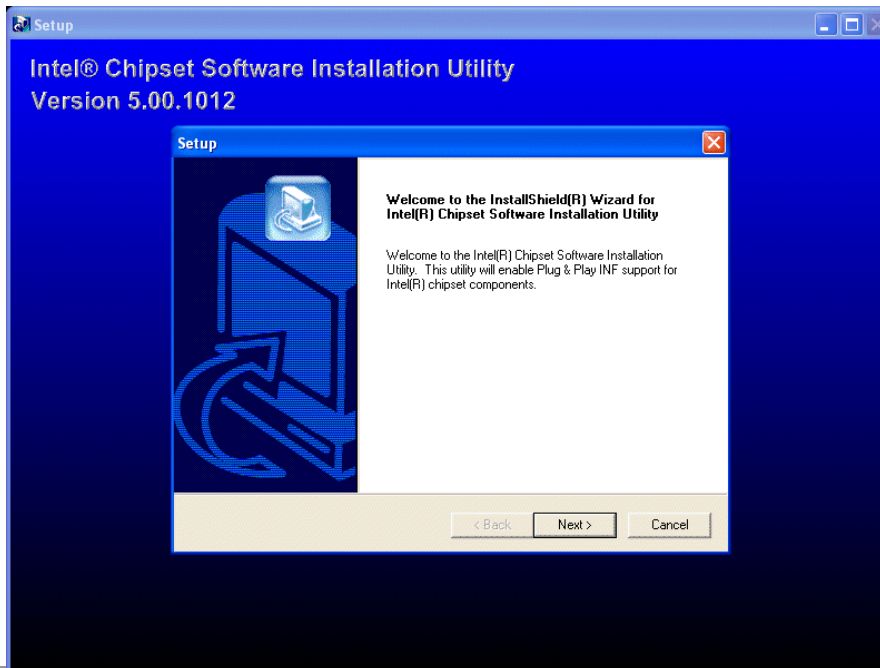
BroadCOM BCM5705 Gigabit LAN Driver (AX4C Max only)

For Win2000/Xp operating system, please kindly follow this InstallShield Wizard for steps.
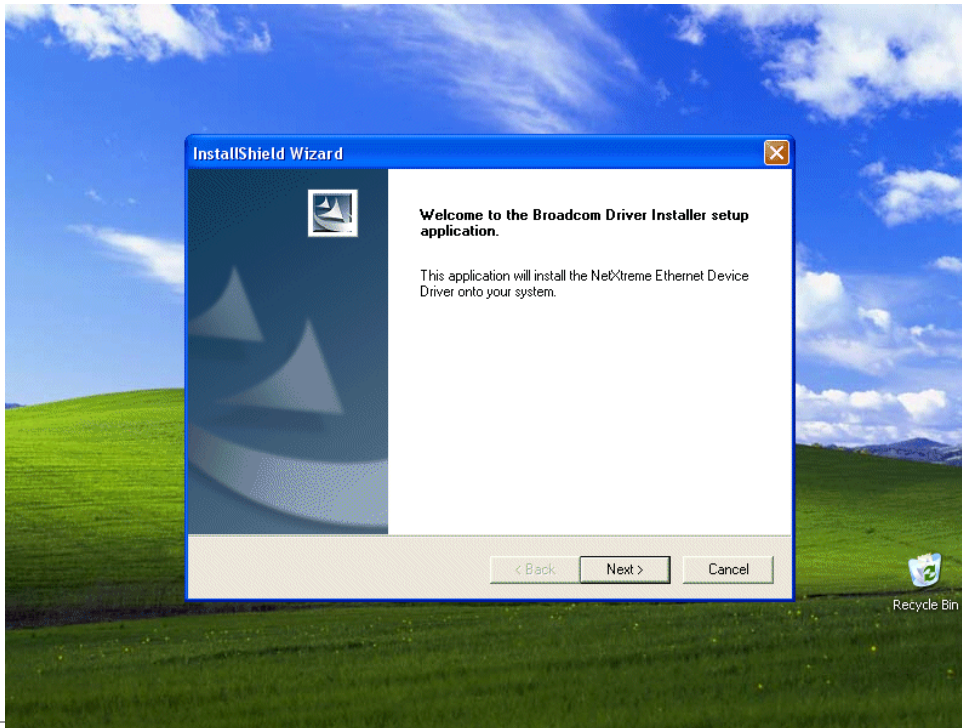
BroadCom Enthernet Driver InstallGuide under Win98SE/ME

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

2.   Insert the supplied "Bonus CD "

3.   Click "PCI Enthernet Controller " → " Driver " → "Update Driver" and Select "Install the software automatically
       (ReCommended) "

       And then Click "Next".

4. 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 "e:\Driver\Lan\BCM5705" is the designation of the driver on your system.

Update Device Driver Wizard

Windows will search for updated drivers in its driver database on your hard drive, and in any of the following selected locations. Click Next to start the search.

- ☐ Floppy disk drives

- ☐ CD-ROM drive

- ☐ Microsoft Windows Update

- ☑ Specify a location:

  E:\Driver\Lan\BCM5705

  Browse...

< Back   Next >   Cancel

5. In the Driver Files Search Results window, verify that the correct path to the driver software is shown, then click **Next**.

Update Device Driver Wizard

Windows driver file search for the device:

Broadcom NetXtreme Gigabit Ethernet

Windows is now ready to install the best driver for this device. Click Back to select a different driver, or click Next to continue.

Location of driver:

F:\B57BCM~7\B57W2K.INF

< Back   Next >   Cancel

6. Then OS will request to insert the Bonus CD into CD-ROM Drive

Insert Disk

Please insert the disk labeled 'Broadcom NetXtreme Installation Media', and then click OK.

OK

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7. Type the path of the BroadCom Enthernet driver and select " OK "

Example: e:\Driver\Lan\BCM5705

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

8. BroadCom Enthernet driver installation finish.

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BroadCom Enthernet Driver InstallGuide under Windows NT4.0

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 "*d:\Driver\Lan\BCM5705*" is the designation of the Lan driver on Bonus CD).
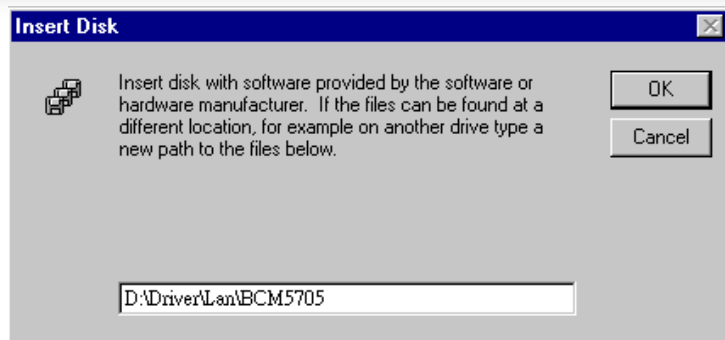
Insert Disk   ☒

Insert disk with software provided by the software or   OK
hardware manufacturer. If the files can be found at a
different location, for example on another drive type a   Cancel
new path to the files below.

D:\Driver\Lan\BCM5705

9. With "Gigabit Ethernet Controller" highlighted in the Select OEM Option window, click **"OK"**.

Select OEM Option   ☒

Choose a software supported by this hardware manufacturer's disk.

Gigabit Ethernet Controller

OK   Cancel   Help

AOpen

The adapter files are installed, then the Network window is displayed showing the newly installed adapter.

Network [?][X]

Identification | Services | Protocols | **Adapters** | Bindings

Network Adapters:

[1] Broadcom NetXtreme Gigabit Ethernet (Bus 1, Slot 8).

| Add... | Remove | Properties... | Update |

Item Notes:

Broadcom NetXtreme Gigabit Ethernet NDIS 4.0 Driver Version 2.14.

Close | Cancel

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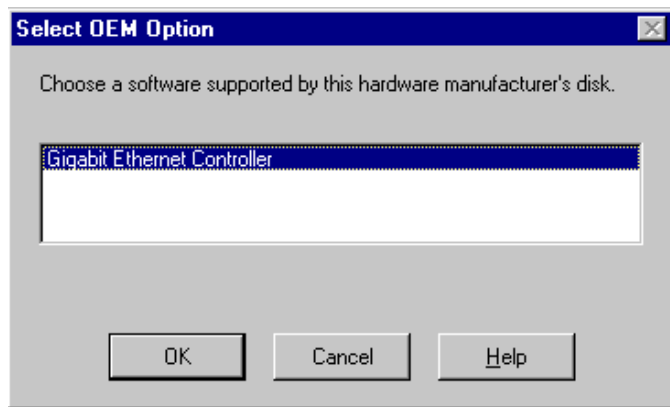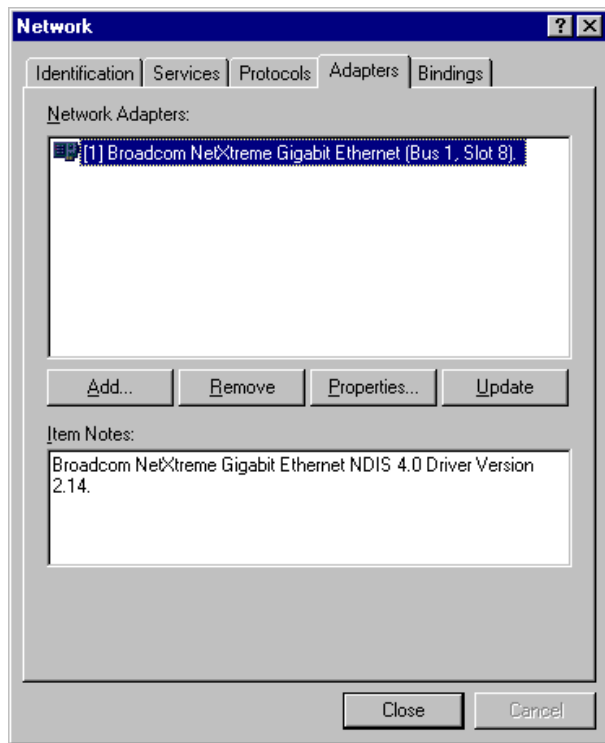
10. Click **"Close"**, then the Microsoft TCP/IP Properties window appears.

11. Configure the TCP/IP protocol and click **"OK"**.

12. When prompted to restart your computer, click **"Yes"**.

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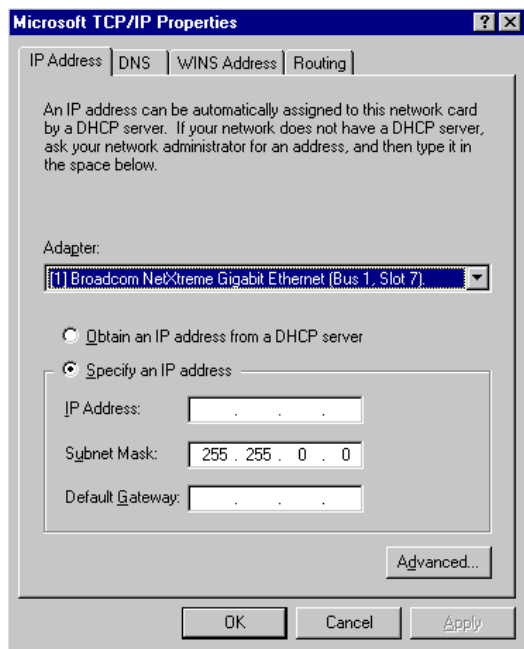
BroadCOM BCM4401 10/100 LAN Driver (AX4C Pro only)

For Win2000/Xp operating system, please kindly follow this InstallShield Wizard for steps.

BroadCom Enthernet Driver InstallGuide under Win98SE/ME

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

System Properties   ? ×

General | Device Manager | Hardware Profiles | Performance |

○ View devices by type   ○ View devices by connection

```
🖥 Computer
├─🔊 CDROM
├─💾 Disk drives
├─🖥 Display adapters
├─🗜 Floppy disk controllers
├─🗜 Hard disk controllers
├─⌨ Keyboard
├─🖥 Monitors
├─🖱 Mouse
├─🖧 Network adapters
├─❓ Other devices
│   └─⚠ PCI Ethernet Controller
├─🖳 Ports (COM & LPT)
├─🎮 Sound, video and game controllers
├─🖥 System devices
└─🔌 Universal Serial Bus controllers
```

Properties   Refresh   Remove   Print...

OK   Cancel

AOpen

2.   Insert the supplied "Bonus CD "

3.   Click "PCI Enthernet Controller " → " Driver " → "Update Driver" and Select "Install the software automatically
     (ReCommended) "

     And then Click "Next".

4. 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\BCM4401

Where "e:\Driver\Lan\BCM4401" is the designation of the driver on your system.

Copying Files...

The file 'bcm4sbe5.sys' on BroadCom NetXtreme Installation Media cannot be found.

Insert Broadcom NetXtreme Installation Media in the selected drive, and click OK.

Copy files from:

D:\Driver\Lan\BCM4401\

OK | Cancel | Skip File | Details...

5. In the Driver Files Search Results window, verify that the correct path to the driver software is shown, then click **Next**.

Update Device Driver Wizard

Windows will search for updated drivers in its driver database on your hard drive, and in any of the following selected locations. Click Next to start the search.

☐ Floppy disk drives

☐ CD-ROM drive

☐ Microsoft Windows Update

☑ Specify a location:

D:\Driver\Lan\CBM4401\

Browse...

< Back   Next >   Cancel

6. Then OS will request to insert the Bonus CD into CD-ROM Drive

Insert Disk   ☒

Please insert the disk labeled 'BroadCom 440x 10/100 Integrated Controll Install Disk' and then click OK

OK

7.   Type the path of the BroadCom Enthernet driver and select " OK "

Example: e:\Driver\Lan\BCM4401

Where "e:\Driver\Lan\BCM4401" is the designation of the " bcm4sbe5.sys " on your Bonus CD.

Update Device Driver Wizard

Windows driver file search for the device:

BroadCom 440X 10/100 Integrated Controller

Windows is now ready to install the best driver for this device. Click Back to select a different driver, or click Next to continue.

Location of driver:

D:\Driver\Lan\BCM4401\bcm4sbe5.sys

[< Back]   [Next >]   [Cancel]

8. BroadCom Enthernet driver installation finish.

Update Device Driver Wizard

BroadCom 440X 10/100 Integrated Controller

Windows has finished installing an updated driver for your hardware device.

< Back   Finish   Cancel

AOpen

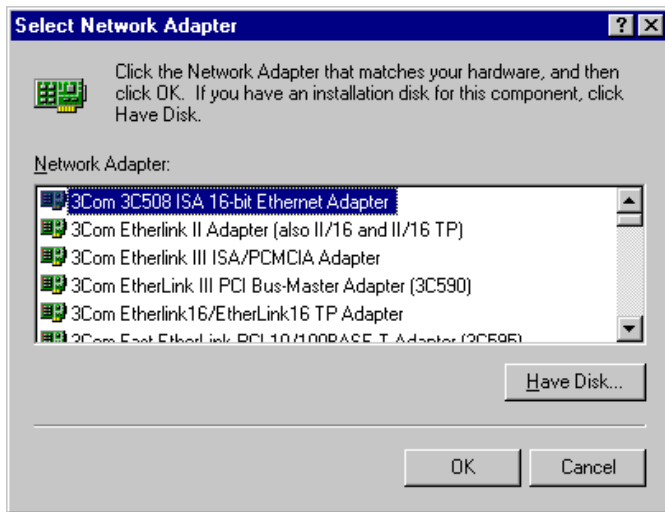## BroadCom Enthernet Driver InstallGuide under Windows NT4.0

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\BCM4401* in the Insert Disk location box (where "*d:\Driver\Lan\BCM4401*" is the designation of the Lan driver on Bonus CD).

Insert Disk   ✕

Insert disk with software provided by the software or   OK
hardware manufacturer. If the files can be found at a
different location, for example on another drive type a   Cancel
new path to the files below.

D:\Driver\Lan\BCM4401
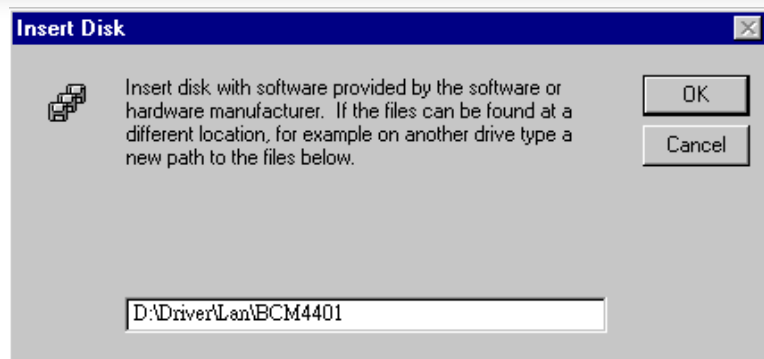
9. With "Gigabit Ethernet Controller" highlighted in the Select OEM Option window, click **"OK"**.

The adapter files are installed, then the Network window is displayed showing the newly installed adapter.

Select OEM Option   ✕

Choose a software supported by this hardware manufacturer's disk.

BroadCom 440x 10/100 Integrated Controller

OK   Cancel   Help

AOpen

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

Network	? X

Identification | Services | Protocols | Adapters | Bindings |

Network Adapters:

[1]BroadCom 440x 10/100 Integrated Controller [Bus0,S...

| Add... | Remove | Properties... | Update |

Item Notes:

Broadcom 440x 10/100 Integrated Controller NDIS 4.0 Driver
Version 3.51

| Close | Cancel |

AOpen
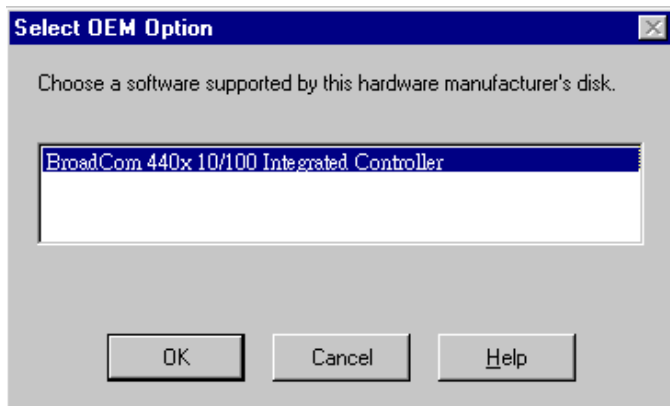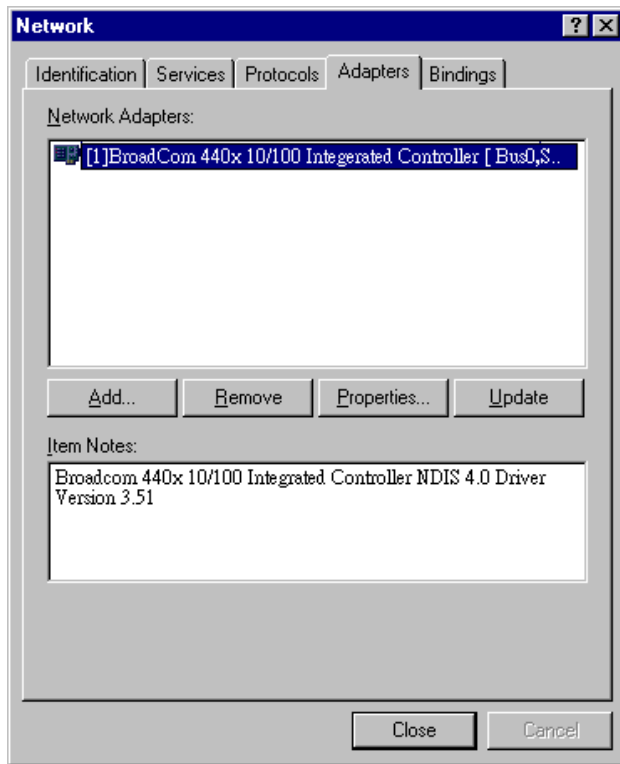
11. Configure the TCP/IP protocol and click **"OK"**.
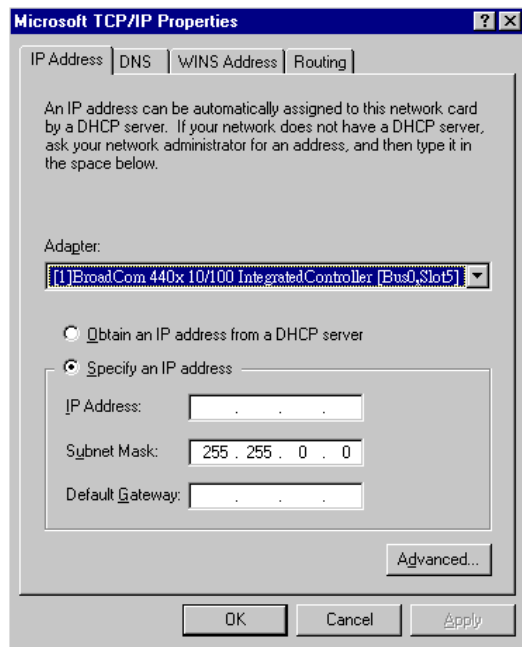
12. When prompted to restart your computer, click **"Yes"**.

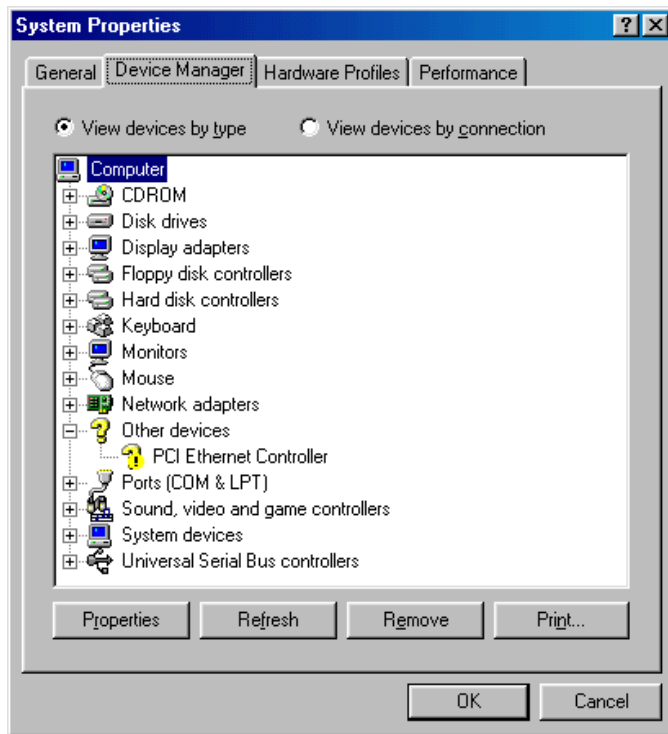# *Installing Onboard Sound Driver (AX4C Pro, AX4C Max only)*

This motherboard comes with AC97 CODEC. You can find the audio driver from the Bonus Pack CD disc auto-run menu.
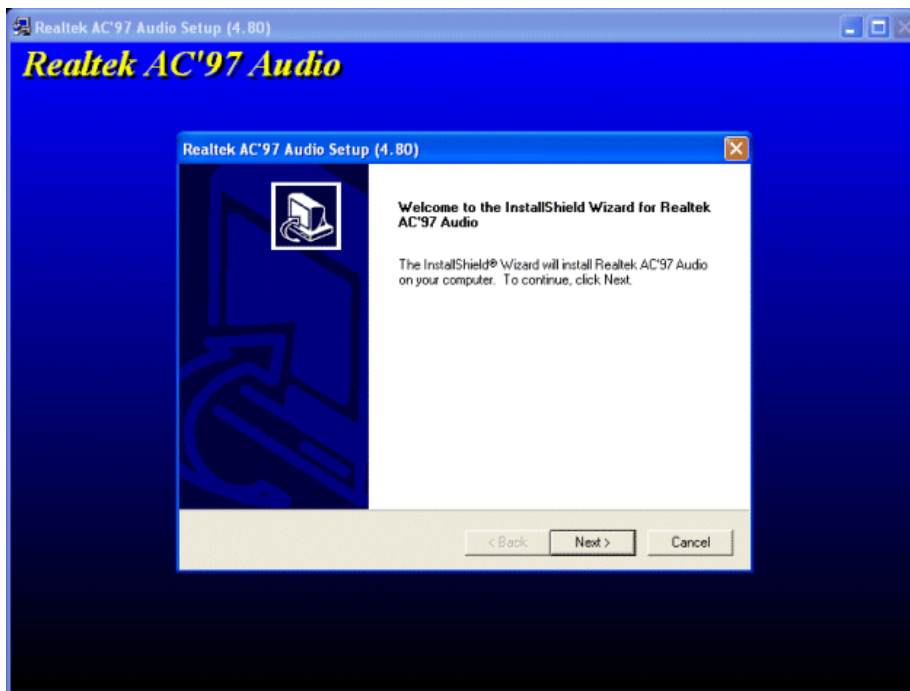
ICH5 USB 2.0 Driver

* Windows 2000 Installation Guide

****
Installing Drivers During Windows 2000 Installation
****

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".
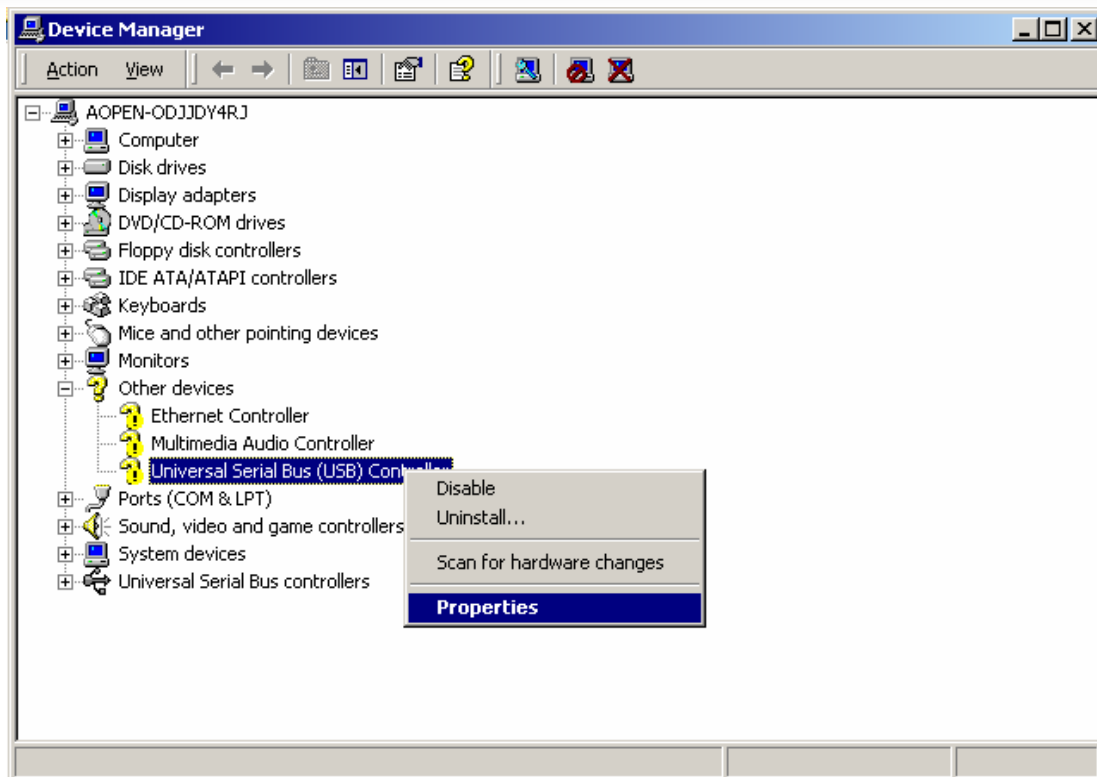
AOpen

AOpen

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.

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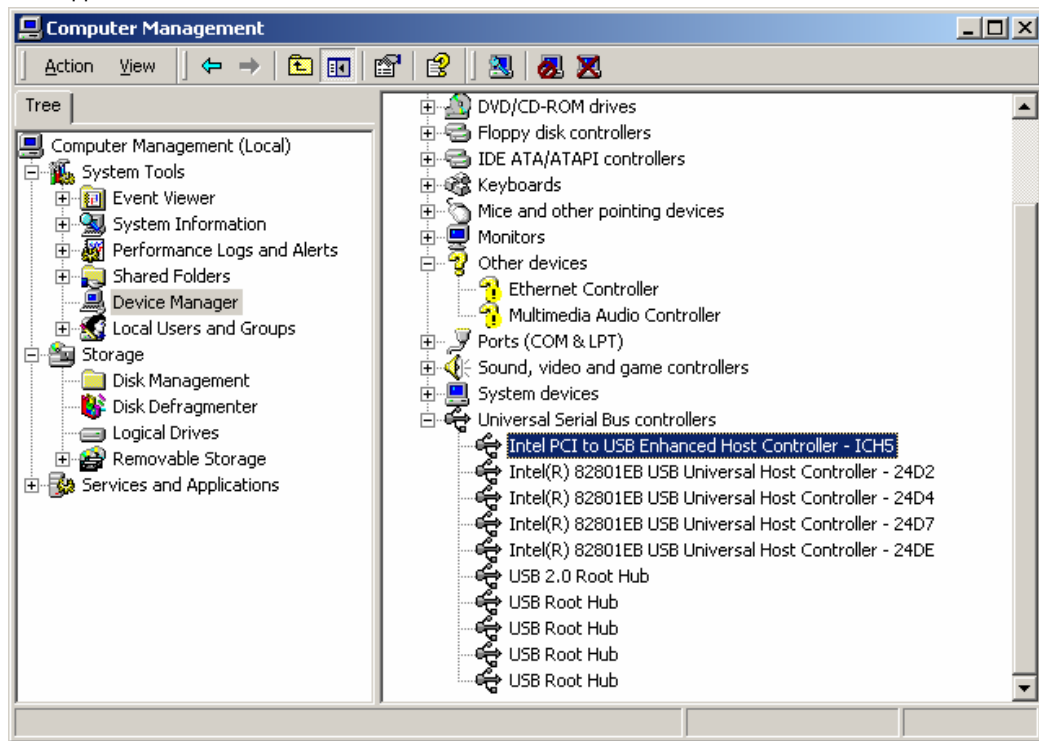
14. Click on "Next," and then on "Finish."

****

Installing Driver in Existing Windows 2000 System

****

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

****

1. From Windows 2000, open the Control Panel from "My Computer" followed by the System icon.
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 - ICH5" should appear.

* Windows 98SE Installation Guide

****
Installing Drivers During Windows 98SE Installation
****

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.

System Properties   `?` `X`

General | Device Manager | Hardware Profiles | Performance |

⦿ View devices by type   ○ View devices by connection

- 🖥 **Computer**
- ⊞ 💿 CDROM
- ⊞ 💾 Disk drives
- ⊞ 🖥 Display adapters
- ⊞ 🖳 Floppy disk controllers
- ⊞ 🖳 Hard disk controllers
- ⊞ ⌨ Keyboard
- ⊞ 🖥 Monitors
- ⊞ 🖱 Mouse
- ⊞ 🖧 Network adapters
- ⊟ ❓ Other devices
  - ⚠ PCI Ethernet Controller
  - ⚠ PCI Multimedia Audio Device
  - ⚠ PCI Universal Serial Bus
- ⊞ 🖉 Ports (COM & LPT)
- ⊞ 🎮 Sound, video and game controllers
- ⊞ 🖥 System devices

[Properties] [Refresh] [Remove] [Print...]

[OK] [Cancel]

AOpen
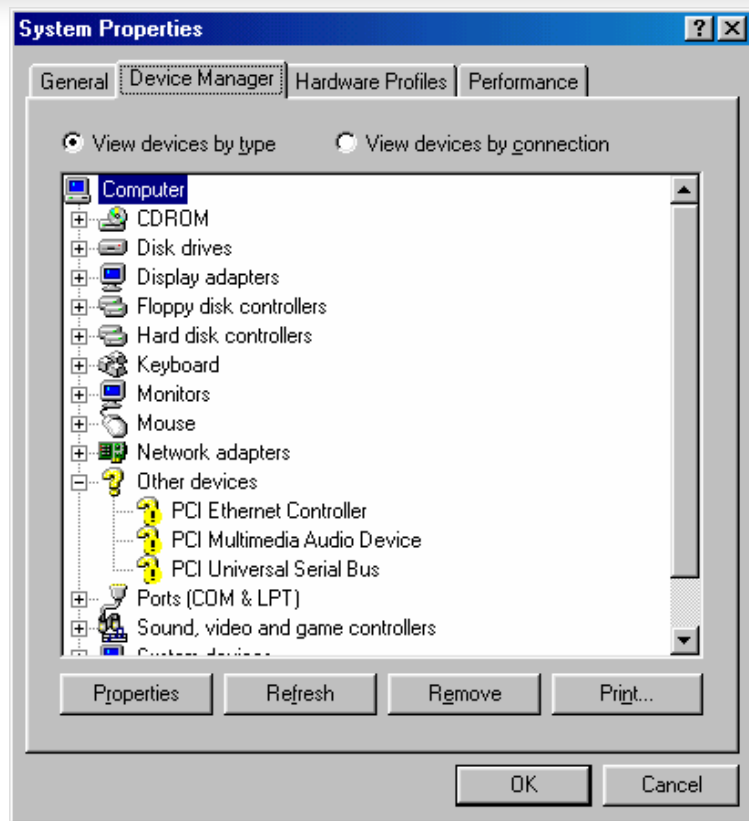
7. Choose the "Driver" tab in the "Properties" window, choose "Update Driver," and then press "Next."

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.

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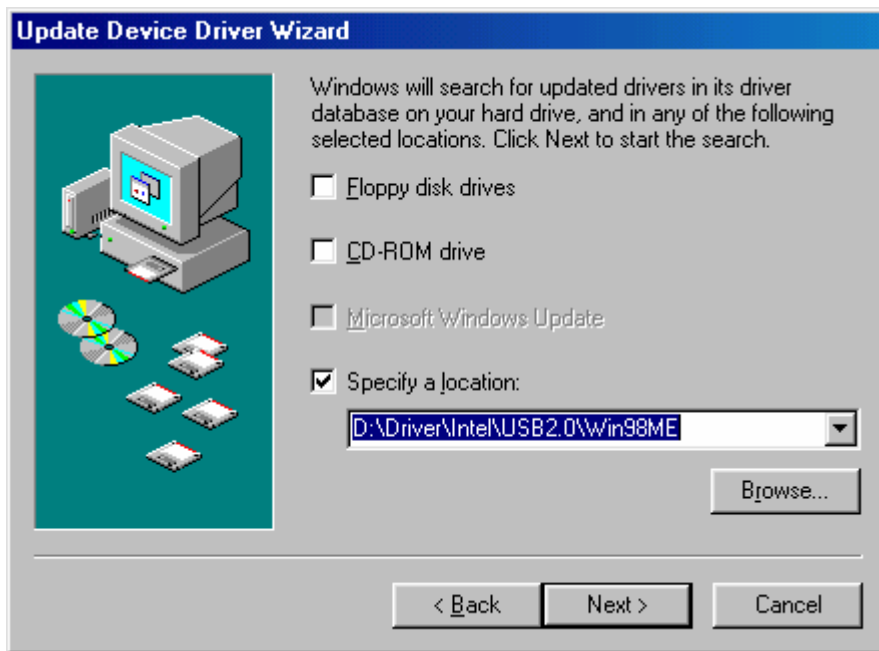
11. Press the "Next" button. A message informing you that Windows has found "Intel USB 2.0 Enhanced Host Controller" should appear.

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

****

Installing Drivers with Existing Windows 98SE

****

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

****

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.

*A*Open

* Windows Me Installation Guide

****
Installing Drivers During Windows Me Installation
****

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.

System Properties   ? X

General | **Device Manager** | Hardware Profiles | Performance |

⦿ View devices by type   ○ View devices by connection

- 💻 Computer
  - ⊞ 📀 CDROM
  - ⊞ 💾 Disk drives
  - ⊞ 🖥 Display adapters
  - ⊞ 🖳 Floppy disk controllers
  - ⊞ 🖳 Hard disk controllers
  - ⊞ ⌨ Keyboard
  - ⊞ 🖥 Monitors
  - ⊞ 🖱 Mouse
  - ⊞ 🖧 Network adapters
  - ⊟ ❓ Other devices
    - ❓ PCI Ethernet Controller
    - ❓ PCI Multimedia Audio Device
    - ❓ **PCI Universal Serial Bus**
  - ⊞ ⌨ Ports (COM & LPT)
  - ⊞ 🎮 Sound, video and game controllers

| Properties | Refresh | Remove | Print... |

OK   Cancel

AOpen

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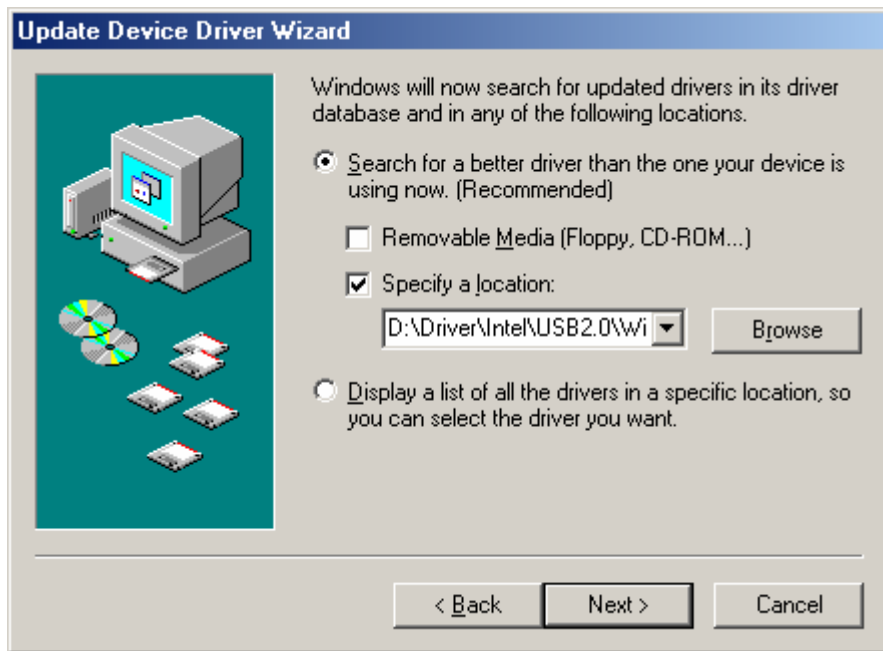
11. Press the "Next" button. A message informing you that Windows Me has found "Intel USB2.0 Enhanced Host Controller" should appear.

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

****
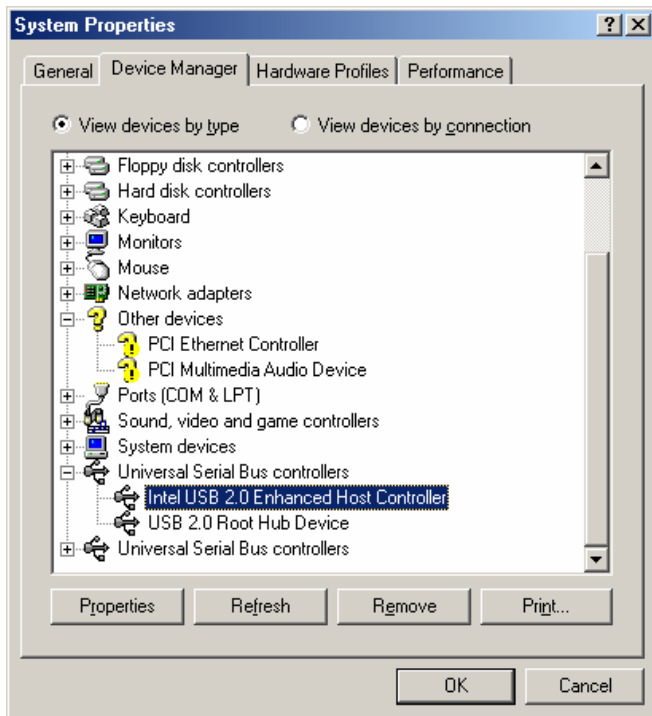
Installing Drivers with Existing Windows Me System

****

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."

****

Confirming Driver Installation in Windows Me

****

To confirm that the driver has been properly loaded in Windows Me, 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 USB2.0 Enhanced Host Controller" should appear.
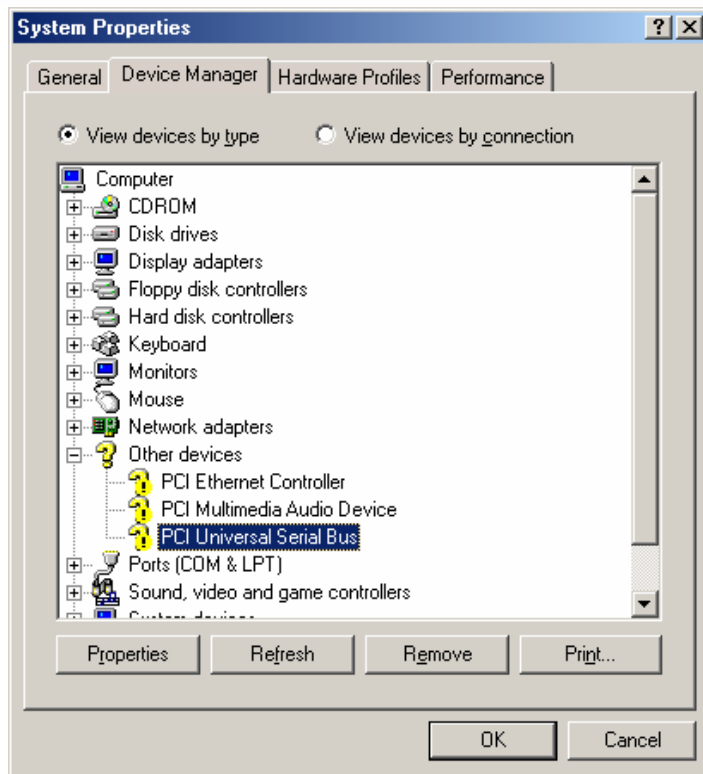
AOpen

NEW!

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.
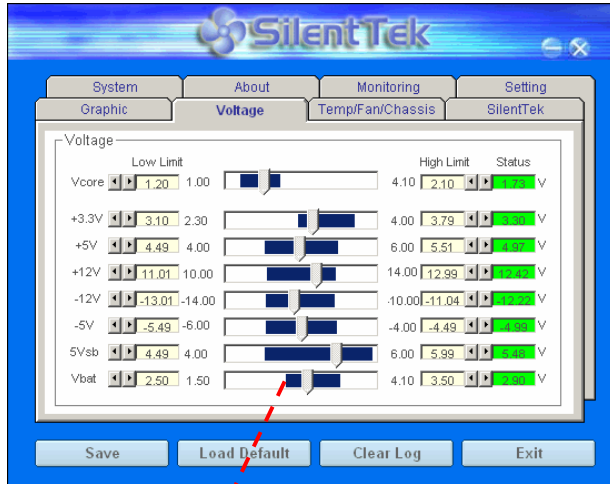
You may check your system voltage from the indicating bar here.
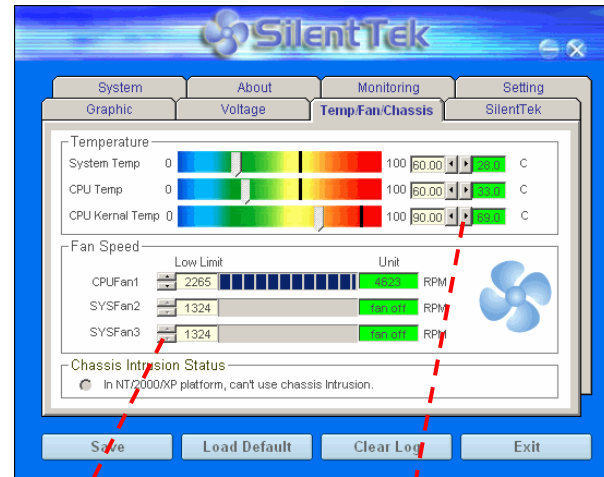
Of course, you may set your defaulted lowest margin for your fans and SilentTek would also pop up a message box to alarm you when the fan is rotating slower than this specified speed.

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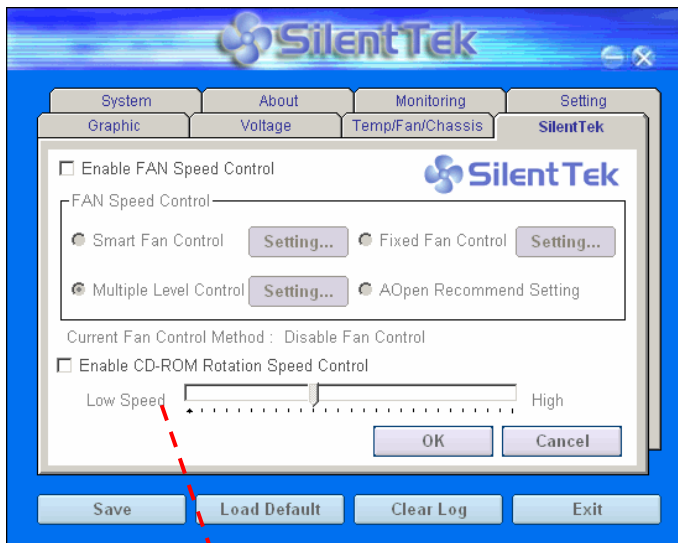
1. **Smart FAN Control**: This is the default setting of SilentTek and can be used for any branded computer housing. With a special algorithm developed by AOpen, the fan speed is automatically adjusted by the factors of CPU and ambient temperature. Ease-of-use and trouble free at your service.

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

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 "S" 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.

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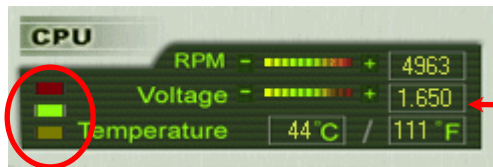
CPU Fan, Voltage and Temperature:
representing CPU fan speed, CPU voltage and CPU temperature in Celsius and Fahrenheit degrees.

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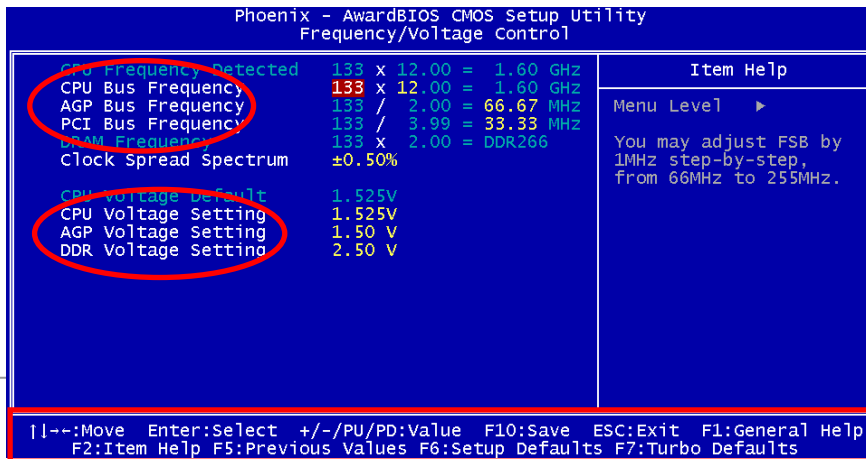
Also, the same keys help you adjust the voltage of CPU and DDR settings. Some values may change while you adjust the settings. You can press "F10" to save the changes you've made.

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.
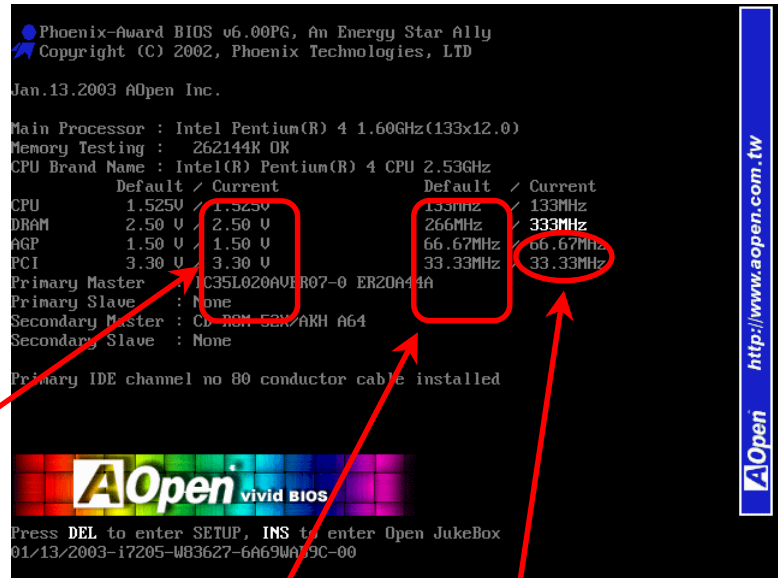
Current values of your system

Default settings of this motherboard

The highlighted setting value you manually adjust

Note: Due to BIOS versions are updated in an extremely fast speed, it's strongly recommended to download the latest version of EzClock from our website for best compatibility.

157

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).

The Phoenix-Award BIOS™ that 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 setting of AX4C-G / AX4C Pro / AX4C Max had 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. Hence, the rest of this chapter is intended to guide you through the process of configuring your system using setup.

Currently there are two kinds of beep sound when system fails to boot at POST. The first type of beep sound consists of a single long beep and two short beeps, indicating a video error has failed BIOS from initializing video screen for displaying any additional information. The 2nd type of beep sound is a single long beep that beeping repeatedly, signaling a DRAM error has occurred. You may look over the indicated error according to different beep significances.

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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About Phoenix-Award BIOS Function Description…

AOpen always dedicates to give users a more friendly computer system. Now, we include all function descriptions of BIOS setup program into the BIOS Flash ROM. When you select one function of BIOS setup program, the function description will appeared at right side of screen. Hence, you don't need read this manual while you changing the BIOS setting.

```
          CMOS Setup Utility - Copyright (C) 1984-2000 Award Software
                            Advanced BIOS Features

     Virus Warning                Disabled          │▲│        Item Help
     CPU Internal Cache           Enabled           │ │
     External Cache               Enabled           │ │   Menu Level    ►
     CPU L2 Cache ECC Checking    Enabled           │ │
     Quick Power On Self Test     Disabled          │ │   Allows you to choose
     First Boot Device            Floppy            │ │   the VIRUS warning
     Second Boot Device           HDD-0             │ │   feature for IDE Hard
     Third Boot Device            LS120             │ │   Disk boot sector
     Boot Other Device            Enabled           │ │   protection. If this
     Swap Floppy Drive            Disabled          │ │   function is enabled
     Boot Up Floppy Seek          Enabled           │ │   and someone attempt to
     Boot Up NumLock Status       On                │ │   write data into this
     Gate A20 Option              Fast              │ │   area , BIOS will show
     Typematic Rate Setting       Disabled          │ │   a warning message on
   x Typematic Rate (Chars/Sec)   6                 │ │   screen and alarm beep
   x Typematic Delay (Msec)       250               │ │
     Security Option              Setup             │ │
     OS Select For DRAM > 64MB    Non-OS2           │ │
     Video BIOS Shadow            Enabled           │▼│

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

Menu Items Select Window   Item Function Description Window

How To Use Phoenix-Award™ BIOS Setup Program

Generally, you can use the 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 value. You also can press <F1> key for help and 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. By the way, all products of AOpen also provides a special function in the BIOS setup, you can press <F3> key selecting preferred menu language to display.

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 Setup Default 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 the setting of jumpers and connect correct cables. Power on and enter the BIOS Setup, press <Del> during POST (Power-On Self Test). Choose "Load Setup Defaults" for recommended optimal performance.

Del

```
        CMOS Setup Utility - Copyright (C) 1984-2001 Award Software
  ► 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 Configura                         faults
  ► PC Health Status    Load Setup Defaults (Y/N)? Y   faults
  ► Frequency/Voltage

  Esc : Quit                       ↑ ↓ → ←   : Select Item
  F10 : Save & Exit Setup          (Shift)F3 : Change Language

                      Load Setup Defaults
```

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.*

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.
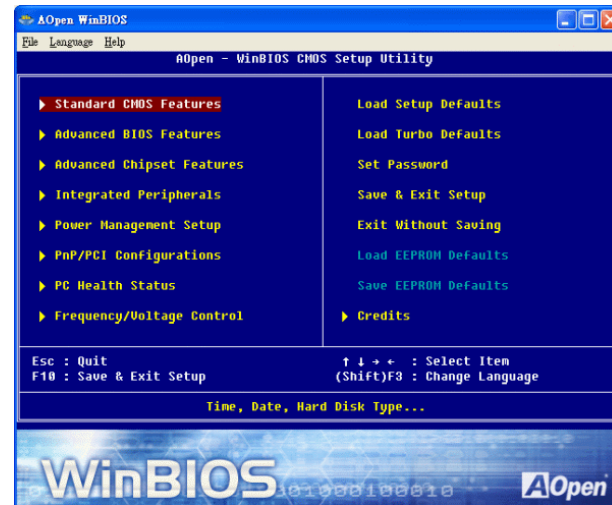
Function keys:

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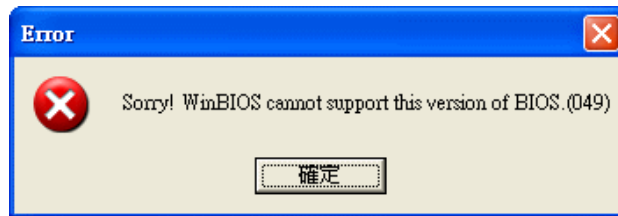
(http://english.aopen.com.tw/tech/download/WinBIOS/default.htm)

Error

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

確定

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.

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 even the latest 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.
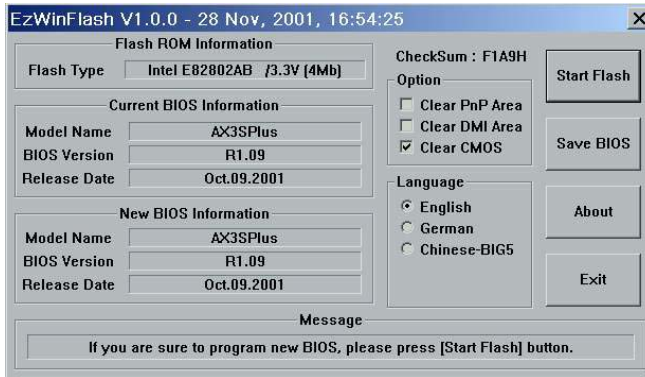
Caution: By updating your motherboard, you are taking a risk of BIOS flash failure. If your motherboard is working stable, and there are no major bugs that had been fixed by a latter BIOS revision, we recommend that you DO NOT try to upgrade your BIOS.

If you intent on upgrading, PLEASE BE SURE to get the right BIOS revision for the right motherboard model to avoid any possibility failure.
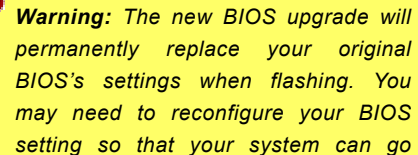
Note: The model name on this BIOS picture is for reference only. It may not be the exact model name.

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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://english.aopen.com.tw)

2. Unzip the download BIOS package (ex: WAX4CMAX102.ZIP) with WinZip (http://www.winzip.com) in Windows environment.

3. Save the unzipped files into a folder, for example, WAX4CMAX102.EXE & WAX4CMAX102.BIN.

4. Double click on the WAX4CMAX102.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*

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^2PROM. 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.

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

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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.

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.

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 interconnection) 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 family includes 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.
>
> Make sure if all jumper settings are correct.
>
> Clear CMOS
>
> Next

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   │
          └──────┬───────┘
                 │
                 ▼
              ◇─────────◇                No      ┌───────────────────────────┐
             Check if there is display? ────────▶│ 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.   │
    └──────────────────────────────────────────┘
                 │
                 ▼
              ◇─────────◇                No      ┌───────────────────────────┐
             Check if the system ────────────────▶│ It is very possible that your │
                reboots?                          │ keyboard is defective.        │
              ◇─────────◇                        └───────────────────────────┘
                 │ Yes
                 ▼
          ┌──────────────┐
          │     Next     │
          └──────────────┘
```

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 98.

End

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://club.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 select your preferred language after log on, and 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://club.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.
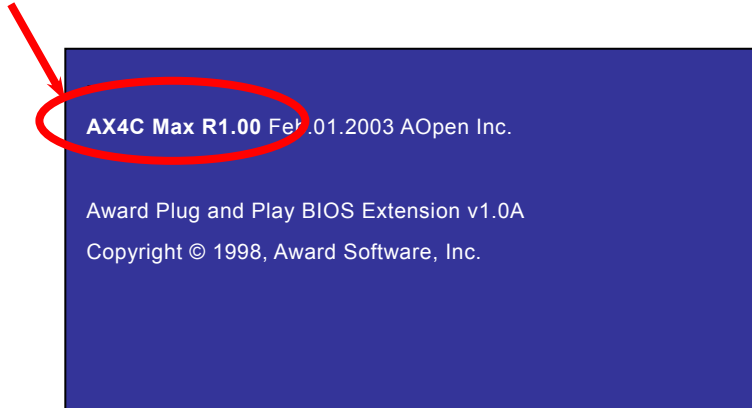
Part Number and Serial Number

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:

P/N:91.88110.201   S/N:91949378KN73
Part No.   Serial No.

918811020191949378KN73
Part No.   Serial No.

P/N: 91.88110.201 is part number, **S/N: 91949378KN73** is serial number.

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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:

AX4C Max R1.00 Feb.01.2003 AOpen Inc.

Award Plug and Play BIOS Extension v1.0A

Copyright © 1998, Award Software, Inc.

AX4C Max is model name of motherboard; **R1.00** is BIOS version.

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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:

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- Be able to personalize your AOpen web pages.

- Receive e-mail notification about latest BIOS/Driver/Software release information.

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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: 49-1805-559191 Fax: 49-2102-157799	Japan AOpen Japan Inc. Tel: 81-048-290-1800 Fax: 81-048-290-1820

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Simplified Chinese	*http://www.aopen.com.cn/tech/default.htm*