










AK77-400G
AK77-400GN
Online Manual

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Before You Start



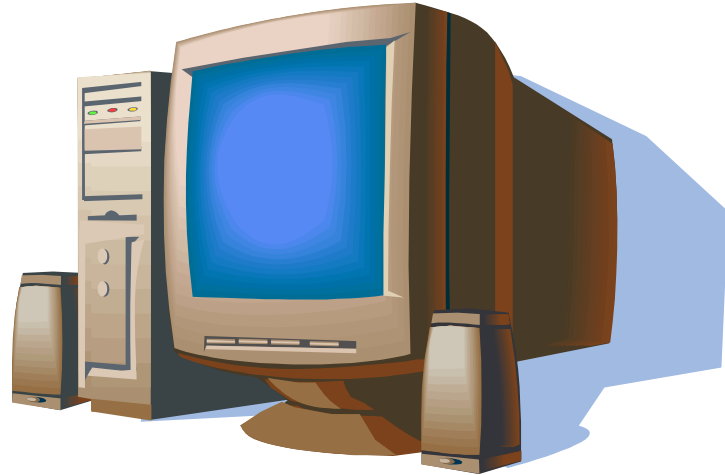
This Online Manual will introduce to the user how this product is installed. All useful information will be described in later chapters. Please keep this manual carefully for future upgrades or system configuration changes. This Online Manual is saved in [PDF format](#), we recommend using Adobe Acrobat Reader 5.0 for online viewing, it is included in [Bonus CD 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.

Overview

Thank you for choosing AOpen AK77-400G / AK77-400GN motherboard. The AK77-400G / AK77-400GN motherboard is AMD® Socket 462 motherboard based on the ATX form featuring the [VIA KT400A chipset](#). As high performance chipset built in the motherboard, this motherboard comes with AMD® Socket 462 series Athlon™ & Duron™ and AthlonXP™ processor (with CPU Overheat Protection circuit to Athlon™XP CPU only) and 200/266/333 MHz [EV6](#) system bus. In the AGP performance, it has one AGP slot and supports AGP 8X/4X/2X mode and pipelined spilt-transaction long burst transfer up to 2.1GB/sec. With high bandwidth 266/533MB/s 8-bit V-Link Host Controller, [DDR400](#), [DDR333](#) and [DDR266](#) DDR RAM can be applied to this motherboard and maximum memory size can be up to 3GB. The on-board IDE controller supports Ultra DMA 66/100/133 mode. On the strength of RealTek LAN controller on board, it provides 10/100M bps Ethernet for office and home use. Beside, this motherboard has a S/PDIF connector and an [AC97 CODEC](#) ALC650F chipset onboard to provide 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. Now, let's enjoy all features from AOpen AK77-400G / AK77-400GN.



Feature Highlight

CPU

Supports AMD® Socket 462 series CPU with 200/266/333 MHz EV6 Bus designed for Socket 462 technology.

Athlon: 600MHz~1.4GHz

Duron: 600MHz~1.2GHz

AthlonXP: 1500+ (1.33GHz) ~3000+ (2.2GHz)

Chipset

The VIA KT400A consists of Host system controller and the VT8235CE highly integrated V-Link Client PCI/LPC controller. The Host system controller provides superior performance between the CPU, RAM, AGP bus, and V-Link interface with pipelined, burst, and concurrent operation. The VT8235CE V-Link Client controller is a highly integrated PCI/LPC controller. Its internal bus structure is based on 66MHz PCI bus that provides 8x bandwidth compare to previous generation PCI/ISA bridge chips. The VT8235CE integrated Client V-Link controller with 266/533MB/s bandwidth between Host/Client V-Link interface, providing a V-Link-PCI and V-Link-LPC controller.

Ultra DMA 66/100/133 Bus Master IDE

Comes with an on-board PCI Bus Master IDE controller with two connectors that supports four IDE devices in two channels, supports Ultra DMA 66/100/133, PIO Modes 3 and 4 and Bus Master IDE DMA Mode 4, and supports Enhanced IDE devices.

LAN Port (for AK77-400GN)

On the strength of Realtek LAN controller on board, which is a highly integrated Platform LAN Connect device, it provides 10/100 Mbps Ethernet for office and home use.

Expansion Slots

Including five 32-bit/33MHz PCI and one AGP 8X/4X slots. The PCI local bus throughput can be up to 132MB/s. All of them are master PCI slots with arbitration and decoding for all integrated functions and LPC bus. The [Accelerated Graphics Port \(AGP\)](#) specification provides a new level of video display sophistication and speed. And the data transfer rate can be up to 2112MB/s.

Memory

Provides three 184-pin DDR DIMM sockets that support DDR 400/333/266 composed of an arbitrary mixture of 64, 128, 256, 512 MB or 1GB RAM up to 3 GB maximum.

On-board AC97 Sound

AK77-400G / AK77-400GN uses the [AC97 CODEC](#) RealTek ALC650F chip, which includes a complete audio recording and playback system.

S/PDIF Connector

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

Six USB 2.0 Connectors

Provides four ports on the back panel and one [USB](#) 2.0 header on board to connect USB interface devices, such as mouse, keyboard, modem, scanner, etc. With fancy speed up to 480Mbps USB 2.0 is 40 times faster than the traditional ones. 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.

1MHz Stepping CPU Frequency Adjustment

Provides “1MHz Stepping CPU Frequency Adjustment” function in the BIOS. This magic function allows you adjust CPU [FSB](#) frequency from 100~248MHz by 1MHz stepping, and lets your system can get maximum performance.

Watch Dog ABS

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

Power Management/Plug and Play

AK77-400G / AK77-400GN supports the power management function that conforms to the power-saving standards of the U.S. Environmental Protection Agency (EPA) Energy Star program. It also offers [Plug-and-Play](#), which helps saving users from configuration problems, thus making the system much more user-friendly.

Hardware Monitoring Management

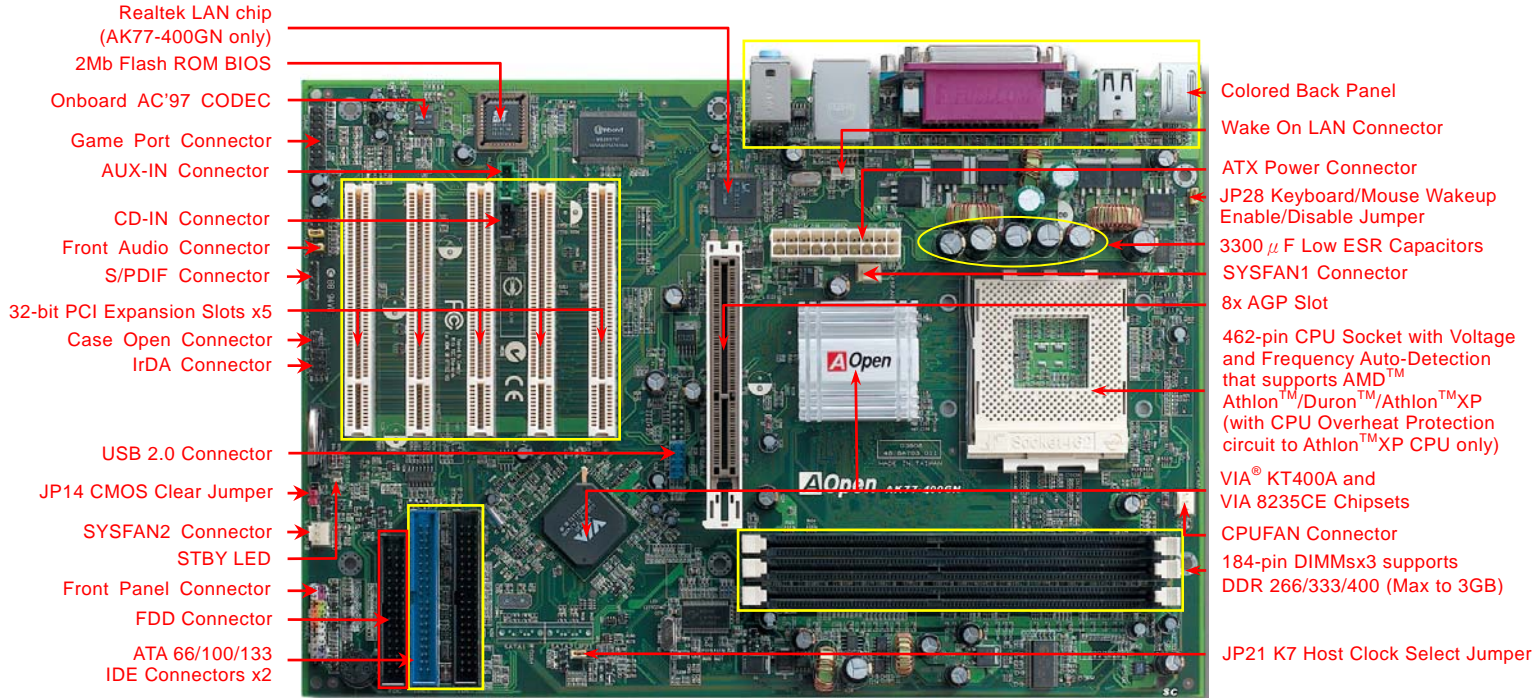
Supports CPU or system fans status, temperature and voltage monitoring and alert, through the on-board hardware monitor module and AOpen Hardware Monitoring Utility.

Quick Installation Procedure

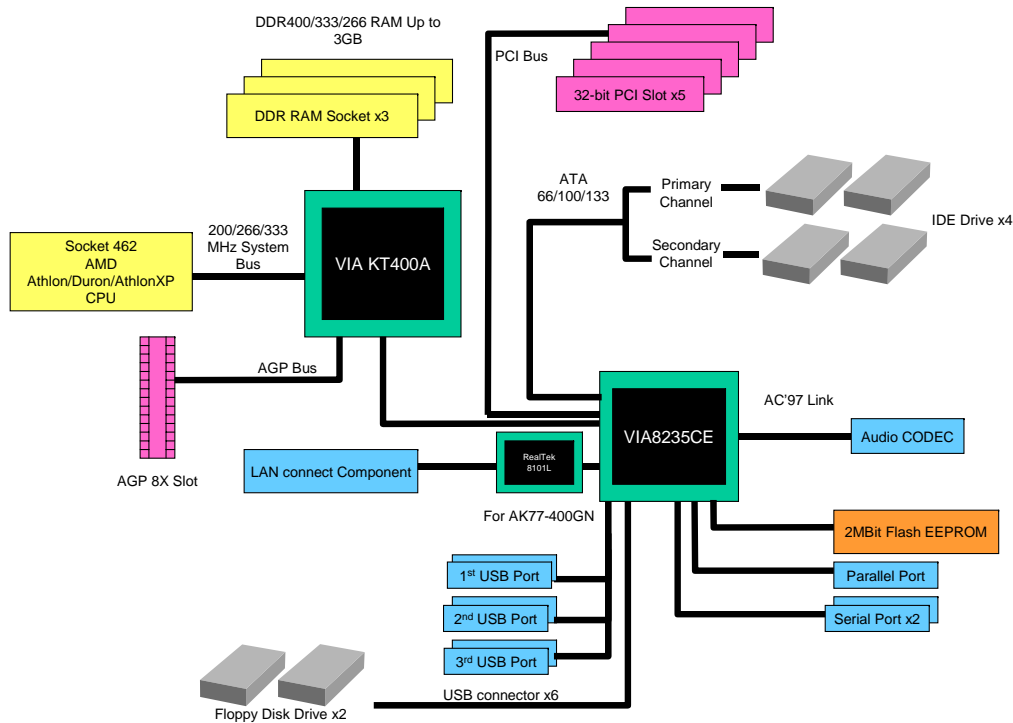
This page gives you a quick procedure on how to install your system. Follow each step accordingly.

1. Installing [CPU and Fan](#)
2. [Installing System Memory \(DIMM\)](#)
3. [Connecting Front Panel Cable](#)
4. [Connecting IDE and Floppy Cable](#)
5. [Connecting ATX Power Cable](#)
6. [Connecting Back Panel Cable](#)
7. [Power-on and Load BIOS Setup Default](#)
8. [Setting CPU Frequency](#)
9. Reboot
10. [Installing Operating System \(such as Windows XP\)](#)
11. [Installing Driver and Utility](#)

Motherboard Map



Block Diagram



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 procedures requiring ESD protection.*

About “Manufacturer Upgrade Optional” and “User Upgrade Optional”...

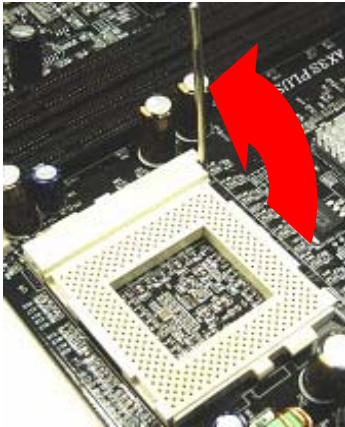
When you read this online manual and start to assemble your computer system, you may find some of functions are called “Manufacturer Upgrade Optional”, and some are called “User Upgrade Optional”. Though all AOpen motherboards include many amazing and powerful features, in some situations, these powerful 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.



CPU Installation

This motherboard supports AMD® Athlon and Duron Socket 462 series CPU. Be careful of CPU orientation when you plug it into CPU socket (with **CPU Overheat Protection** function implemented, the system will be automatically power off when the temperature of CPU reached 97 degree, but works on AthlonXP CPU only).

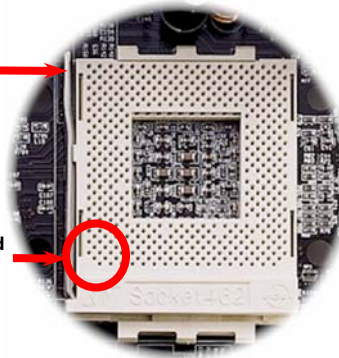
1. Pull up the CPU socket lever and up to 90-degree angle.



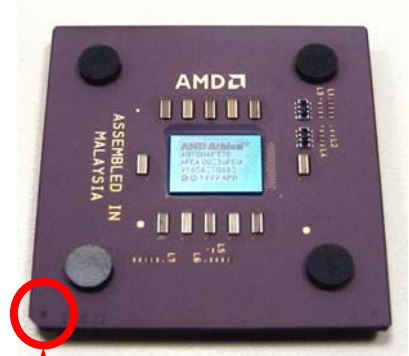
2. Locate Pin 1 in the socket and look for a black dot or cut edge on the CPU upper interface. Match Pin 1 and cut edge, then insert the CPU into the socket.

CPU socket
Lever

CPU pin 1 and
cut edge

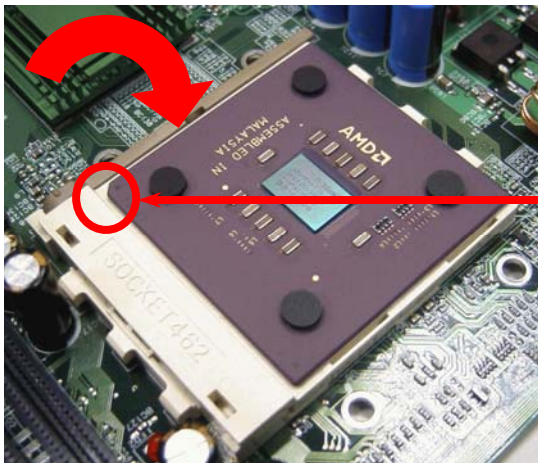


Black dot and
cut edge



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

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.

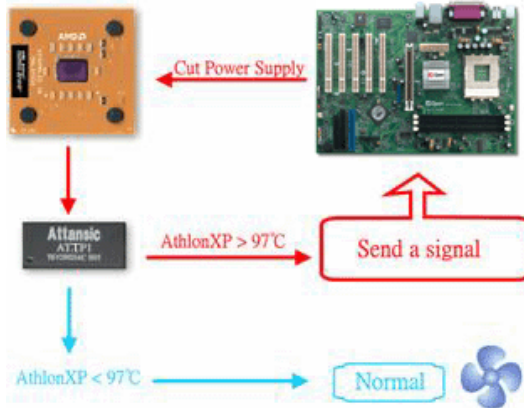
Note: This picture is for example only; it may not exactly be the same motherboard.

AOpen Overheat Protection (O.H.P.) Technology



With AMD platform substantially keeps increasing the speed of its CPU, it inevitably led to the annoying problem of high CPU operation temperature at the same time. In order to prevent accidental failure of CPU fan, which could cause the burning down of the AthlonXP CPU, we, AOpen, have meticulously developed a new technology, named, O.H.P. (Overheat Protection) Technology to protect them. Thanks to the intelligent monitoring design of AOpen O.H.P. technology, user can now finally set their mind at ease even when fan failed to work without fearing the possible damage of CPU.

Under the circumstances that CPU fan is running properly, AthlonXP temperature should be way below the highest temperature limit of 97°C. However, if CPU fan accidentally becomes malfunction or improperly installed, the CPU temperature would rocket



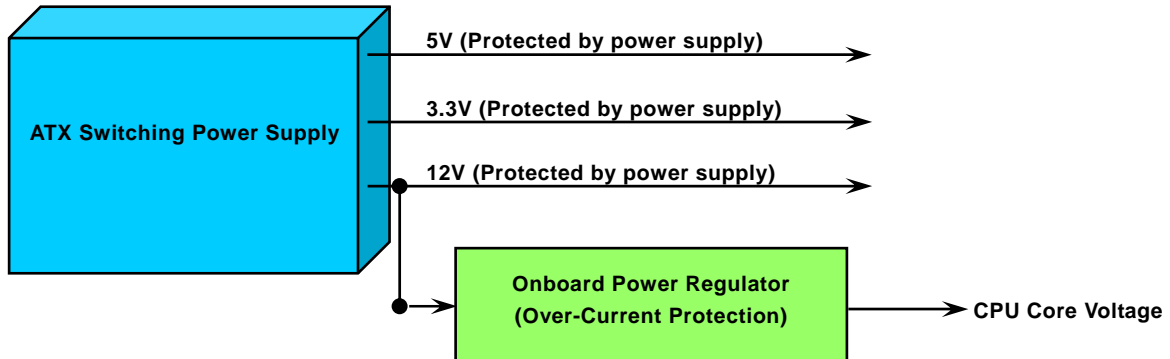
abruptly, and you may find your system hang up or crying over the smoking CPU if you haven't installed AOpen O.H.P. previously. With AOpen O.H.P. technology applied, the specific thermal detection pins on AthlonXP CPU would sense voltage difference when processor is overheated with fan failed, and the overheat protection system would immediately send out a signal to abort your system by cutting CPU electricity before any damage is done. Unlike other manufacturers who use BIOS or software to control the power supply of CPU, AOpen O.H.P. Technology is purely hardware-controlled the minute after system boot-up, and occupies no system resource. We are pleasant to phase in this practical function on all AOpen AMD series motherboards to protect customer's valuable hardware and personal data.

Note: AOpen Overhear Protection Technology only support processors base on 0.13-micron technology in this motherboard.



CPU Over-current Protection

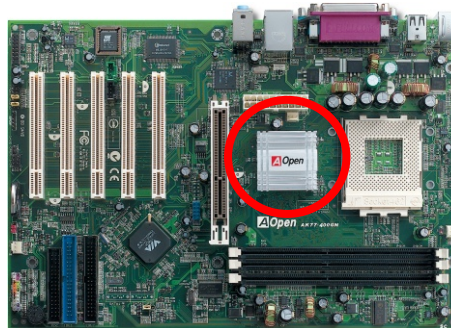
Over Current Protection has been popularly implemented on ATX 3.3V/5V/12V switching power supply for a while. However, new generation CPU is able to use regulator of different voltages to transfer 12V to CPU voltage (for example, to 2.0V). This motherboard is with switching regulator onboard that supports 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.**

Enlarged Aluminum Heatsink

Cool down CPU and Chipset is important for system reliability. Enlarged aluminum heat sink provides better heat consumption especially when you are trying to over clocking the CPU.



Setting CPU Frequency

BIOS Setup > Frequency/Voltage Control > CPU Bus Frequency

This motherboard is CPU jumper-less design, you can set CPU frequency through the BIOS setup, and no jumpers or switches are needed. The default setting is "table select mode". You can adjust the FSB from "CPU Bus Frequency" for overclocking.

Core Frequency = CPU Bus Clock * CPU Ratio

PCI Clock = CPU Bus Clock / Clock Ratio

AGP Clock = PCI Clock x 2

EV6 Bus Speed = CPU external bus clock x 2

CPU Ratio	From 5.0x to 18.0x step 0.5x
CPU FSB (By manual Adjustment)	100~191 by 1MHz stepping adjustment technology



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 till the AOpen "Watch Dog ABS" reset the system in five seconds and system will auto-detect hardware again.

CPU	CPU Core Frequency	EV6 Bus Clock	Ratio
Athlon 1.33G	1.33GHz	266MHz	10.0x
Athlon 1.4G	1.4GHz	266MHz	10.5x
AthlonXP 1500+	1.3GHz	266MHz	10.0x
AthlonXP 1600+	1.4GHz	266MHz	10.5x
AthlonXP 1700+	1.46GHz	266MHz	11.0x
AthlonXP 1800+	1.53GHz	266MHz	11.5x
AthlonXP 1900+	1.6GHz	266MHz	12.0x
AthlonXP 2000+	1.667GHz	266MHz	12.5x
AthlonXP 2100+	1.73GHz	266MHz	13x
AthlonXP 2200+	1.80GHz	266MHz	13.5x
AthlonXP 2400+	2.0GHz	266MHz	15x
AthlonXP 2500+ (Barton)	1.833GHz	333MHz	11x
AthlonXP 2600+	2.13GHz	266MHz	16x
AthlonXP 2600+	2.08GHz	333MHz	12.5x
AthlonXP 2700+	2.16GHz	333MHz	13x
AthlonXP 2600+ (Barton)	1.917GHz	333MHz	11.5x
AthlonXP 2800+ (Barton)	2.083GHz	333MHz	12.5x
AthlonXP 3000+ (Barton)	2.167GHz	333MHz	13x

Note: With CPU speed changing rapidly, there might be fastest CPU on the market by the time you received this installation guide. This table is kindly for your references only.

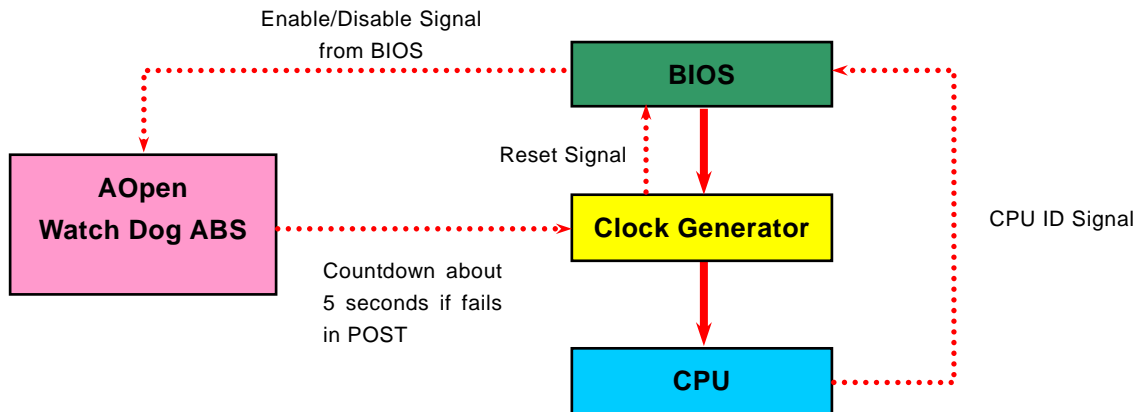
Note: VIA® KT400A chipset supports 200/266/333MHz FSB with performance reaches maximum 333MHz EV6 system bus and supports 66MHz AGP clock, higher clock setting may cause serious system damage.

Warning: Supposed you have had adjusted CPU ratio on your current CPU, and you plan to replace it with a new CPU. Please use <Home> key or Clear CMOS to restore the default setting after reinstalling a new CPU.

AOpen “Watch Dog ABS”

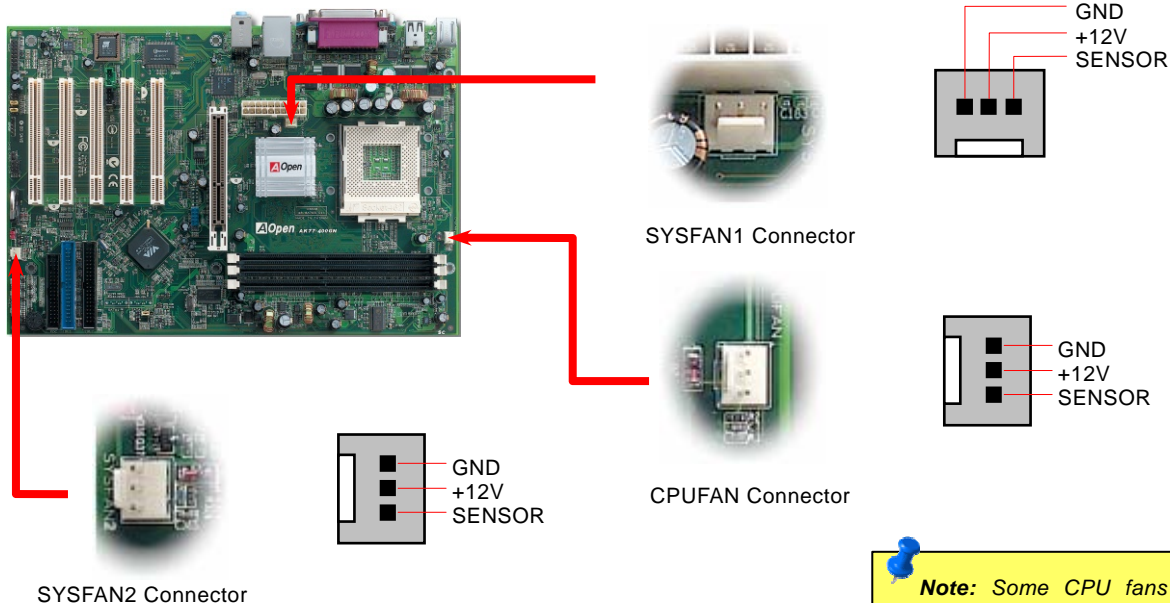


With this motherboard, AOpen provides a very special, useful feature for overclockers. When you power-on the system, the BIOS will check last system [POST](#) status. If it succeeded, the BIOS will enable “Watch Dog ABS” function immediately, and set the CPU [FSB](#) frequency by user’s setting that 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 without removing the cover of system housing, and be able to set the jumper to clear CMOS data when your system hanged.



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

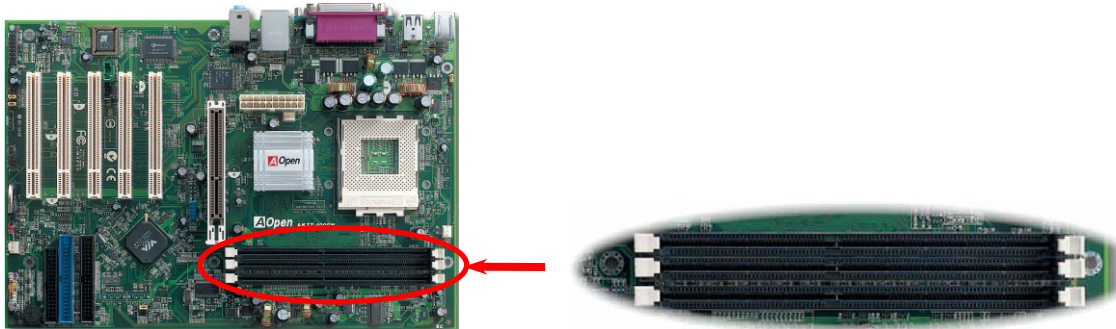
Plug in the CPU fan cable to the 3-pin **CPUFAN** connector. If you have chassis fan, you can also plug it on **SYSFAN1** (FAN1) or **SYSFAN2** (FAN2) connector.



Note: Some CPU fans do not have sensor pin, so that cannot support fan monitoring.

DIMM Sockets

This motherboard has three 184-pin DDR DIMM sockets that allow you to install [DDR266/333/400](#) memory up to 3 GB. Non-ECC DDR RAM is supported. Otherwise, it will cause serious damage on memory sockets or RAM module.



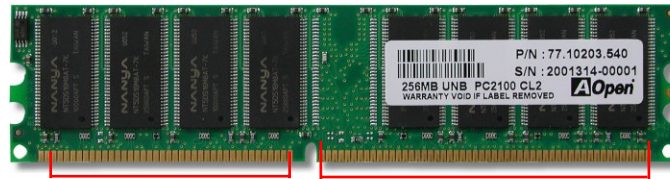
Warning: This motherboard supports DDR RAM. Please do not install the SDRAM on the DDR RAM sockets; otherwise it will cause serious damage on memory sockets or RAM module.

Note: According to the standard DDR400 specification from JEDEC (Joint Electron Device Engineering Council), it is regulated that DDR400 supports only 2x DIMM on the memory module for a maximum 2GB capacity, and DDR333 supports up to 3x DIMM for a maximum of 3GB capacity. Please be noted that KT400A motherboards follow this standard specification on memory as well.

How to Install Memory Modules

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

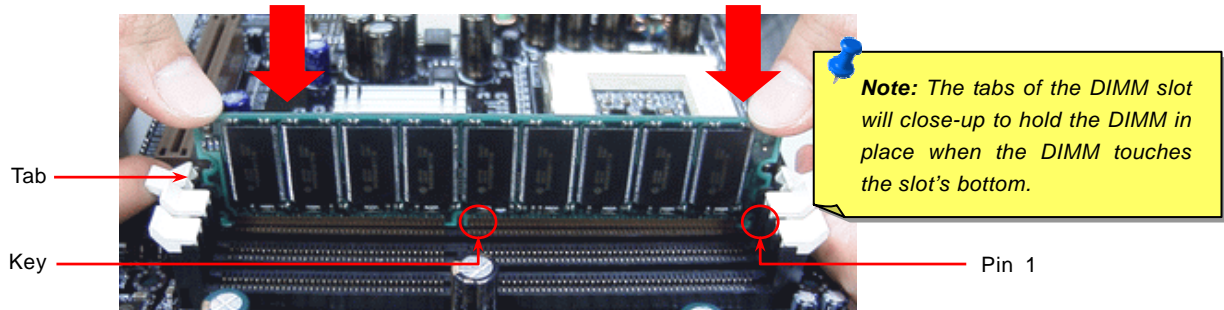
1. Make sure the DIMM module's pin face down and match the socket's size as depicted below.



40 pins

52 pins

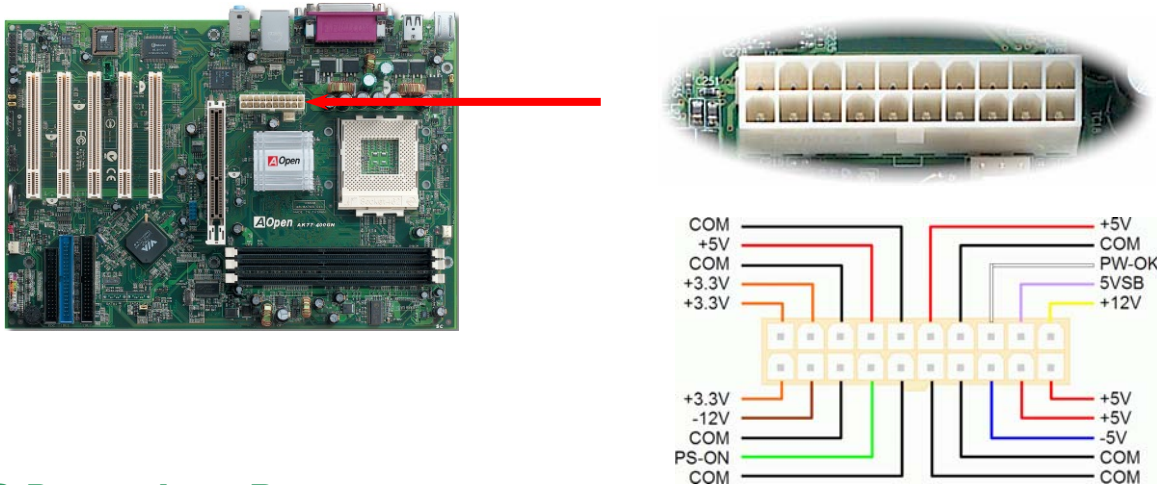
2. Insert the module straight down to the DIMM slot with both hands and press down firmly until the DIMM module is securely in place.



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

ATX Power Connector

The ATX power supply uses 20-pin connector shown below. Make sure you plug in the right direction.

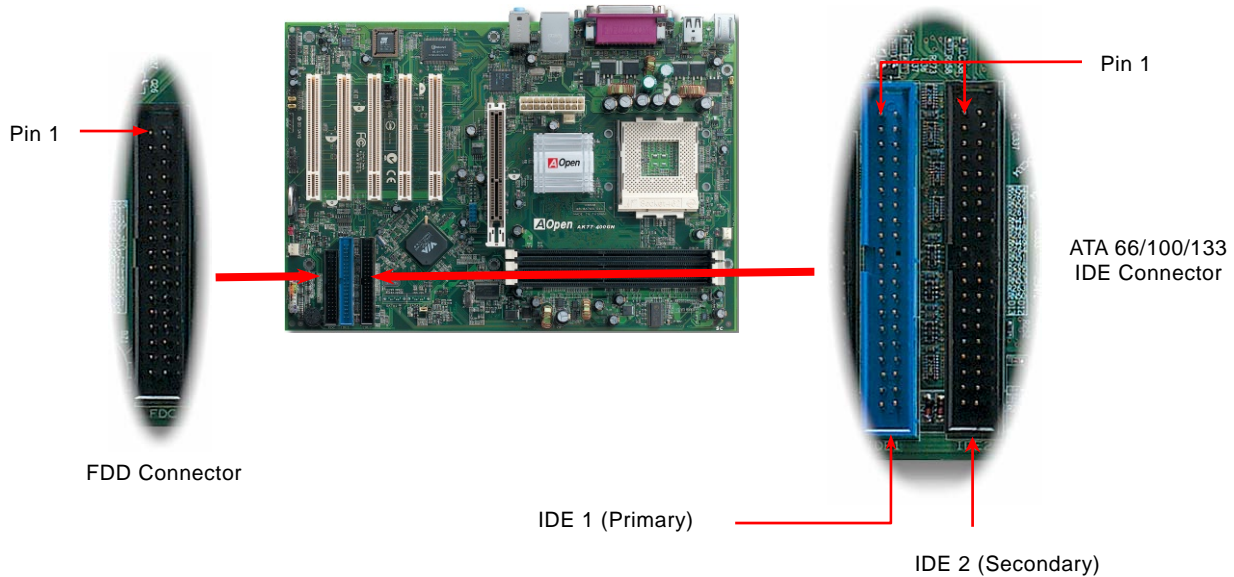


AC Power Auto Recovery


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

IDE and Floppy Connector

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



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



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



Tip:

1. *For better signal quality, it is recommended to set the far end side device to master mode and follow the suggested sequence to install your new device. Please refer to above diagram*
2. *To achieve the best performance of Ultra DMA 66/100/133 hard disks, a special **80-wires IDE cable** for Ultra DMA 66/100/133 is required.*

ATA133 Supported

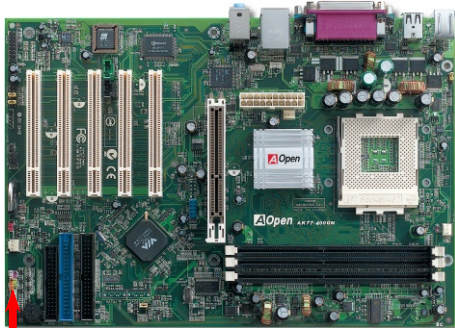


This motherboard supports [ATA66](#), [ATA100](#) or [ATA133](#) IDE devices. Following table lists the transfer rate of IDE PIO and DMA modes. The IDE bus is 16-bit, which means every transfer is two bytes. As the hard drive industry introduces faster and higher capacity hard drives, the current Ultra 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 speed on this motherboard can be satisfied.

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

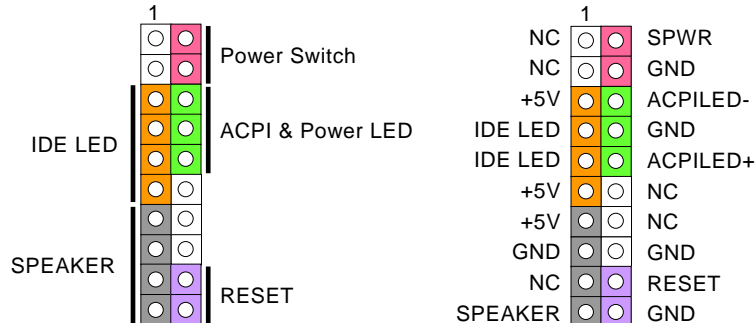
Front Panel Connector



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 & 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**.

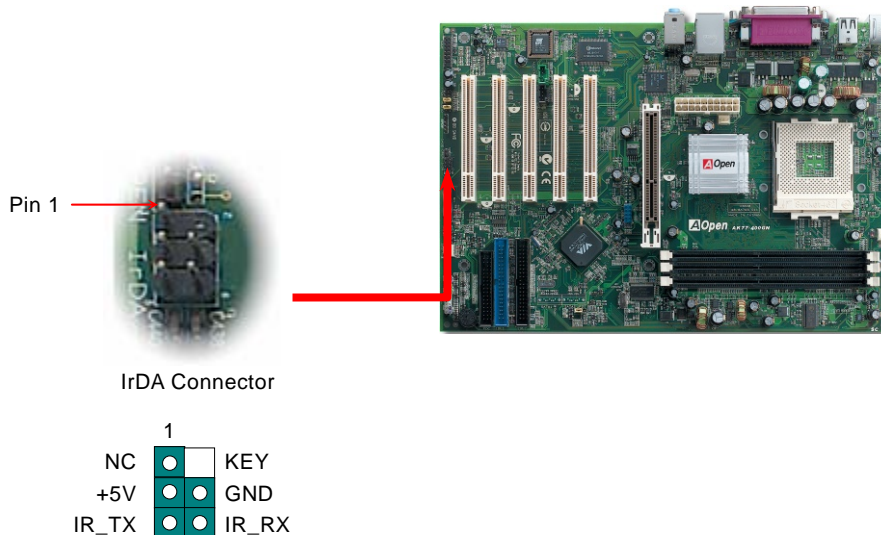
Suspend Type	ACPI LED
Power on Suspend (S1)	Blinking between green and red
Suspend to RAM (S3) or Suspend to Disk (S4)	Blinking between green and red



IrDA Connector

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

Install the infrared module onto the **IrDA** connector and enable the infrared function from BIOS Setup, UART2 Mode, make sure to have the correct orientation when you plug in the IrDA connector.

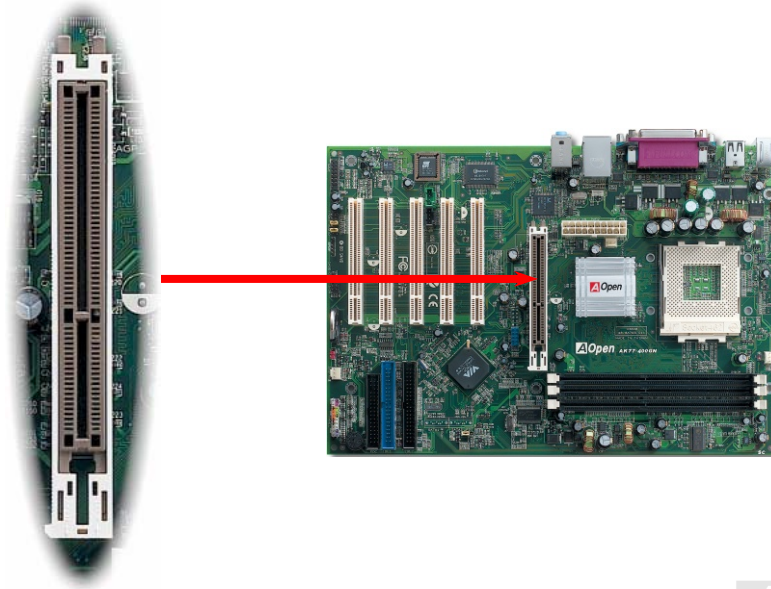


AGP (Accelerated Graphic Port) 8X Expansion Slot



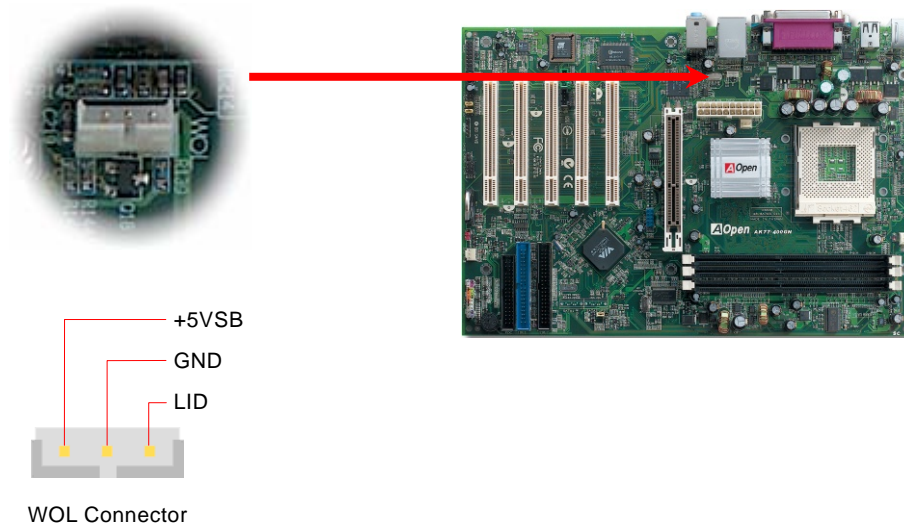
The AK77-400G / AK77-400GN provides an [AGP](#) 8X slot. The AGP 8X is a bus interface targeted for high-performance 3D graphic. AGP supports only memory read/write operation and single-master single-slave one-to-one only. AGP uses both rising and falling edge of the 66MHz clock, for 4X AGP, the data transfer rate is $66\text{MHz} \times 4\text{bytes} \times 4 = 1056\text{MB/s}$. AGP is now moving to AGP 8X mode, which is $66\text{MHz} \times 4\text{bytes} \times 8 = 2.1\text{GB/s}$.

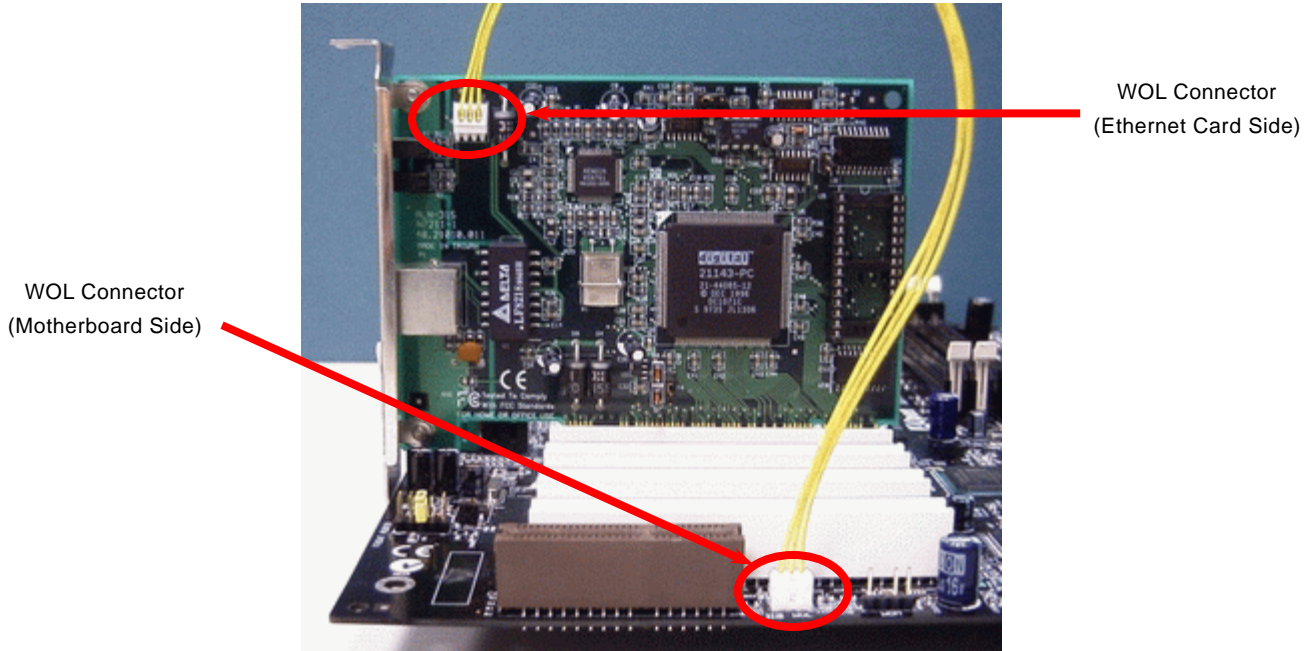
Warning: It is strongly recommended not to install a 3.3V AGP card, which is not supported by VIA® Apollo KT400A chipsets.



WOL (Wake on LAN) Connector

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.

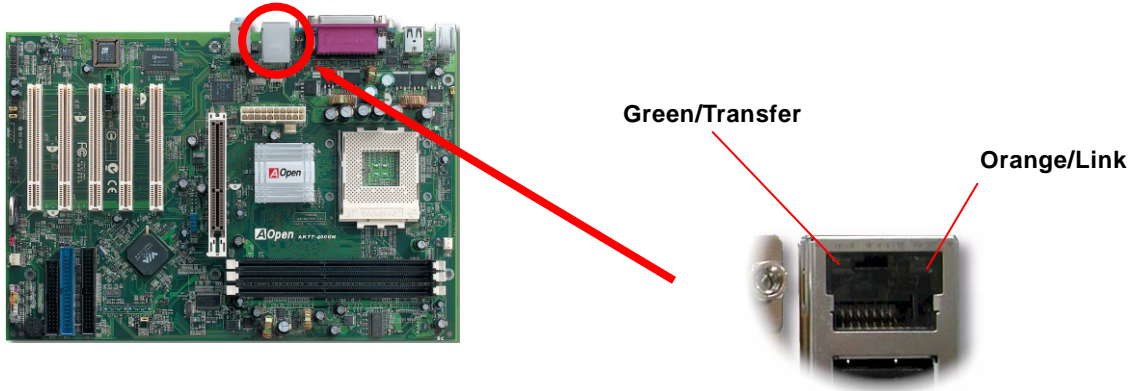




Note: This picture is for example only; it may not exactly be the same motherboard.

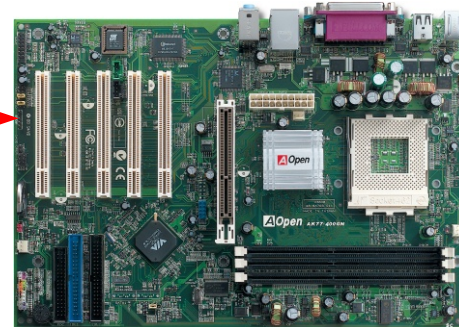
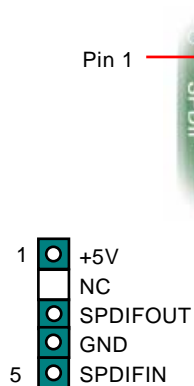
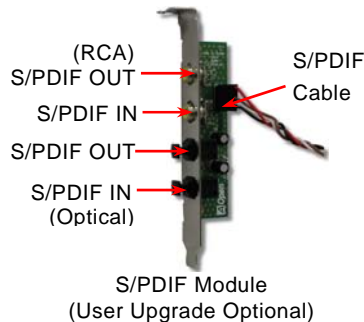
10/100 Mbps LAN onboard (for AK77-400GN)

On the strength of Realtek LAN controller on board, this motherboard provides 10/100 Mbps Ethernet for office and home use. The Ethernet RJ45 connector is located on top of USB connectors. The orange LED indicates the link mode, it lights when linking to network. The green LED indicates the transfer mode and it lights when data is transferring in 100 Mbps. To enable or disable this function, you may simply adjust it through BIOS.



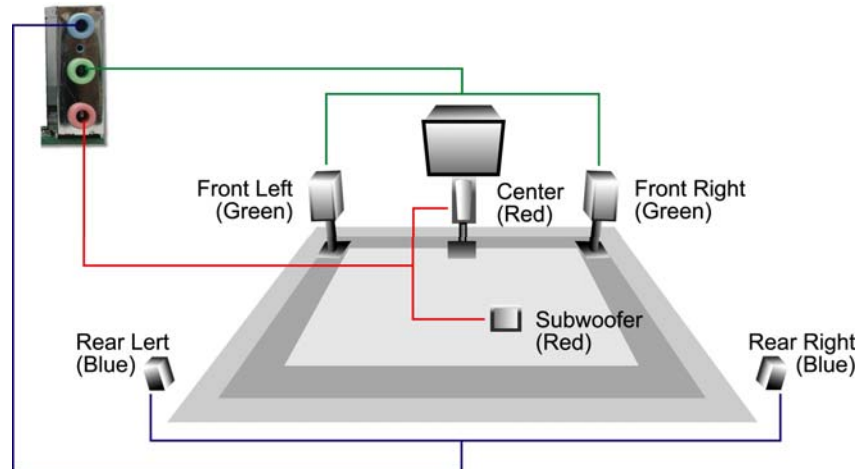
S/PDIF (Sony/Philips Digital Interface) Connector **NEW!**

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



Super 5.1 Channel Audio Effect **NEW!**

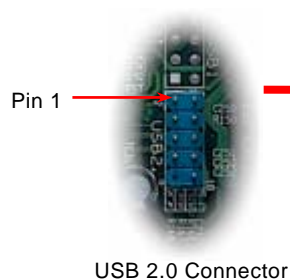
This motherboard comes with an ALC650F Codec which supports high quality of 5.1 Channel audio effect, bringing you a brand new audio experience. On the strength of the innovative design of ALC650F, you're able to use standard line-jacks for surround audio output without connecting any external module. 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 below represents the standard location of all speakers in 5.1 Channel 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.



Support Six USB 2.0 Port



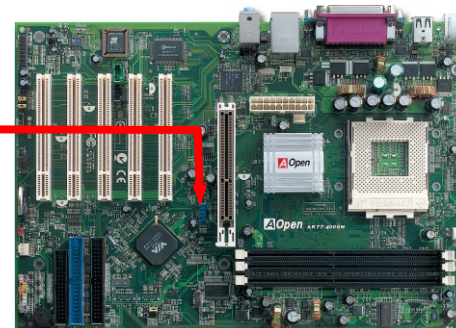
This motherboard provides six [USB](#) 2.0 ports to connect USB devices, such as mouse, keyboard, modem, printer, etc. There are four ports on the PC99 back panel and one header on board. Please note that USB 2.0, with fancy speed up to 480Mbps, is 40 times faster than the traditional ones. Except for the speed increase, USB 2.0 supports old USB 1.0/1.1 software and peripherals, offering impressive and even better compatibility to customers.



USB 2.0 Connector

1			
+5V	●	●	+5V
SBD2-	●	●	SBD3-
SBD2+	●	●	SBD3+
GND	●	●	GND
KEY	□	●	NC

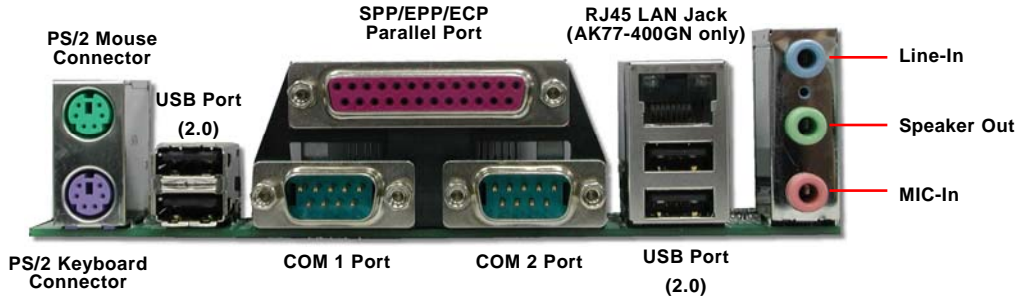
USB 2.0 Connector



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

Color Coded Back Panel

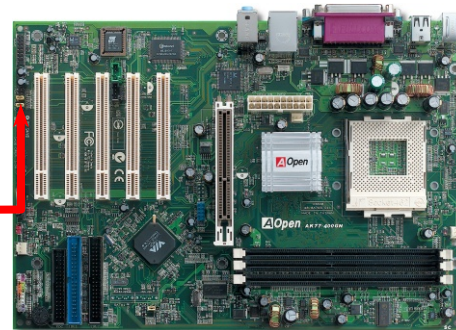
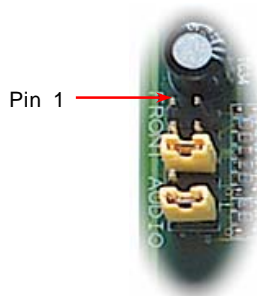
The onboard I/O devices are PS/2 Keyboard, PS/2 Mouse, serial ports COM1 and COM2, RJ45 LAN Jack, Printer, [USB](#), AC97 sound. The view angle of drawing shown here is the back panel of the housing.



PS/2 Keyboard:	For standard keyboard, which use PS/2 plug.
PS/2 Mouse:	For PC-Mouse, which use 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.
Speaker Out:	To External Speaker, Earphone or Amplifier.
Line-In:	Comes from the signal sources, such as CD/Tape player.
MIC-In:	From Microphone.

Front Audio Connector

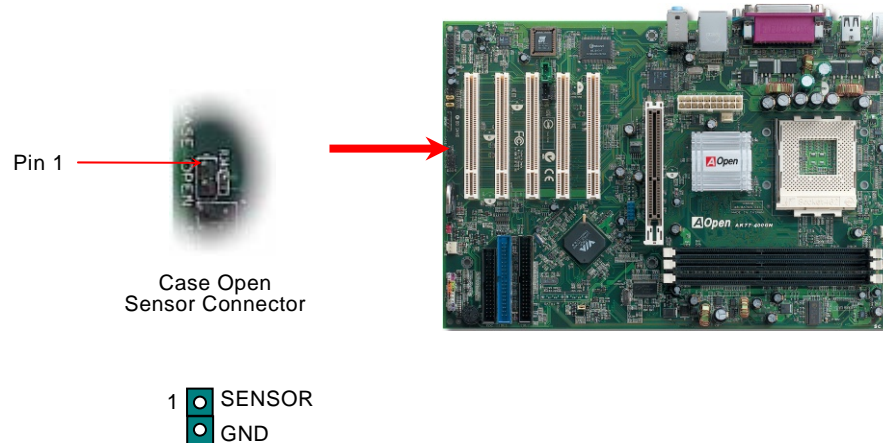
If the housing has been designed with an audio port on the front panel, you'll be able to connect onboard audio to front panel through this connector. By the way, please remove 5-6 and 9-10 jumper caps from the Front Audio Connector before connecting the cable. Please do not remove these 5-6 and 9-10 yellow jumper caps if there's no audio port on the front panel.



	1		
AUD_MIC	● ●	AUD_GND	
AUD_MIC_BIAS	● ●	AUD_VCC	
AUD_FPOUT_R	● ●	AUD_RET_R	
NC	□	KEY	
AUD_FPOUT_L	● ●	AUD_RET_L	

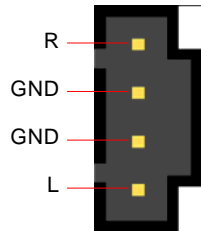
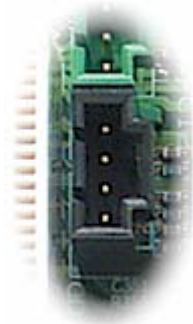
Case Open Connector

The “CASE OPEN” header provides chassis intrusion-monitoring function. To make this function work, you have to enable it in the system BIOS, connect this header to a sensor somewhere on the chassis. So, whenever the sensor is being triggered by light or 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.

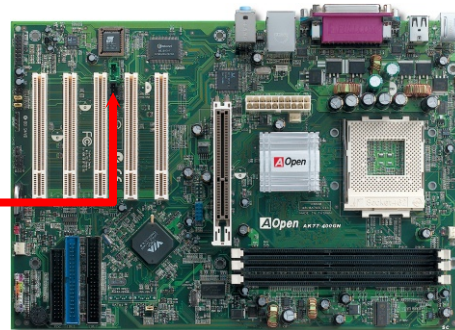


CD Audio Connector

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



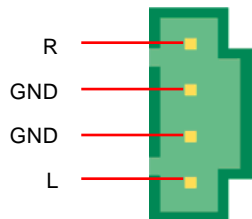
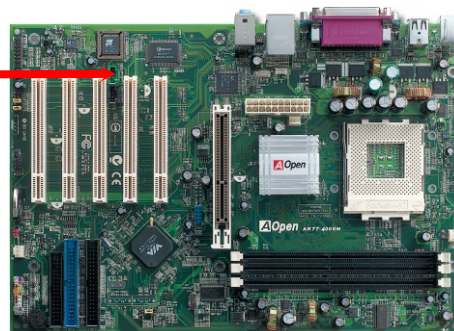
CD-IN Connector



Note: Though the latest version of Windows supports "Digital Audio" through IDE bus, 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.



AUX-IN Connector

Game Port Bracket Supported

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

Joystick Module
(User Upgrade Optional)

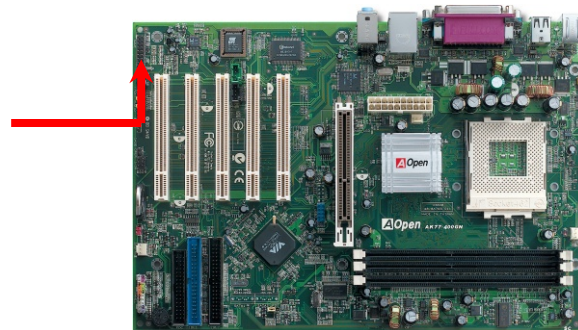


Pin1



1

+5V	●	●	+5V
JAB1	●	●	JBB1
JACX	●	●	JBCX
GND	●	●	MIDI_TXD
GND	●	●	JBCY
JACY	●	●	JBB2
JAB2	●	●	MIDI_RXD
+5V	●	□	KEY

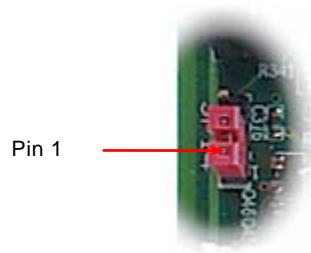


Note: This picture is for example only; it may not exactly look the same with the motherboard you purchased.

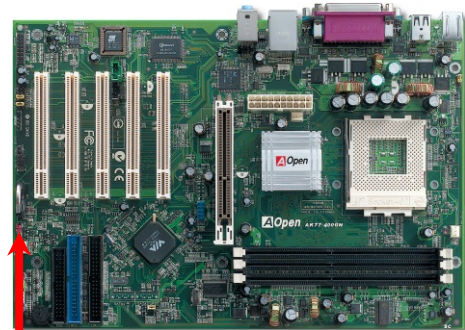
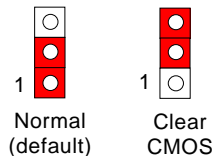
JP14 Clear CMOS Data Jumper

You can clear CMOS to restore system default setting. To clear the CMOS, follow the procedures 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 pin 1 & pin 2.
5. Connect ATX power cable back to connector PWR2.



Pin 1



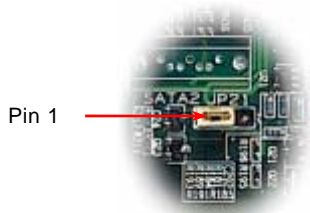
Tip: When should I Clear CMOS?

1. Boot fails because of overclocking...
2. Forget password...
3. Troubleshooting...

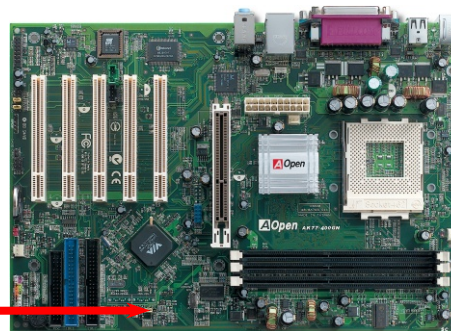
JP21 K7 Host Clock Selection

This jumper is used to specify the relationship of PCI and FSB clock. Generally speaking, if you are not an over-clocker, we recommend you to set it to the default setting. Additionally, this motherboard also provides **"1MHz Stepping Adjustment"** feature for overclockers to adjust CPU FSB frequency via BIOS setup program. If you fix the CPU FSB frequency by JP21, the "1MHz Stepping Adjustment" range will be changed according to what type of CPU you use.

JP 21	CPU FSB	Range
1-2 (default)	133 MHz	130-160 MHz
	166 MHz	161-191 MHz
	200 MHz	200-248 MHz
2-3	/	100-129 MHz



Pin 1



JP21 K7 Host Clock

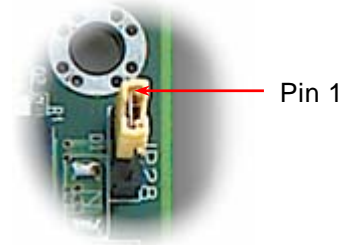
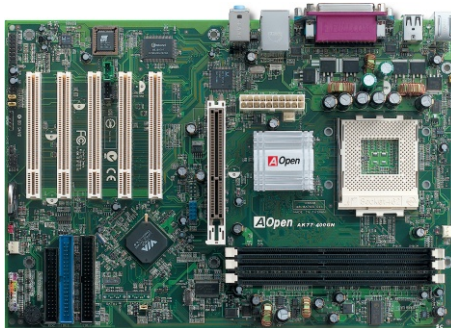
Select Jumper

Auto detect
(default)

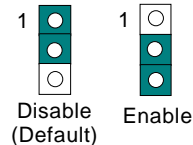
100MHz

JP28 KB/Mouse Wake-up 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 pin2-3.

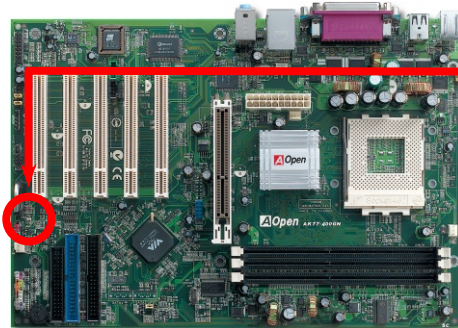


JP28 KB/Mouse
Wake-up Jumper



STBY LED

STBY LED is AOpen's considerate design that aims 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.



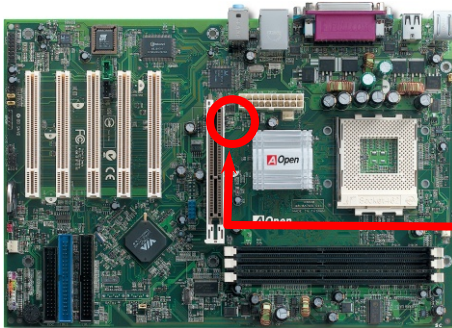
System
Power LED



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

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-voltage 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.

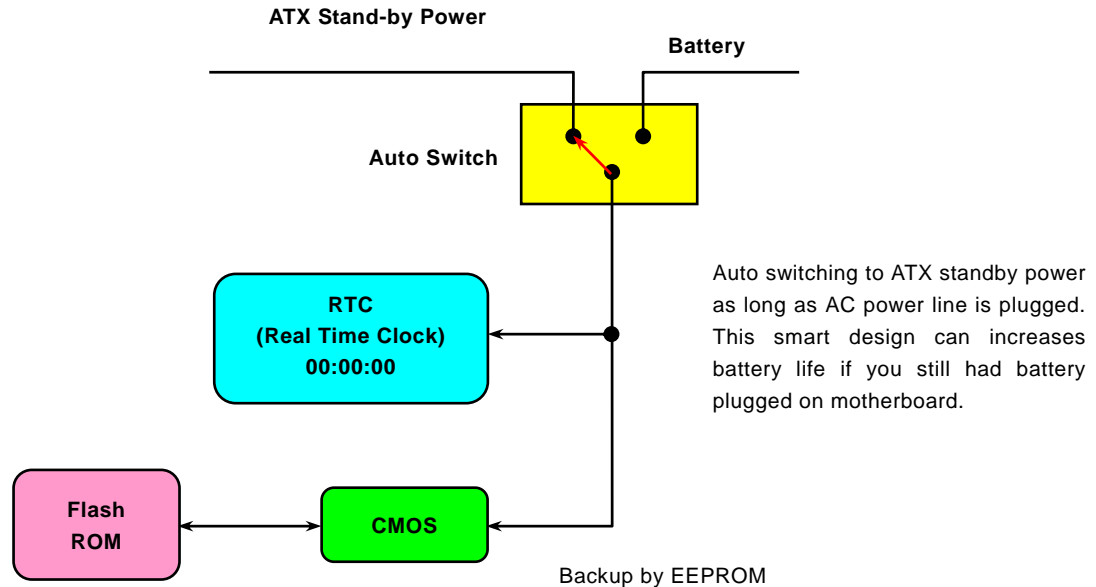


AGP LED

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.

Battery-less and Long Life Design

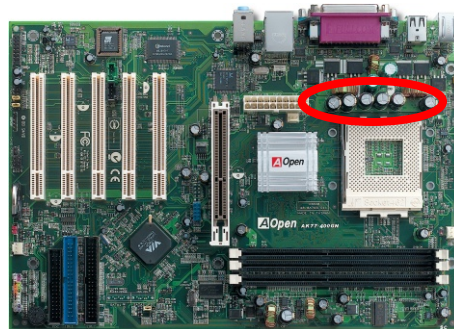
This Motherboard implements [Flash ROM](#) and a special circuit that allows you to save your current CPU and CMOS Setup configurations without using the battery. The RTC (real time clock) can also keep running as long as the power cord is plugged. If you lose your CMOS data by accident, you can just reload the CMOS configurations from Flash ROM and the system will recover as usual.



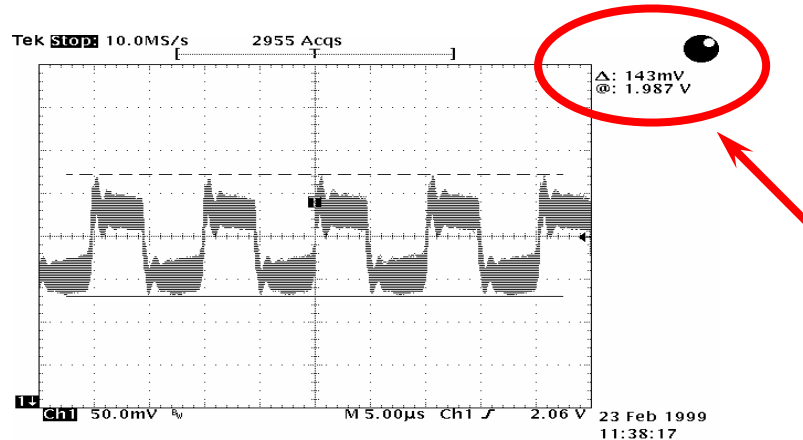
3300 μF Low ESR Capacitor

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, this motherboard implements 3300 μF capacitor, which is much larger than normal capacitor (1000 or 1500 μF) and it provides better stability for CPU power.



The power circuit of the CPU core voltage must be checked to ensure system stability for high speed CPUs (such as the Pentium IV, or when overclocking). A typical CPU core voltage is 2.0V, so a good design should control voltage between 1.860V and 2.140V. That is, the transient must be below 280mV. Below is a timing diagram captured by a Digital Storage Scope, it shows the voltage transient is only 143mv even when maximum 60 current is applied.



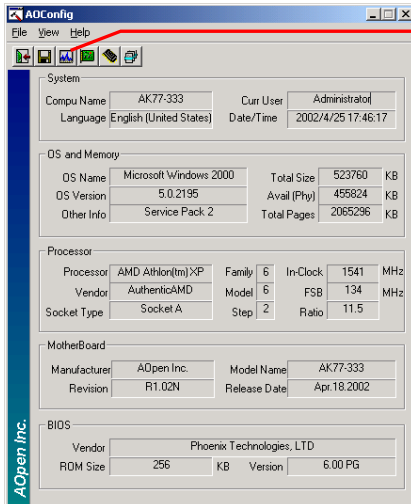
Note: This diagram for example only; it may not exactly be the same motherboard.

AOConfig Utility



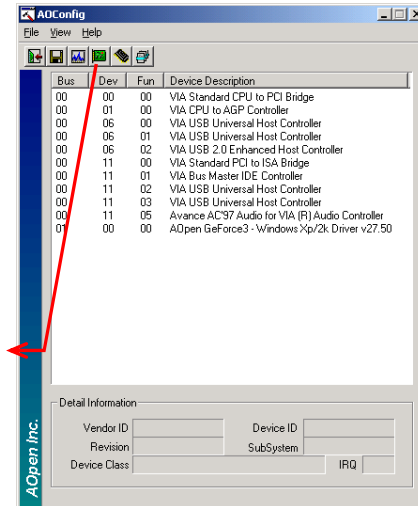
AOpen always dedicated to provide users a much friendlier computer environment. We now bring you a comprehensive system detective utility. AOConfig is a Windows based utility with user-friendly interface that allows users to obtain information of the operation system and hardware such as motherboard,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

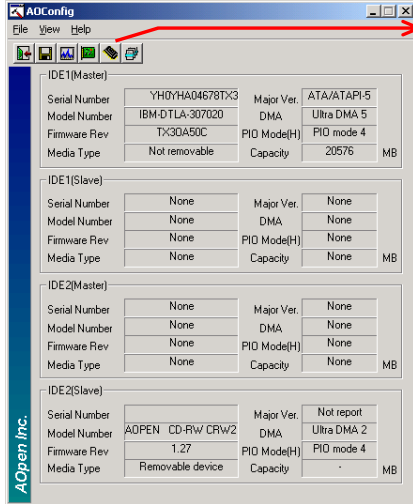
Moreover, AOConfig allows users to save information in *.BMP or *.TXT format which users may collect the system information in detail and send them to AOpen directly for technical support or further diagnosis of system problem.



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

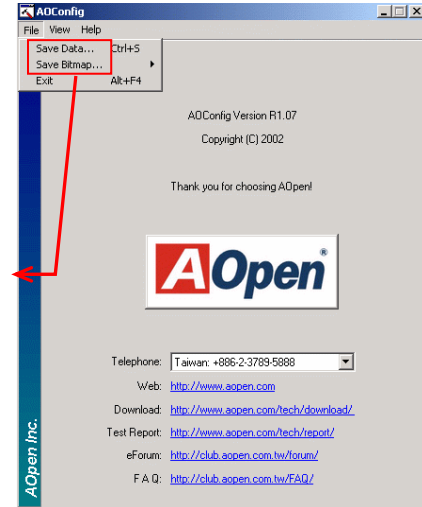
2. The PCI device page shows the configurations of all PCI devices installed on your motherboard.





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 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.

EzClock **NEW!**

Have you ever thought how great it would be if you can adjust the frequency setting on your motherboard under Windows environment and be a real master of your system? Everybody knows that the ratio and frequency setting are key factors to influence the system performance; however, it's absolutely not an easy task for an amateur to adjust the setting value. On most traditional motherboards, you have to get into BIOS screen for the frequency and reboot the system again and again. But from now on, you don't suffer 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 real-time. 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.



AOpen

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.

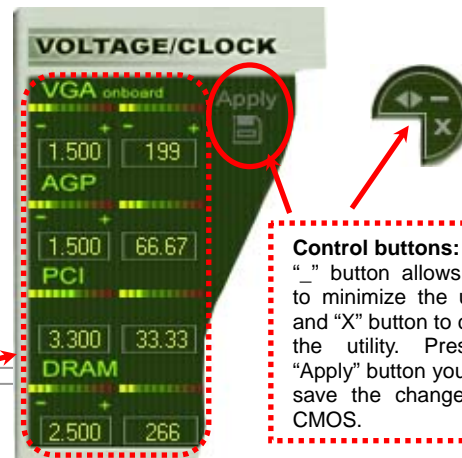
CPU Ratio, FSB and frequency displaying area:

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 “Apply” button on the upper right hand corner to save 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.



Control buttons:

“-” button allows you to minimize the utility and “X” button to close the utility. Pressing “Apply” button you can save the changes to CMOS.

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.

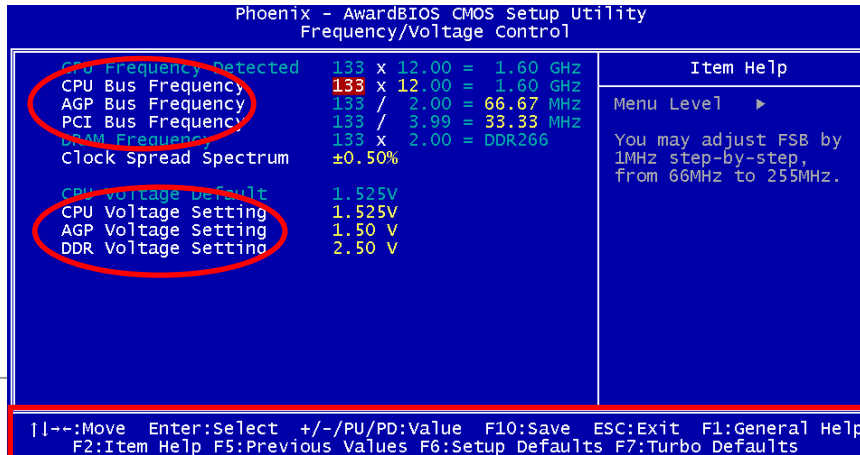


CPU Fan, Voltage and Temperature:

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

Note: The items provided by EzClock Utility vary in different motherboards. The unavailable function in your motherboard will present in grey.

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

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.

```

Phoenix-Award BIOS v6.00PG, An Energy Star Ally
Copyright (C) 2002, Phoenix Technologies, LTD

Jan.13.2003 AOpen Inc.

Main Processor : Intel Pentium(R) 4 1.60GHz(133x12.0)
Memory Testing : 262144K OK
CPU Brand Name : Intel(R) Pentium(R) 4 CPU 2.93GHz

Default Current Default Current
CPU 1.5250 1.5250 133MHz 333MHz
DRAM 2.50 2.50 V 266MHz
AGP 1.50 1.50 V 66.67MHz
PCI 3.30 3.30 V 33.33MHz

Primary Master : IDE0:020000L07-0 ER20A40
Primary Slave : None
Secondary Master : CD-ROM 52X/AKH A64
Secondary Slave : None

Primary IDE channel no 80 conductor cable installed

AOpen vivid BIOS

Press DEL to enter SETUP, INS to enter Open JukeBox
01/13/2003-i7205-W83627-6A69LAB9C-00
  
```

Default settings of
this motherboard

The highlighted setting
value you manually

PHOENIX-AWARD BIOS

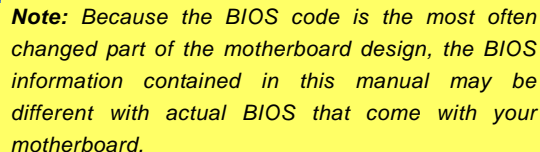
System parameters can be modified by going into [BIOS](#) Setup menu, this menu allows you to configure the system parameters and save the configuration into the 128 bytes CMOS area, (normally in the RTC chip or in the main chipset).

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 this motherboard 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 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.*

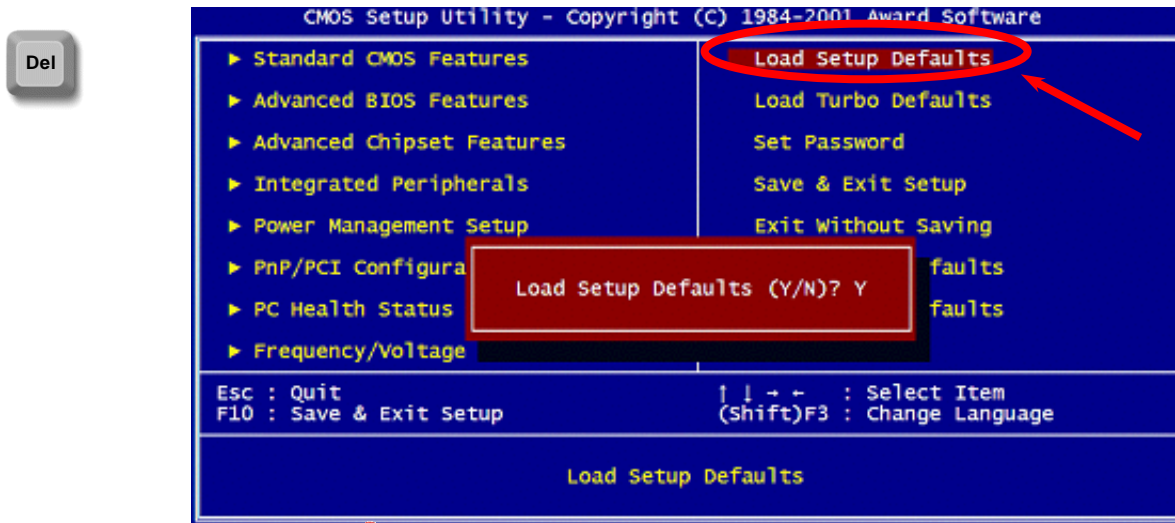
How To Use Phoenix-Award™ BIOS Setup Program

Generally, you can use arrow keys to highlight items that you want to choose, then press <Enter> key to select, and use the <Page Up> and <Page Down> key to change setting values. You can press <Esc> key to quit Phoenix-Award™ BIOS setup program. The following table provides details about how to use keyboard in the Phoenix-Award™ BIOS setup program.

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 during POST (Power-On Self Test). Choose "Load Setup Defaults" for recommended optimal performance.



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

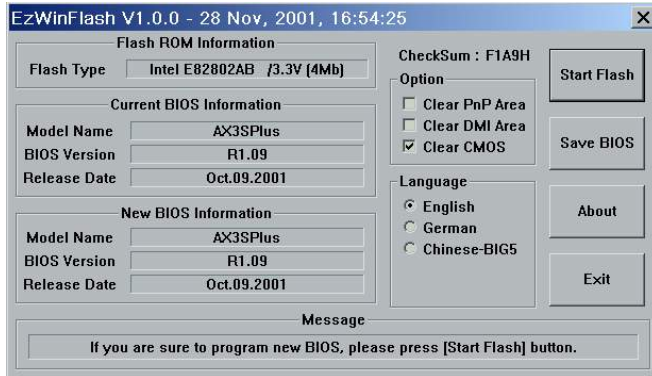


BIOS Upgrade under Windows environment



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

In the meanwhile, in order to provide a much more user-friendly operating environment, AOpen EzWinFlash is natively designed to have multi-language function to provide easier way for users' usage in changing BIOS setting.



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


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

Note: The model name on this BIOS picture is for reference only. It may not be the exact model name.

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: WAK77400GN102.ZIP) with WinZip (<http://www.winzip.com>) in Windows environment.
3. Save the unzipped files into a folder, for example, WAK77400GN102.EXE & WAK77400GN102.BIN.
4. Double click on the WAK77400GN102.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 at POST to [enter BIOS setup](#), choose "Load Setup Defaults", then "Save & Exit Setup". Done!

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



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

Vivid BIOS technology



Vivid BIOS


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

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

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



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

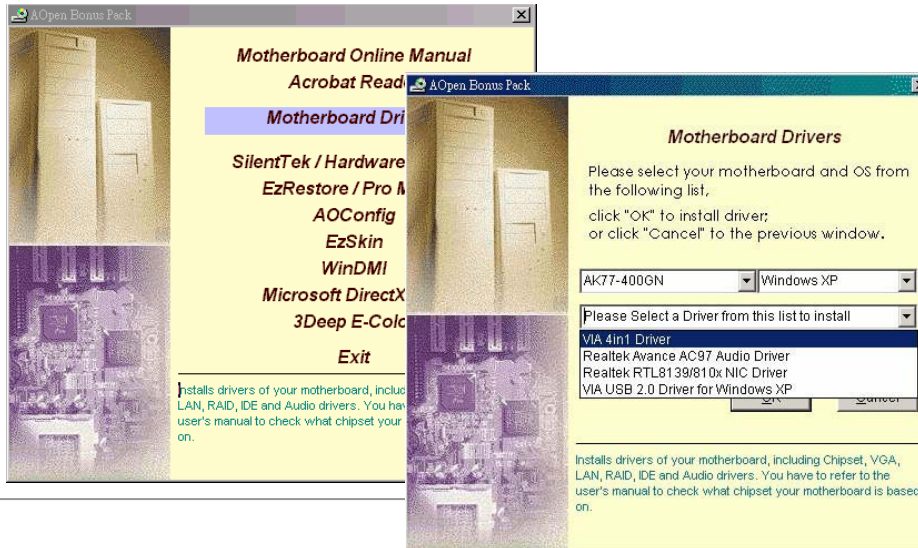
change your Vivid BIOS screen or to download your favourite Open JukeBox skin. If you see this little logo  shown beside your model name on the BIOS download page, <http://download.aopen.com.tw/downloads>, it is assured that your motherboard supports this innovative feature!

Driver and Utility

There are motherboard drivers and utilities included in AOpen Bonus CD. 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 XP) before you can install any drivers or utilities. Please refer to your operation system's installation guide.

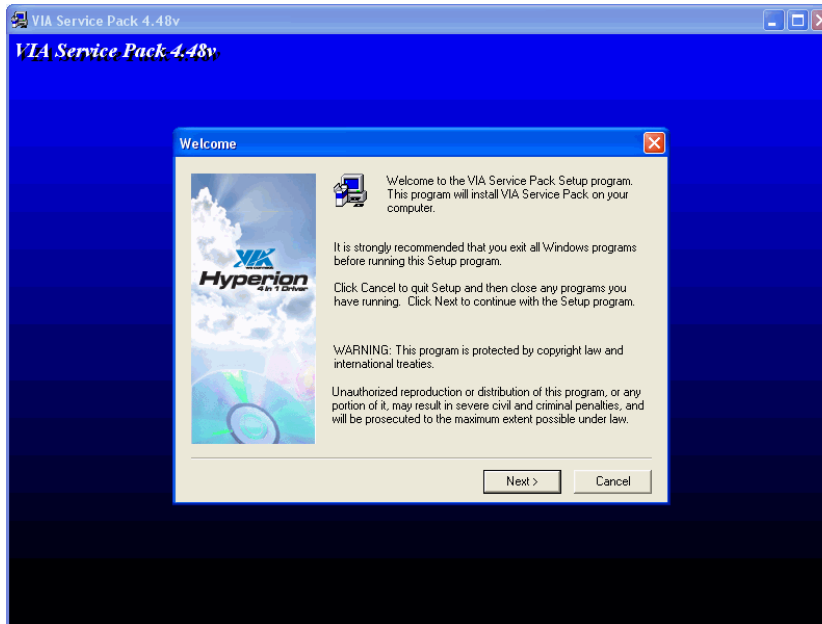
Auto-run Menu from Bonus CD

You can use the auto-run menu of Bonus CD. Choose the utility and driver and select model name.



Installing VIA 4 in 1 Driver

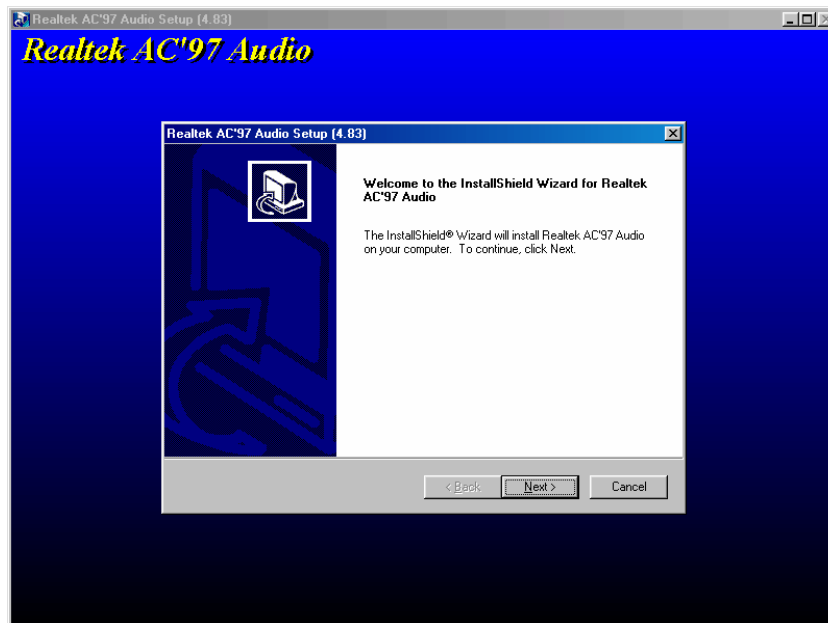
You can install the VIA 4 in 1 driver ([IDE Bus master](#) (For Windows NT use), VIA ATAPI Vendor Support Driver, VIA [AGP](#), IRQ Routing Driver (For Windows 98 use), VIA Registry (INF) Driver) from the Bonus Pack CD auto-run menu.



Warning: To take advantage of ATA133, it is a must to install the latest version of VIA 4in1 driver in the Bonus CD. For Windows2000, it cannot support ATA133 even after installing the latest version of VIA 4-in-1 driver until the new release of Service-Pack 3 from Microsoft.

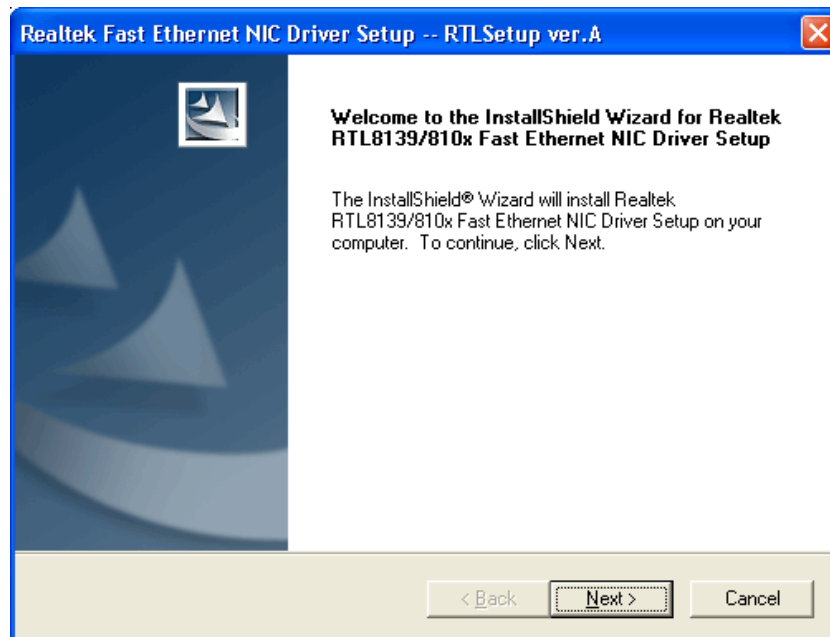
Installing Audio Driver

This motherboard comes with RealTek ALC650F [AC97 CODEC](#) and the sound controller is in VIA South Bridge chipset. You can find the audio driver from the Bonus Pack CD auto-run menu.



Installing LAN Driver in Windows 98SE/ME/2000/XP (for AK77-400GN)

This motherboard comes with RealTek controller on board, which is a highly integrated Platform LAN connecting device providing 10/100 Mbps Ethernet for office and home use. You can install the LAN driver from the Bonus Pack CD auto-run menu.



Installing LAN Driver in Windows 95 / NT 4.0

[Windows 95 (Golden version), Win95A and OSR2]

Installing driver procedure on Microsoft Windows 95:

1. Ask you to select which driver you want to install, select "Driver from disk provided by hardware manufacturer".
2. Specify the setup file pathname
[CD-ROM]:\Driver\LAN\RTL8100\Windows\95\WIN95A (for Windows 95 and Win95A) or
[CD-ROM]:\Driver\LAN\RTL8100\Windows\95\W95OSR2 (for Windows 95 OSR2).
3. Windows 95 will appear some messages to insert Windows 95 system disk to complete setup step.
4. Windows 95 will finish the other installation procedure automatically, and then you restart the system.

[Windows NT 3.5, 3.51 & 4.0]

Installing driver procedure on Microsoft Windows NT:

When you are in Windows NT:

1. In the Main group of NT, select the "Control Panel" icon.
2. In the Control Panel window, choose the "Network" icon.
3. In the Network Settings dialog box, choose the "Add Adapter" button. The Add Network Adapter dialog box appears.

4. In the list of network cards, select "<other> requires disk from manufacturer", and then press <Enter> button.
5. Enter drive and pathname
[CD-ROM]:\Driver\LAN\RTL8100\Windows\NT (for NT 4.0) that is the path where the setup files OEMSETUP.INF is located, and then chooses the OK button.
6. The screen will appear "Select Line Speed" dialog box that is provided by RTL8139.SYS driver. The default value is "auto" so that the RTL8139 PCI Fast Ethernet adapter and its driver RTL8139.SYS will auto-detect the line speed, 10 MB or 100MB, while the RTL8139.SYS is loading. The other values, "10" or "100", are only used when you want to forced RTL8139 PCI Fast Ethernet adapter to 10Mb or 100Mb.
7. The screen will appear "Input Ethernet ID" dialog box that is provided by RTL8139.SYS driver. This option is only required when you have more than one Realtek RTL8139 PCI Fast Ethernet adapters on this computer. Select "SKIP" if only one adapter is installed on this computer.
8. "Bus Location" display in next screen. Your machine contains more than one hardware bus; please select the Bus Type and Bus number on which your network adapter card is installed.
9. NT will then perform the binding process. If any additional network software options were installed, you may be prompted for specific information for these packages.
10. Restarting your system you will acquire network service.

NOTES:

* Installing Multiple LAN Adapters: Enter Windows NT and follow above setup procedure step 2, in the "Network Settings" dialog box, choose the "Configure" button. The "Input Ethernet ID" dialog box appears and input adapter's Ethernet ID. Last step is to select OK and close NETWORK SETUP. Select SKIP if only one adapter is installed on this computer.

Installing USB 2.0 Driver

This motherboard comes with USB 2.0 function. You can install USB 2.0 Driver under Windows 98SE, Windows ME, Windows 2000 and Windows XP from the Bonus Pack CD auto-run menu.



Note: After installing USB 2.0 driver under WinME, there would be a "green question mark" on "VIA USB 2.0 Enhanced Host Controller" item. Please rest assured that it is not an error message. You may just ignore it.

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 $66\text{MHz} \times 4\text{byte} \times 1 = 264\text{MB/s}$

2X AGP, data transfer rate is $66\text{MHz} \times 4\text{byte} \times 2 = 528\text{MB/s}$

4X AGP, data transfer rate is $66\text{MHz} \times 4\text{byte} \times 4 = 1056\text{MB/s}$.

8X AGP, data transfer rate is $66\text{MHz} \times 4\text{byte} \times 8 = 2112\text{MB/s}$.

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 $16.6\text{MHz} \times 2 = 33\text{MB/s}$.

ATA/66, data transfer rate is $16.6\text{MHz} \times 4 = 66\text{MB/s}$.

ATA/100, data transfer rate is $16.6\text{MHz} \times 6 = 100\text{MB/s}$.

ATA/133, data transfer rate is $16.6\text{MHz} \times 8 = 133\text{MB/s}$.

(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 $200 \times 64 / 8 = 1600 \text{MB/s}$ (PC1600)

DDR266, transfer bandwidth up to $266 \times 64 / 8 = 2100 \text{MB/s}$ (PC2100)

DDR333, transfer bandwidth up to $333 \times 64 / 8 = 2700 \text{MB/s}$ (PC2700)

DDR400, transfer bandwidth up to $400 \times 64 / 8 = 3200 \text{MB/s}$ (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 E²PROM. 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

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 0.18 μ m 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 0.13 μ m 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 I²C 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 completely 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

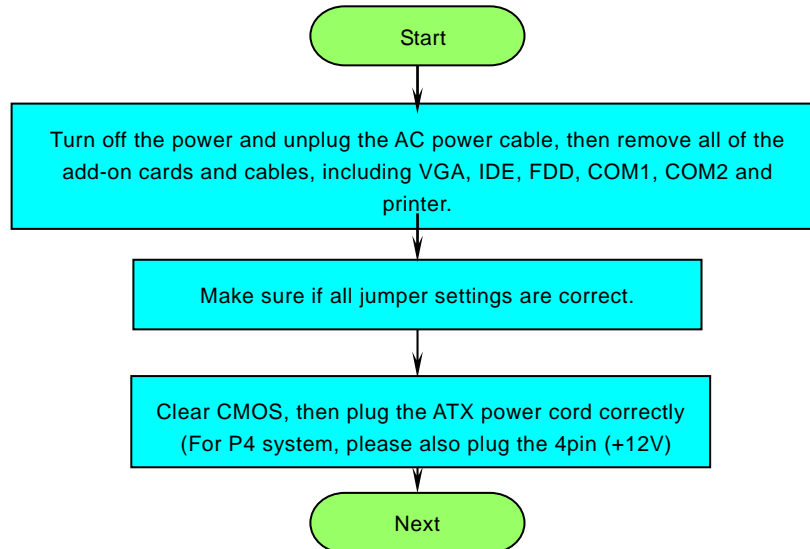
A compressed file format to reduce file size. To unzip file, run shareware PKUNZIP (<http://www.pkware.com/>) for DOS and other operating system or WINZIP (<http://www.winzip.com/>) for windows environment.

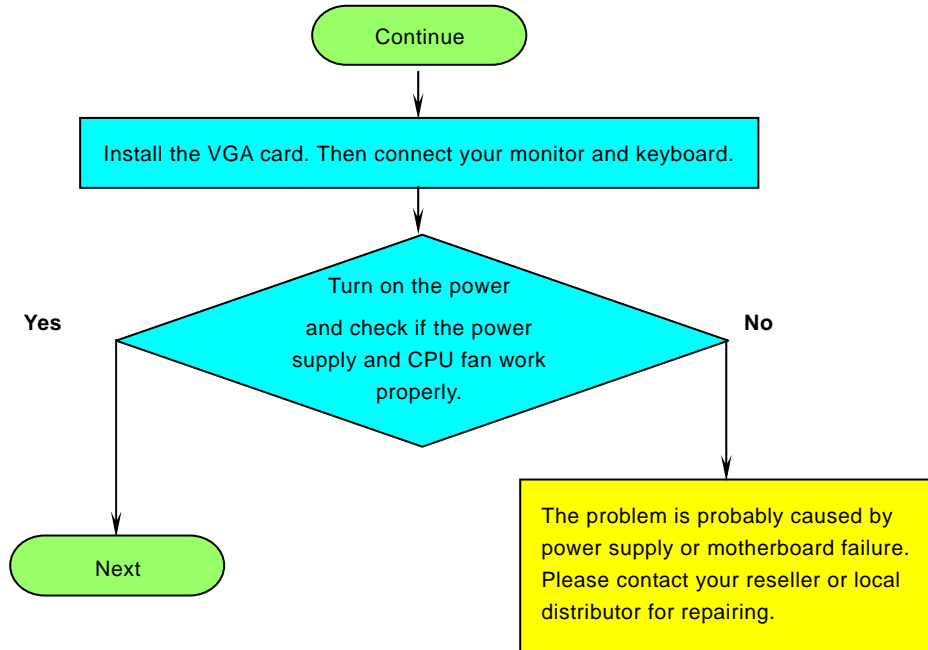


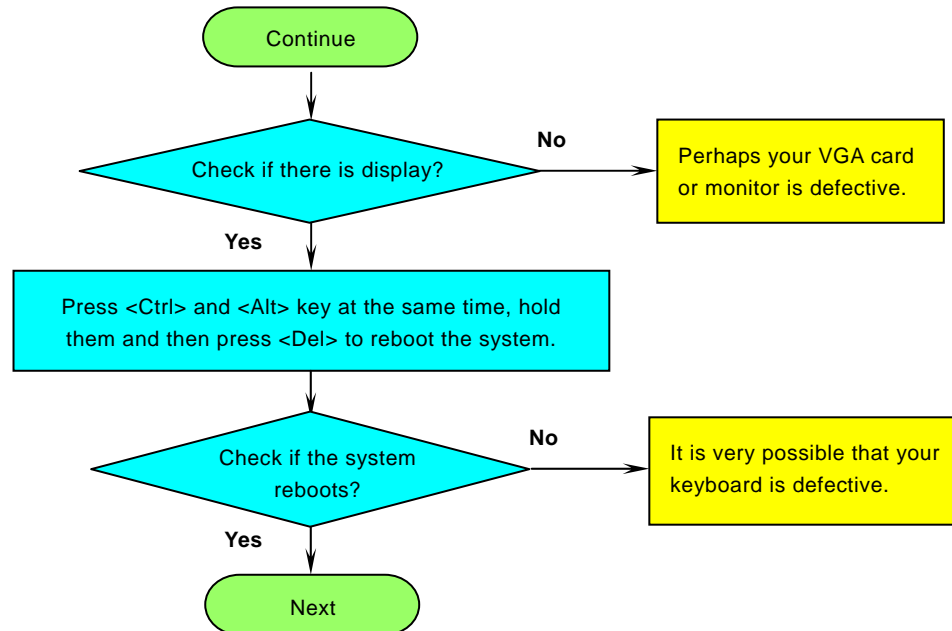


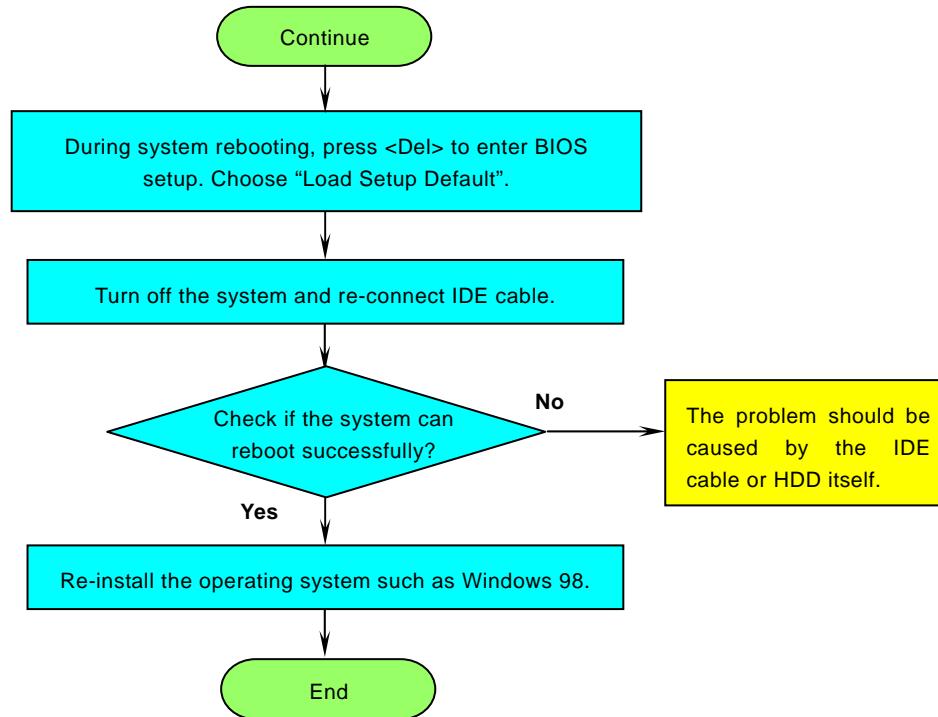
Troubleshooting

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











Technical Support

Dear Customer,

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

Thanks very much for your understanding!

AOpen Technical Supporting Team

1

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

<http://download.aopen.com.tw/downloads>

2

Test Report: We recommend you to choose board/card/device from the compatibility test reports for assembling your PC. It may prevent incompatibility problems.

<http://english.aopen.com.tw/tech/report/default.htm>

3

FAQ: Here we list problems that users often encounter and FAQ (Frequently Asked Questions). You may select your preferred language after log on and find a solution to your problem.

<http://club.aopen.com.tw/faq/>

4

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

<http://download.aopen.com.tw/downloads>

5

eForum: AOpen eForum is provided to discuss our products with other users, in which your problem probably had been discussed before or will be answered. After log on, you may select your preferred language under “Multi-language”.

<http://club.aopen.com.tw/forum/>

6

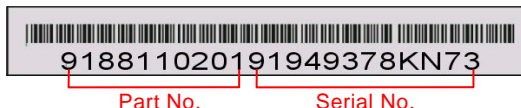
Contact Distributors/Resellers: We sell our products through resellers and integrators. They should know your system configuration very well and should be able to solve your problem efficiently and provide important reference for you.

7

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

Part Number and Serial Number

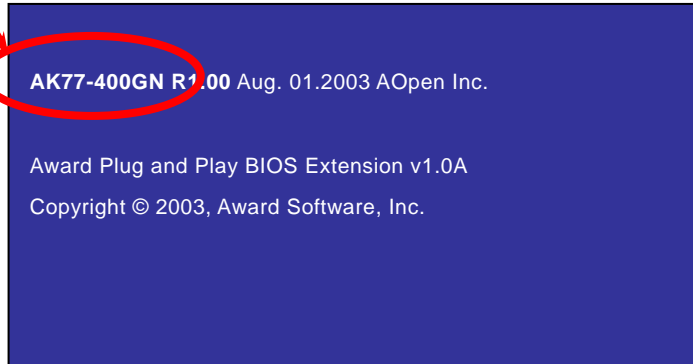
The Part Number and Serial number are printed on bar code label. You can find this bar code label on the outside packing, or on component side of PCB. For example:



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

Model name and BIOS version

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



AK77-400GN is model name of motherboard, **R1.00** is BIOS version.



Product Registration

Club AOpen

Welcome to AOpen Inc.



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

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

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

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



How to Contact Us



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

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