AP59S

User's Guide

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AP59S
Mainboard

User's Guide

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Organization

Chapter 1, **Overview**, covers the introduction and specifications of the system board and special features.

Chapter 2, **Hardware Installation**, describes hardware jumpers, connectors and memory configuration. There are user friendly drawings to locate jumper and connector.

Chapter 3, **AWARD BIOS**, explains the system BIOS and tells how to configure the system by setting the BIOS parameters.

Appendix A, **Frequently Asked Question**, collects most frequently asked question of this product.

Appendix B, **Troubleshooting Guide**, includes first aid information you need if you meet trouble, the WWW address and worldwide service telephone/fax are also included.

Appendix C, **Jumper Table Summary**, gives you a tabular summary of the jumper settings discussed in Chapter 2.

Conventions

The following conventions are used in this manual:

`Text entered by user, default settings, recommended selections`	Represent text input by the user, default settings and recommended selections
<Enter>, <Tab>,<Ctl>, <Alt>, <Ins>, <Del>, etc	Represent the actual keys that you have to press on the keyboard.

Note:
Gives bits and pieces of additional information related to the current topic.

Warning:
Alerts you to any damage that might result from doing or not doing specific actions.

Caution:
Suggests precautionary measures to avoid potential hardware or software problems.

Important:
Reminds you to take specific action relevant to the accomplishment of the procedure at hand.

Tip:
Tells how to accomplish a procedure with minimum steps through little shortcuts.

Contents

Chapter 1

Overview

AP59S is a high-performance Pentium®-based system board that utilizes **SIS 5591** AGPset on **Baby AT** PCI/ISA platform. This motherboard supports new architectures such as high speed **AGP** graphic port, **SDRAM**, **Ultra DMA/33**, **Bus master IDE** and **USB** port. It has **512KB** pipelined-burst second-level cache onboard and support two single in-line memory module (SIMM) plus two Dual in-line memory module (DIMM) that allows to **mix EDO and SDRAM** memory and expansion up to a maximum of **768MB**.

In addition, AP59S also implements:

High Efficient Synchronous Switching Regulator

Most of the current switching designs are Asynchronous mode, which from the technical point of view, still consumes very high power as well as heat. AP59S implements high efficient synchronous switching design that the temperature of MOS FET is far less than Schottky diode of Asynchronous design.

CPU core current protection

AP59S implements CPU core voltage 15A over-current protection to prevent any accident short circuit and prevent system damage.

CPU Thermal Protection (Optional)

AP59S has a special thermal detection circuit to have warning through application software when the temperature is higher than a predefined value.

CPU and Housing Fan Monitoring

AP59S has one more "fan monitoring" function to prevent system overheat. There are two fan connectors, one is for CPU and the other can be a extra housing fan. The system will report and alarm fan malfunction though utility software such as Hardware Monitor utility (named AOhw101, where 101 means version number).

Overview

Full-range CPU core voltage

This motherboard supports the CPU core voltage from 1.3V to 3.5V, that can be applied to various CPU type in future.

Resetable Fuse

AP59S implements resetable fuses to prevent any accidental short circuit caused by keyboard or USB devices hot plug.

Multi-language BIOS (Optional BIOS)

This breakthrough will help you set BIOS items without the language barrier.

FCC DoC certificate

AP59S has passed FCC DoC test. The radiation is very low, you can use any kind of housing.

Powerful utility software support

AOpen Bonus Pack bundled CD contains many useful utilities, such as Norton Antivirus, Hardware Monitor utility, and BIOS flash utility, etc.

1.1 Specifications

Form Factor	Baby AT
Board Size	220 mm x 242 mm
CPU	Intel Pentium Processor P54C, PP/MT (P55C), AMD K5/ K6, Cyrix 6x86/M2 and IDT WinChip C6.
System Memory	FPM or EDO 72-pin SIMM x 2, and SDRAM 168-pin x 2. The maximum is 768MB.
Second-level Cache	512KB pipelined-burst cache onboard
Chipset	SiS 5591 AGPset
Expansion Slots	ISA x2 and PCI x3
Serial Port	Two serial ports UART 16C550 compatible
Parallel Port	One parallel port supports standard parallel port (SPP), enhanced parallel port (EPP) or extended capabilities port (ECP).
Floppy Interface	Floppy interface supports 3.5 inches drives with 720KB, 1.44MB or 2.88MB format or 5.25 inches drives with 360KB, 1.2MB format
IDE Interface	Dual-channel IDE interface support maximum 4 IDE hard disks or CDROM, mode 4 , bus master hard disk drives and Ultra DMA/33 mode hard drives are also supported.
USB Interface	Two USB ports supported by USB bracket, the BIOS also supports USB driver to simulate legacy keyboard.
PS/2 Mouse	PS/2 mouse supported by PS/2 mouse bracket.
Keyboard	Default AT compatible keyboard, mini-DIN PS/2 keyboard connector is optional.
RTC and Battery	RTC build in chipset, Lithium (CR-2032) battery.
BIOS	AWARD Plug-and-Play Flash ROM BIOS

Chapter 2

Hardware Installation

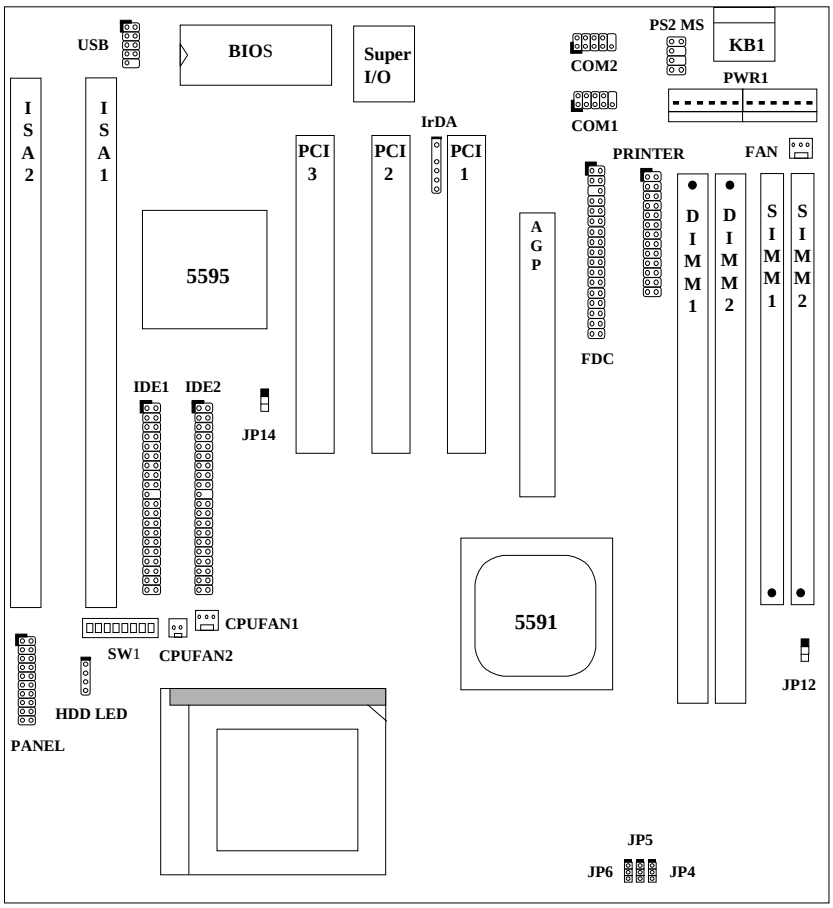
This chapter gives you a step-by-step procedure on how to install your system. Follow each section accordingly.

Caution: *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.*

2.1 Jumper and Connector Locations

The following figure shows the locations of the jumpers and connectors on the system board:



Jumpers:

SW1:	DIP Switch for CPU voltage and clock ratio
JP4,JP5,JP6:	CPU external (bus) clock
JP12:	I/O Voltage
JP14:	Clear CMOS

Connectors:

KB1:	AT keyboard connector
PWR1:	AT (PS/2) power connector
PS2 MS:	PS/2 mouse connector
USB:	USB connector
COM1:	COM1 connector
COM2:	COM2 connector
FDC:	Floppy drive connector
PRINTER:	Printer connector
IDE1:	IDE1 primary channel
IDE2:	IDE2 secondary channel
CPUFAN1:	3-pin CPU fan connector
CPUFAN2:	2-pin CPU fan connector
FAN:	3-pin housing fan connector
IrDA:	IrDA (Infrared) connector
HDD LED:	HDD LED connector
PANEL:	Front panel (Multifunction) connector

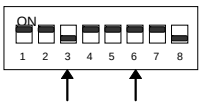
2.2 Jumpers

Jumpers are made by pin headers and plastic connecting caps for the purpose of customizing your hardware. Doing so requires basic knowledge of computer hardware, be sure you understand the meaning of the jumpers before you change any setting. The onboard jumpers are normally set to their default with optimized settings.

On the mainboard, normally there is a bold line marked beside pin 1 of the jumper, sometimes, there are numbers also. If we connect (short) plastic cap to pin 1 and 2, we will say set it at 1-2, and when we say jumper is open, that means no plastic cap connected to jumper pins.

Open Short Jumper set at 1-2 Jumper set at 2-3

For your convenience to install a CPU, this motherboard also use a DIP switch to set CPU voltage and frequency ratio. The following figure simply shows you how to set this DIP switch, please see also to next sections for more details.

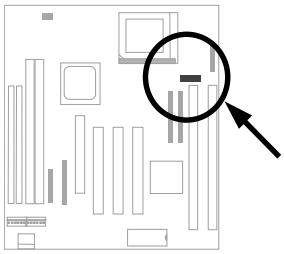


OFF **ON**

2.2.1 Setting the CPU Voltage

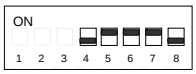
S4	S5	S6	S7	S8	Vcore
ON	ON	ON	ON	OFF	3.52V
OFF	ON	ON	ON	OFF	3.45V
ON	OFF	ON	ON	OFF	3.3V
OFF	OFF	ON	ON	OFF	3.2V
ON	OFF	OFF	ON	OFF	2.9V
OFF	OFF	OFF	ON	OFF	2.8V
OFF	ON	OFF	OFF	OFF	2.2V
OFF	ON	OFF	ON	ON	1.8V

SW1 is used to select CPU core voltage (Vcore) and ratio, there are totally eight switches on this DIP. After installing a CPU, remember to set the switch 4-8 to specify a proper Vcore.



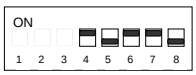
3.52V

6x86, K5 or IDT C6



3.45V

P54C

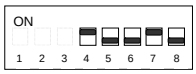


3.3V

IDT C6

3.2V

K6-233

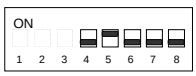


2.9V

K6-166/200 or M2

2.8V

P55C (MMX)



2.2V

K6-266/300

Warning: *Please make sure that you have installed CPU fan properly if Intel PP/MT-233 or AMD K6 CPU is being selected to use. It may cause your system unstable if you can not meet the heat dissipation requirement from above CPU type. It is recommended to adopt larger fan on these CPU for better air flow in the system. Please refer to AOpen's web site (http://www.aopen.com.tw) to choose a proper CPU fan.*

Warning*: If your CPU is IDT C6, note that this processor supports one of two voltage range, 3.135 ~ 3.465V (3.45V) and 3.45 ~ 3.6V (3.52V). See the CPU specification to set the correct voltage.*

Tip: *Normally, for single voltage CPU, Vcpuio (CPU I/O Voltage) is equal to Vcore, but for CPU that needs dual voltage such as PP/MT (P55C) or Cyrix 6x86L, Vcpuio is different from Vcore and must be set to Vio (PBSRAM and Chipset Voltage). The single or dual voltage CPU is automatically detected by hardware circuit.*

Tip: *For supporting more different CPUs in future, this motherboard uses five switchs to specify Vcore. There are 32 settings totally, and the range is from 1.3V to 3.5V.*

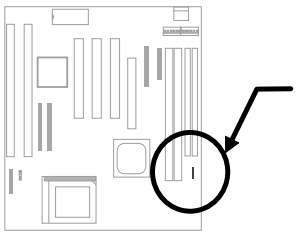
CPU	Type	S4	S5	S6	S7	S8	Vcore
INTEL P54C	Single Voltage	OFF	ON	ON	ON	OFF	3.45V
INTEL MMX P55C	Dual Voltage	OFF	OFF	OFF	ON	OFF	2.8V
AMD K5	Single Voltage	ON	ON	ON	ON	OFF	3.52V
AMD K6-166/200	Dual Voltage	ON	OFF	OFF	ON	OFF	2.9V
AMD K6-233	Dual Voltage	OFF	OFF	ON	ON	OFF	3.2V
AMD K6-266/300	Dual Voltage	OFF	ON	OFF	OFF	OFF	2.2V
Cyrix 6x86	Single Voltage	ON	ON	ON	ON	OFF	3.52V
Cyrix 6x86L	Dual Voltage	OFF	OFF	OFF	ON	OFF	2.8V
Cyrix M2	Dual Voltage	ON	OFF	OFF	ON	OFF	2.9V
IDT C6	Single Voltage	ON ON	ON OFF	ON ON	ON ON	OFF OFF	3.52V 3.3V

This motherboard supports the CPU core voltage from 1.3V to 3.5V, that can be applied to the various CPU type in future. For your reference, all settings are listed in the following table.

Vcore	S4	S5	S6	S7	S8
1.30V	OFF	OFF	OFF	OFF	ON
1.35V	ON	OFF	OFF	OFF	ON
1.40V	OFF	ON	OFF	OFF	ON
1.45V	ON	ON	OFF	OFF	ON
1.50V	OFF	OFF	ON	OFF	ON
1.55V	ON	OFF	ON	OFF	ON
1.60V	OFF	ON	ON	OFF	ON
1.65V	ON	ON	ON	OFF	ON
1.70V	OFF	OFF	OFF	ON	ON
1.75V	ON	OFF	OFF	ON	ON
1.80V	OFF	ON	OFF	ON	ON
1.85V	ON	ON	OFF	ON	ON
1.90V	OFF	OFF	ON	ON	ON
1.95V	ON	OFF	ON	ON	ON
2.00V	OFF	ON	ON	ON	ON
2.05V	ON	ON	ON	ON	ON
2.1V	ON	OFF	OFF	OFF	OFF
2.2V	OFF	ON	OFF	OFF	OFF
2.3V	ON	ON	OFF	OFF	OFF
2.4V	OFF	OFF	ON	OFF	OFF
2.5V	ON	OFF	ON	OFF	OFF
2.6V	OFF	ON	ON	OFF	OFF
2.7V	ON	ON	ON	OFF	OFF
2.8V	OFF	OFF	OFF	ON	OFF
2.9V	ON	OFF	OFF	ON	OFF
3.0V	OFF	ON	OFF	ON	OFF
3.1V	ON	ON	OFF	ON	OFF
3.2V	OFF	OFF	ON	ON	OFF
3.3V	ON	OFF	ON	ON	OFF
3.4V	OFF	ON	ON	ON	OFF
3.5V	ON	ON	ON	ON	OFF

JP12	I/O Voltage (Vio)
1-2	3.3V (default)
3-4	3.43V

JP12 is reserved for testing purposes only. This jumper enables you to set the voltage of the onboard chipset and PBSRAM (Vio). For dual-voltage CPU, this jumper also functions as CPU I/O voltage (Vcpuio) controller.



JP12

3.3V (default)

JP12

3.43V

2.2.2 Selecting the CPU Frequency

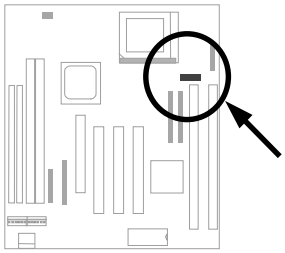
Intel Pentium, Cyrix 6x86, AMD K5/K6 and IDT C6 CPU are designed to have different Internal (Core) and External (Bus) frequency.

Core frequency = Ratio * External bus clock

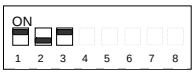
S1	S2	S3	CPU Frequency Ratio
OFF	OFF	OFF	1.5x (3.5x)
ON	OFF	OFF	2x
ON	ON	OFF	2.5x (1.75x)
OFF	ON	OFF	3x
ON	OFF	ON	4x
ON	ON	ON	4.5x
OFF	ON	ON	5x

The ratio of Core/Bus frequency is selected by the switch 1-3 of **SW1**.

Note: *Intel PP/MT MMX 233MHz is using 1.5x jumper setting for 3.5x frequency ratio, and AMD PR166 is using 2.5x setting for 1.75x frequency ratio.*

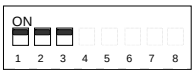


3x



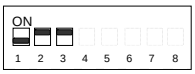
4x

1.5x (3.5x)

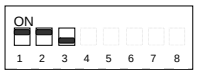


4.5x

2x



5x



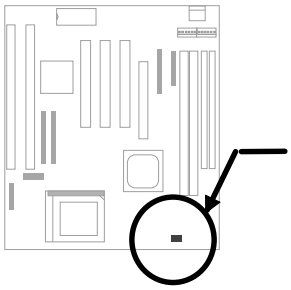
2.5x (1.75x)

Note: *Intel PP/MT 233MHz is using 1.5x jumper setting for 3.5x frequency ratio, and AMD PR166 is using 2.5x setting for 1.75x frequency ratio.*

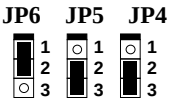
Note: *AP59S can automatically detect the CPU type and select CPU burst mode of SIS chipset. (Only SiS chipset provide this feature.) For Cyrix CPU, AP59S will set to Linear Mode for better performance. For Intel and AMD CPU, Toggle Mode is set.*

JP6	JP5	JP4	SDRAM	PCI	AGP
2-3	2-3	2-3	60MHz	30MHz	60MHz
1-2	2-3	2-3	66MHz	33MHz	66MHz
2-3	2-3	1-2	75MHz	32MHz	64MHz
1-2	1-2	2-3	75MHz	37MHz	75MHz
1-2	2-3	1-2	83MHz	32MHz	64MHz
2-3	1-2	1-2	90MHz	30MHz	60MHz
1-2	1-2	1-2	100MHz	33MHz	66MHz

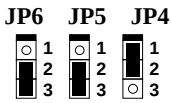
JP4, **JP5** and **JP6** are the selections of CPU external clock (bus clock), which is actually the clock from clock generator.



60MHz



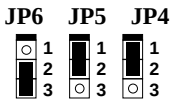
66MHz



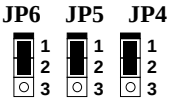
75MHz (Asynchronous)

75MHz (Synchronous)

83MHz



90MHz



100MHz

Warning: *SIS 5591 chipset supports maximum 83MHz external CPU bus clock, the 90MHz and 100MHz settings are for internal test only, set to 90MHz or 100MHz exceeds the specification of 5591 chipset, which may cause serious system damage.*

Caution: *Following table are possible settings of current CPU available on the market. The correct setting may vary because of new CPU product, refer to your CPU specification for more details.*

INTEL Pentium	CPU Core Frequency	Ratio	External Bus Clock	S1	S2	S3	JP6 & JP5 & JP4
P54C 90	90MHz =	1.5x	60MHz	OFF	OFF	OFF	2-3 & 2-3 & 2-3
P54C 100	100MHz =	1.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3
P54C 120	120MHz =	2x	60MHz	ON	OFF	OFF	2-3 & 2-3 & 2-3
P54C 133	133MHz =	2x	66MHz	ON	OFF	OFF	1-2 & 2-3 & 2-3
P54C 150	150MHz =	2.5x	60MHz	ON	ON	OFF	2-3 & 2-3 & 2-3
P54C 166	166MHz =	2.5x	66MHz	ON	ON	OFF	1-2 & 2-3 & 2-3
P54C 200	200MHz =	3x	66MHz	OFF	ON	OFF	1-2 & 2-3 & 2-3

INTEL Pentium MMX	CPU Core Frequency	Ratio	External Bus Clock	S1	S2	S3	JP6 & JP5 & JP4
PP/MT 150	150MHz =	2.5x	60MHz	ON	ON	OFF	2-3 & 2-3 & 2-3
PP/MT 166	166MHz =	2.5x	66MHz	ON	ON	OFF	1-2 & 2-3 & 2-3
PP/MT 200	200MHz =	3x	66MHz	OFF	ON	OFF	1-2 & 2-3 & 2-3
PP/MT 233	233MHz =	3.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3

AMD K5	CPU Core Frequency	Ratio	External Bus Clock	S1	S2	S3	JP6 & JP5 & JP4
PR90	90MHz =	1.5x	60MHz	OFF	OFF	OFF	2-3 & 2-3 & 2-3
PR100	100MHz =	1.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3
PR120	90MHz =	1.5x	60MHz	OFF	OFF	OFF	2-3 & 2-3 & 2-3
PR133	100MHz =	1.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3
PR166	116MHz =	1.75x	66MHz	ON	ON	OFF	1-2 & 2-3 & 2-3

AMD K6	CPU Core Frequency	Ratio	External Bus Clock	S1	S2	S3	JP6 & JP5 & JP4
PR2-166	166MHz =	2.5x	66MHz	ON	ON	OFF	1-2 & 2-3 & 2-3
PR2-200	200MHz =	3x	66MHz	OFF	ON	OFF	1-2 & 2-3 & 2-3
PR2-233	233MHz =	3.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3
PR2-266	266MHz =	4x	66MHz	ON	OFF	ON	1-2 & 2-3 & 2-3
PR2-300	300MHz =	4.5x	66MHz	ON	ON	ON	1-2 & 2-3 & 2-3

Cyrix 6x86 & 6x86L	CPU Core Frequency	Ratio	External Bus Clock	S1	S2	S3	JP6 & JP5 & JP4
P150+	120MHz =	2x	60MHz	ON	OFF	OFF	2-3 & 2-3 & 2-3
P166+	133MHz =	2x	66MHz	ON	OFF	OFF	1-2 & 2-3 & 2-3
P200+	150MHz =	2x	75MHz	ON	OFF	OFF	2-3 & 2-3 & 1-2

Cyrix M2	CPU Core Frequency	Ratio	External Bus Clock	S1	S2	S3	JP6 & JP5 & JP4
MX-PR166	150MHz =	2.5x	60MHz	ON	ON	OFF	2-3 & 2-3 & 2-3
MX-PR200	166MHz =	2.5x	66MHz	ON	ON	OFF	1-2 & 2-3 & 2-3
	150MHz =	2x	75MHz	ON	OFF	OFF	2-3 & 2-3 & 1-2
MX-PR233	200MHz =	3x	66MHz	OFF	ON	OFF	1-2 & 2-3 & 2-3
	166MHz =	2x	83.3MHz	ON	OFF	OFF	1-2 & 2-3 & 1-2
MX-PR266	233MHz =	3.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3
MX-PR300	225MHz =	3x	75MHz	OFF	ON	OFF	2-3 & 2-3 & 1-2
	233MHz =	3.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3
	240MHz =	4x	60MHz	ON	OFF	ON	2-3 & 2-3 & 2-3

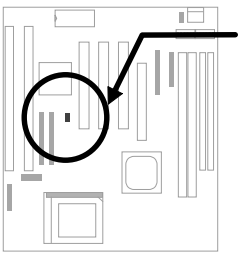
IDT C6	CPU Core Frequency	Ratio	External Bus Clock	S1	S2	S3	JP6 & JP5 & JP4
C6-150	150MHz =	2x	75MHz	ON	OFF	OFF	2-3 & 2-3 & 1-2
C6-180	180MHz =	3x	60MHz	OFF	ON	OFF	2-3 & 2-3 & 2-3
C6-200	200MHz =	3x	66MHz	OFF	ON	OFF	1-2 & 2-3 & 2-3
C6-225	225MHz =	3x	75MHz	OFF	ON	OFF	2-3 & 2-3 & 1-2
C6-240	240MHz =	4x	60MHz	ON	OFF	ON	2-3 & 2-3 & 2-3

Note: *Cyrix 6x86 and AMD K5 CPU use P-rating for the reference of CPU benchmark compared with INTEL P54C, their internal core frequency is not exactly equal to P-rating marked on the CPU. For example, Cyrix P166+ is 133MHz but performance is almost equal to P54C 166MHz and AMD PR133 is 100MHz but performance is almost equal to INTEL P54C 133MHz.*

2.2.3 Clearing the CMOS

JP14	Clear CMOS
1-2	Normal operation (default)
2-3	Clear CMOS

You need to clear the CMOS if you forget your system password. To clear the CMOS, follow the procedures listed below:



Normal Operation (default)

Clear CMOS

The procedure to clear CMOS:

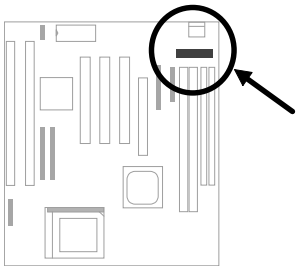
1. Turn off the system power.
2. Locate **JP14** and short pins 2-3 for a few seconds.
3. Return **JP14** to its normal setting by shorting pins 1-2.
4. Turn on the system power.
5. Press DEL during bootup to enter the BIOS Setup Utility and specify a new password, if needed.

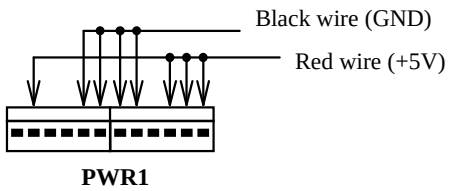
2.3 Connectors

2.3.1 Power Cable

A standard baby AT (PS/2) power supply has two cables with six wires on each. Plug in these cables to the onboard power connector in such a way that all the black wires are in the center. The power connector is marked as **PWR1** on the system board.

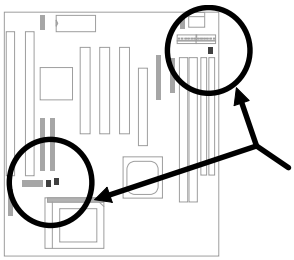
Caution: *Make sure that the power supply is off before connecting or disconnecting the power cable.*

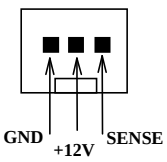




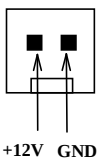
2.3.2 CPU Fan

Plug in the fan cable to the fan connectors onboard. The fan connectors are marked **FAN**, **CPUFAN1** and **CPUFAN2** on the system board. You can plug the CPU fan cable to both the 2-pin fan connector FAN and the 3-pin fan connector CPUFAN1. CPUFAN2 can be reserved for the housing fan. Note that only CPUFAN1 and CPUFAN2 supports the fan monitoring function, because 3-pin fan has an extra pin called SENSE, which periodically sends fan signal out.





CPUFAN1
CPUFAN2

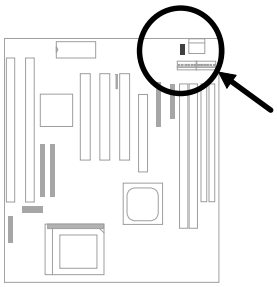


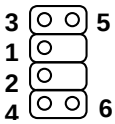
FAN

2.3.3 PS/2 Mouse

To connect a PS/2 mouse, insert the PS/2 mouse bracket connector to **PS2 MS** on the system board. Then plug in the PS/2 mouse cable to the mouse port on the bracket.

Pin	Description
1	MS DATA
2	NC
3	GND
4	+5V
5	MS CLK
6	NC

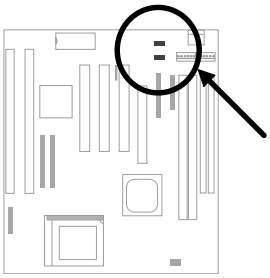


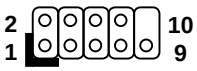


PS2 MS

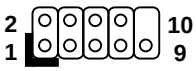
2.3.4 Serial Devices (COM1/COM2)

To support serial devices, insert the serial device connector into the serial port on the bracket. Plug in the 10-pin flat cable to the appropriate onboard connectors. The serial port 1 connector is marked as **COM1** and the serial port 2 connector is marked as **COM2** on the system board.





COM1

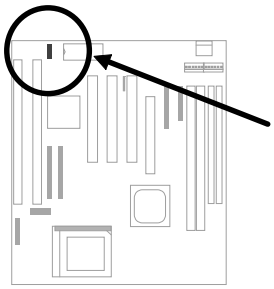


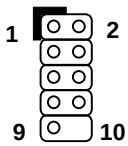
COM2

2.3.5 USB Device (optional)

You need a USB bracket to have your system to support additional USB device(s). To attach a USB bracket, simply insert the bracket cable to the onboard USB connector marked as **USB.**

Pin	Description	Pin	Description
1	V0	2	V1
3	D0-	4	D1-
5	D0+	6	D1+
7	GND	8	GND
9	NC	10	NC

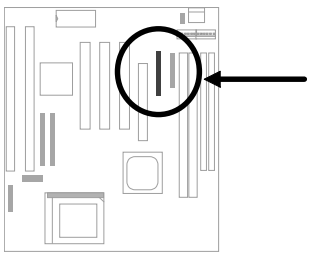


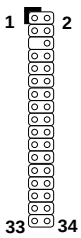


USB

2.3.6 Floppy Drive

Connect the 34-pin floppy drive cable to the floppy drive connector marked as **FDC** on the system board.

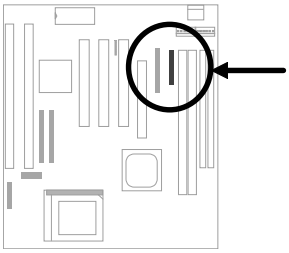


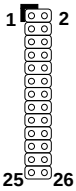


FDC

2.3.7 Printer

Plug in the 26-pin printer flat cable to the onboard parallel connector marked as **PRINTER** on the board.





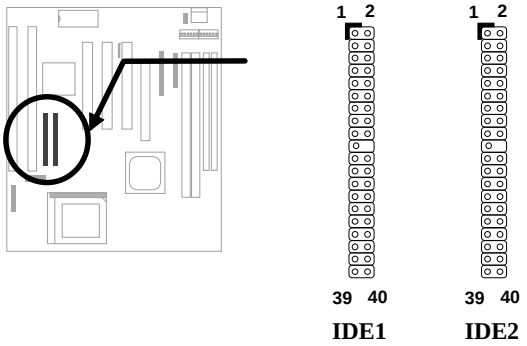
PRINTER

2.3.8 IDE Hard Disk and CD ROM

This mainboard supports two 40 pin IDE connectors marked as **IDE1** and **IDE2.** IDE1 is also known as primary channel and IDE2 as secondary channel, each channel supports two IDE devices that makes total of four devices.

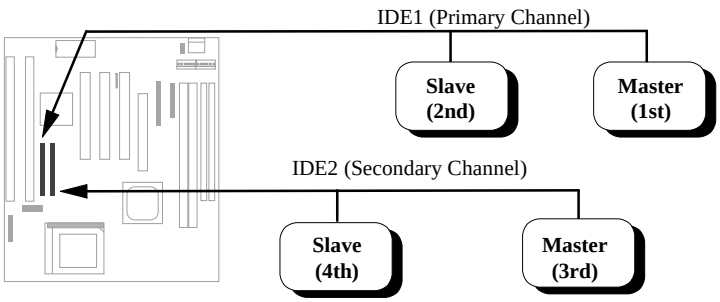
In order to work together, the two devices on each channel must be set differently to master and slave mode, either one can be hard disk or CDROM. The setting as master or slave mode depends on the jumper on your IDE device, please refer to your hard disk and CDROM manual accordingly.

Connect your first IDE hard disk to master mode of the primary channel. If you have second IDE device to install in your system, connect it as slave mode on the same channel, and the third and fourth device can be connected on secondary channel as master and slave mode respectively.



***Caution**: The specification of IDE cable is maximum 46cm (18 inches), make sure your cable does not excess this length.*

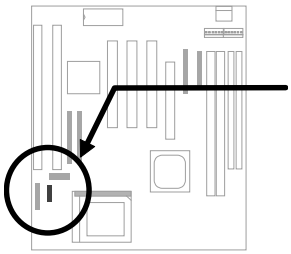
***Caution:** For better signal quality, it is recommended to set far end side device to master mode and follow the suggested sequence to install your new device . Please refer to following figure.*

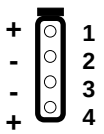


2.3.9 Hard Disk LED

The HDD LED connector is marked as **HDD LED** on the board. This connector is designed for different type of housing, actually only two pins are necessary for the LED. If your housing has four pin connector, simply plug it in. If you have only two pin connector, please connect to pin 1-2 or pin 3-4 according to the polarity.

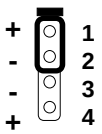
Pin	Description
1	HDD LED
2	GND
3	GND
4	HDD LED





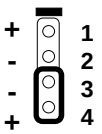
HDD LED

4-pin connector



HDD LED

2-pin connector at pin 1-2



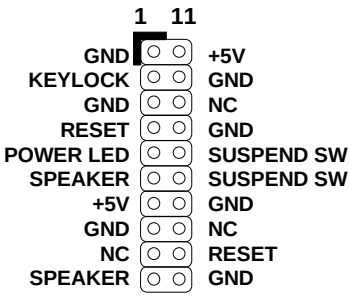
HDD LED

2-pin connector at pin 3-4

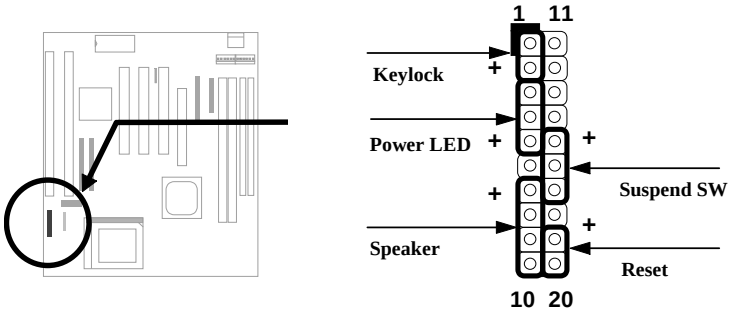
2.3.10 Panel Connector

The Panel (multifunction) connector is a 20-pin connector marked as **PANEL** on the board. Attach the power LED, keylock, speaker, reset switch, and suspend switch connectors to the corresponding pins as shown in the figure.

Some housings have a five-pin connector for the keylock and power LED Since power LED and keylock are aligned together, you can still use this kind of connector.

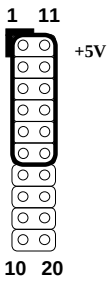


PANEL



PANEL

Other housings may have a 12-pin connector. If your housing has this type of connector, connect it to PANEL as shown in the figure. Make sure that the red wire of the connector is connected to +5V.



PANEL

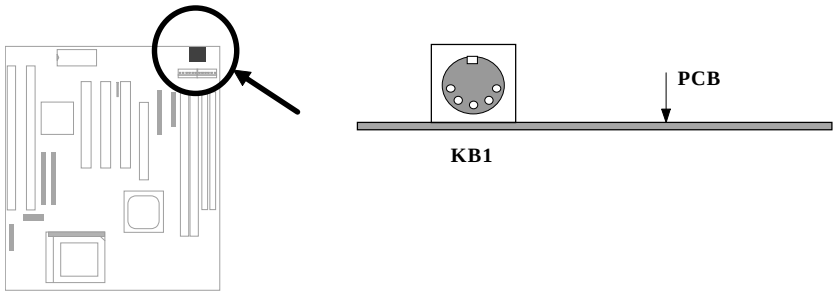
Note: *If your housing comes with Turbo switch connector, you may use this connector for Suspend switch functions.*

Note*: Pressing the Suspend switch allows you to manually force the system to suspend mode. However, this is possible only if the Power Management function in the BIOS Setup menu is enabled.*

2.3.11 Keyboard

The onboard keyboard connector is a five-pin AT-compatible connector marked as **KB1**. The view angle of drawing shown here is from back panel of the housing.

***Note**: The mini DIN PS/2 keyboard connector is optional.*



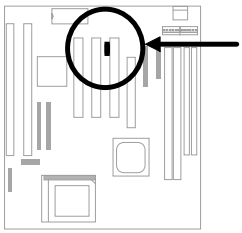
2.3.12 IrDA Connector

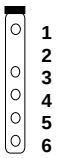
Serial port 2 can be configured to support wireless infrared module, with this module and application software such as Laplink, user can transfer files to or from laptops, notebooks, PDA and printers. This mainboard supports IrDA (115Kbps, 1 meter) as well as ASK-IR (19.2Kbps).

Install infrared module onto **IrDA** connector and enable infrared function from BIOS setup, make sure to have correct orientation when you plug onto IrDA connector.

Pin	Description
1	+5V
2	NC
3	IRRX
4	GND
5	IRTX
6	+3.3V

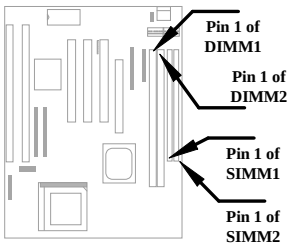
***Note**: Onboard serial port 2 (COM2) will not be available after IrDA connector is enabled.*





IrDA

2.4 Configuring the System Memory



This mainboard has two 72 pin SIMM sockets (Single-in-line Memory Module) and two 168 pin DIMM socket (Dual-in-line Memory Module) that allow you to install system memory from minimum 8MB up to maximum 768MB. Note that both SIMMs in this board must be in the same size and type.

The SIMM supported by this mainboard can be identified by 4 kinds of factors:

I. Size: single side, 1Mx32 (4MB), 4Mx32 (16MB), 16Mx32 (64MB), and double side, 1Mx32x2 (8MB), 4Mx32x2 (32MB), 16Mx32x2 (128MB).

II. Speed: 60ns or 70ns access time

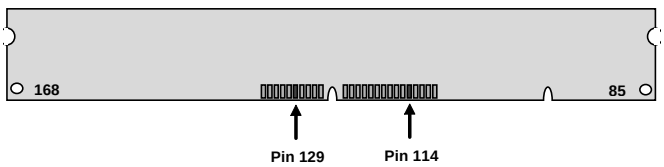
III. Type: FPM (Fast page mode) or EDO (Extended data output)

IV. Parity: without parity (32 bit wide) or with parity (36 bit wide).

The DIMM supported by this motherboard are always 64-bit wide DIMMs, which can be identified by following factors:

I. Size: single side, 1Mx64 (8MB), 2Mx64 (16MB), 4Mx64 (32MB), 8Mx64 (64MB), 16Mx64 (128MB), and double side, 1Mx64x2 (16MB), 2Mx64x2 (32MB), 4Mx64x2 (64MB), 8Mx64x2 (128MB), 16Mx64x2 (256MB).

Tip: *Here is a trick to check if your DIMM is single-side or double-side -- if there are traces connected to golden finger pin 114 and pin 129 of the DIMM, the DIMM is probably double-side; otherwise, it is single-side. Following figure is for your reference.*

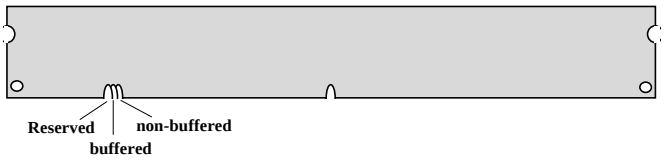


II. Speed:

SDRAM: normally marked as as -12, which means the clock cycle time is 12ns and maximum clock of this SDRAM is 83MHz. Sometimes you can also find the SDRAM marked as -67, which means maximum clock is 67MHz.

EDO: the access time of EDO RAM can be 60ns or 70ns.

III. Buffered and non-buffered: This motherboard supports non-buffered DIMMs. You can identify non-buffered DIMMs and buffered DIMMs according to the position of the notch, following figure is for your reference:



Because the positions are different, only non-buffered DIMMs can be inserted into the DIMM sockets on this motherboard. Although most of DIMMs on current market are non-buffered, we still recommend you to ask your dealer for the correct type.

IV. 2-clock and 4-clock signals: Although both of 2-clock and 4-clock signals are supported by this motherboard, we strongly recommend you to choose 4-clock SDRAM in consideration of reliability.

Tip: *To identify 2-clock and 4-clock SDRAM, you may check if there are traces connected to golden finger pin 79 and pin 163 of the SDRAM. If there are traces, the SDRAM is probably 4-clock; Otherwise, it is 2-clock.*

V. Parity: This motherboard supports standard 64 bit wide (without parity) DIMMs.

VI. SPD support: BIOS will automatically detect DIMM with SPD, and set to appropriate timing. DIMMs without SPD are still able to work fine on this board, but BIOS POST screen will give you a warning message that you use a DIMM without SPD.

There is no jumper setting required for the memory size or type. It is automatically detected by the system BIOS. You can use any single side SIMM and DIMM combination list below for SIMM or DIMM socket, and the total memory size is to add them together. This motherboard supports maximum 768 MB system memory. To achieve this, you may install two 256MB DIMMs and two 128MB SIMMs.

SIMM1	SIMM2	Subtotal of Bank0
None	None	0MB
4MB	4MB	8MB
8MB	8MB	16MB
16MB	16MB	32MB
32MB	32MB	64MB
64MB	64MB	128MB
128MB	128MB	256MB

DIMM1	Size of DIMM1
None	0MB
8MB	8MB
16MB	16MB
32MB	32MB
64MB	64MB
128MB	128MB
256MB	256MB

DIMM2	Size of DIMM2
None	0MB
8MB	8MB
16MB	16MB
32MB	32MB
64MB	64MB
128MB	128MB
256MB	256MB

Total Memory Size = Subtotal of SIMM1 + Subtotal of SIMM2

+ Size of DIMM1 + Size of DIMM2

***Warning**: It is not recommanded to use SIMM and SDRAM DIMM together unless you have 5V tolerance SDRAM (such as Samsung or TI). The FPM/EDO operate at 5V while SDRAM operates at 3.3V. If you combine them together the system will temporary work fine; however after a few months, the SDRAM 3.3V data input will be damaged by 5V FPM/EDO data output line.*

Caution: *Make sure that you install the same SIMM type and size for each bank.*

Caution: *There are some old DIMMs made by EDO or FPM memory chip, they can only accept 5V power and probably can not fit into the DIMM socket, make sure you have 3.3V true SDRAM DIMM before your insert it.*

The driving capability of new generation chipset is limited because the lack of memory buffer (to improve performance). This makes DRAM chip count an important factor to be taking into consideration when you install SIMM. Unfortunately, there is no way that BIOS can identified the correct chip count, you need to calculate the chip count by yourself. The simple rule is: By visual inspection, use only SIMM with chip count less than 24 chips.

Warning*: Do not install any SIMM that contains more than 24 chips. SIMMs contain more than 24 chips exceed the chipset driving specification. Doing so may result in unstable system behavior.*

Warning*: Although Intel SIS chipset supports x4 SDRAM chip. Due to loading issue, it is not recommended to use this kind of SDRAM.*

Tip: *The SIMM/DIMM chip count can be calculated by following example:*

1. *For 32 bit non-parity SIMM using 1M by 4 bit DRAM chip, 32/4=8 chips.*
2. *For 36 bit parity SIMM using 1M by 4 bit DRAM chip, 36/4=9 chips.*
3. *For 36 bit parity SIMM using 1M by 4 bit and 1M by 1 bit DRAM, the chip count will be 8 data chips(8= 32/4) plus 4 parity chips(4=4/1), total is 12 chips.*
4. *For 64 bit DIMM using 1M by 16 bit SDRAM, the chip count is 64/16=4 chips.*

There is an important parameter affects SDRAM performance, CAS Latency Time. It is similar as CAS Access Time of EDO DRAM and is calculated as number of clock state. The SDRAM that AOpen had tested are listed below. If your SDRAM has unstable problem, go into BIOS "Chipset Features Setup", change CAS Latency Time to 3 clocks.

Manufacturer	Model	Suggested CAS Latency Time	5V Tolerance
Samsung	KM416511220AT-G12	2	Yes
NEC	D4S16162G5-A12-7JF	2	No
Hitachi	HM5216805TT10	2	No
Fujitsu	81117822A-100FN	2	No
TI	TMX626812DGE-12	2	Yes
TI	TMS626812DGE-15	3	Yes
TI	TMS626162DGE-15	3	Yes
TI	TMS626162DGE-M67	3	Yes

Following table list the recommended DRAM combinations of SIMM and DIMM:

SIMM Data chip	SIMM Parity chip	Bit size per side	Single/ Double side	Chip count	SIMM size	Recommended
1M by 4	None	1Mx32	x1	8	4MB	Yes
1M by 4	None	1Mx32	x2	16	8MB	Yes
1M by 4	1M by 1	1Mx36	x1	12	4MB	Yes
1M by 4	1M by 4	1Mx36	x1	9	4MB	Yes
1M by 4	1M by 4	1Mx36	x2	18	8MB	Yes
1M by 16	None	1Mx32	x1	2	4MB	Yes
1M by 16	None	1Mx32	x2	4	8MB	Yes
1M by 16	1M by 4	1Mx36	x1	3	4MB	Yes
1M by 16	1M by 4	1Mx36	x2	6	8MB	Yes
4M by 4	None	4Mx32	x1	8	16MB	Yes
4M by 4	None	4Mx32	x2	16	32MB	Yes
4M by 4	4M by 1	4Mx36	x1	12	16MB	Yes
4M by 4	4M by 1	4Mx36	x2	24	32MB	Yes

SIMM Data chip	SIMM Parity chip	Bit size per side	Single/ Double side	Chip count	SIMM size	Recommended
16M by 4	None	16Mx32	x1	8	64MB	Yes, but not tested.
16M by 4	None	16Mx32	x2	16	128MB	Yes, but not tested.
16M by 4	16M by 4	16Mx36	x1	9	64MB	Yes, but not tested.
16M by 4	16M by 4	16Mx36	x2	18	128MB	Yes, but not tested.

DIMM Data chip	Bit size per side	Single/ Double side	Chip count	DIMM size	Recommended
1M by 16	1Mx64	x1	4	8MB	Yes
1M by 16	1Mx64	x2	8	16MB	Yes
2M by 8	2Mx64	x1	8	16MB	Yes
2M by 8	2Mx64	x2	16	32MB	Yes
4M by 16	4Mx64	x2	8	64MB	Yes

DIMM Data chip	Bit size per side	Single/ Double side	Chip count	DIMM size	Recommended
2M by 32	2Mx64	x1	2	16MB	Yes, but not tested.
2M by 32	2Mx64	x2	4	32MB	Yes, but not tested.
4M by 16	4Mx64	x1	4	32MB	Yes, but not tested.
8M by 8	8Mx64	x1	8	64MB	Yes, but not tested.
8M by 8	8Mx64	x2	16	128MB	Yes, but not tested.

***Warning**: 64MB SIMMs using 16M by 4 bit chip (64M bit technology) are not available in the market and are not formally tested by AOpen quality test department yet. However they are supported by design specification from Intel and they will be tested as soon as they are available. Note that 64MB SIMMs using 16M by 1 bit chip (16M bit technology) have chip count exceed 24 and are strongly not recommended.*

Tip: *8 bit = 1 byte, 32 bit = 4 byte. The SIMM size is represented by number of data byte (whether with or without parity), for example, the size of single side SIMM using 1M by 4 bit chip is 1Mx32 bit, that is, 1M x 4 byte= 4MB. For double side SIMM, simply multiply it by 2, that is, 8MB.*

Following table are possible DRAM combinations that is **NOT** recommended:

SIMM Data chip	SIMM Parity chip	Bit size per side	Single/ Double side	Chip count	SIMM size	Recommended
1M by 1	None	1Mx32	x1	32	4MB	No
1M by 1	1M by 1	1Mx36	x1	36	4MB	No
1M by 4	1M by 1	1Mx36	x2	24	8MB	No
4M by 1	None	4Mx32	x1	32	16MB	No
4M by 1	4M by 1	4Mx36	x1	36	16MB	No
16M by 1	None	16Mx32	x1	32	64MB	No
16M by 1	16M by 1	16Mx36	x1	36	64MB	No

DIMM Data chip	Bit size per side	Single/ Double side	Chip count	DIMM size	Recommended
4M by 4	4Mx64	x1	16	32MB	No
4M by 4	4Mx64	x2	32	64MB	No
16M by 4	16Mx64	x1	16	128MB	No
16M by 4	16Mx64	x2	32	256MB	No

Chapter 3

Award BIOS

This chapter tells you how to configure the system parameters. You may update your BIOS via AWARD Flash Utility.

Important: *Because the BIOS code is the most often changed part of the mainboard design, the BIOS information contained in this chapter (especially the Chipset Setup parameters) may be a little different compared to the actual BIOS that came with your mainboard. These changes are implemented to further enhance system performance.*

3.1 Entering the Award BIOS Setup Menu

The BIOS setup utility is a segment of codes/routines residing in the BIOS Flash ROM. This routine allows you to configure the system parameters and save the configuration into the 128 byte CMOS area, (normally in the RTC chip or directly in the main chipset). To enter the BIOS Setup, press DEL during POST (Power-On Self Test). The BIOS Setup Main Menu appears as follows.

***Tip**: Choose "Load Setup Defaults" for recommended optimal performance. Choose "Load Turbo Defaults" for best performance with light system loading.*

The section at the bottom of the screen tells how to control the screen. Use the arrow keys to move between items, [redacted] F2 to color scheme of the display, [redacted] to exit, and F10 to save the changes before exit. Another section at the bottom of the screen displays a brief description of the highlighted item.

After selecting an item, press ENTER to select or enter a submenu.

3.2 Standard CMOS Setup

The "Standard CMOS Setup" sets the basic system parameters such as the date, time, and the hard disk type. Use the arrow keys to highlight an item and [redacted] or [redacted] to select the value for each item.

Standard CMOS à Date

To set the date, highlight the Date parameter. Press PGUP or [redacted] to set the current date. The date format is month, date, and year.

Standard CMOS à Time

To set the time, highlight the Time parameter. Press [redacted] or [redacted] to set the current time in hour, minute, and second format. The time is based on the 24 hour military clock.

Standard CMOS à **Primary Master** à **Type**
Standard CMOS à **Primary Slave** à **Type**
Standard CMOS à **Secondary Master** à **Type**
Standard CMOS à **Secondary Slave** à **Type**

Type
Auto
User
None
1
2
...
45

This item lets you select the IDE hard disk parameters that your system supports. These parameters are Size, Number of Cylinder, Number of Head, Start Cylinder for Pre-compensation, Cylinder number of Head Landing Zone and Number of Sector per Track. The default setting is **Auto**, which enables BIOS to automatically detect the parameters of installed HDD at POST (Power-On Self Test). If you prefer to enter HDD parameters manually, select User. Select None if no HDD is connected to the system.

The IDE CDROM is always automatically detected.

Tip: *For an IDE hard disk, we recommend that you use the "IDE HDD Auto Detection" to enter the drive specifications automatically. See the section "IDE HDD Auto Detection".*

Standard CMOS à **Primary Master** à **Mode**
Standard CMOS à **Primary Slave** à **Mode**
Standard CMOS à **Secondary Master** à **Mode**
Standard CMOS à **Secondary Slave** à **Mode**

Mode
Auto
Normal
LBA
Large

The enhanced IDE feature allows the system to use a hard disk with a capacity of more than 528MB. This is made possible through the Logical Block Address (LBA) mode translation. The LBA is now considered as a standard feature of current IDE hard disk on the market because of its capability to support capacity larger than 528MB. Note that if HDD is formatted with LBA On, it will not be able to boot with LBA Off.

Standard CMOS à **Drive A**
Standard CMOS à **Drive B**

Drive A

These items select floppy drive type. The available settings

None
360KB 5.25"
1.2MB 5.25"
720KB 3.5"
1.44MB 3.5"
2.88MB 3.5"

and types supported by the mainboard are listed on the left.

Standard CMOS à Video

Video
EGA/VGA
CGA40
CGA80
Mono

This item specifies the type of video card in use. The default setting is VGA/EGA. Since current PCs use VGA only, this function is almost useless and may be disregarded in the future.

Standard CMOS à Halt On

Halt On
No Errors
All Errors
All, But Keyboard
All, But Diskette
All, But Disk/Key

This parameter enables you to control the system stops in case of Power-On Self Test (POST) error.

3.3 BIOS Features Setup

This screen appears when you select the option "BIOS Features Setup" from the main menu.

BIOS Features à Virus Warning

Virus Warning
Enabled
Disabled

Set this parameter to Enabled to activate the warning message. This feature protects the boot sector and partition table of your hard disk from virus intrusion. Any attempt during boot up to write to the boot sector of the hard disk drive stops the system and the following warning message appears on the screen. Run an anti-virus program to locate the problem.

```
                ! WARNING !
        Disk Boot Sector is to be modified
Type "Y" to accept write, or "N" to abort write
                Award Software, Inc.
```

BIOS Features à External Cache

External Cache
Enabled
Disabled

Enabling this parameter activates the secondary cache (currently, PBSRAM cache). Disabling the parameter slows down the system. Therefore, we recommend that you leave it enabled unless you are troubleshooting a problem.

BIOS Features à Quick Power On Self Test

Quick Power on Self test
Enable
Disabled

This parameter speeds up POST by skipping some items that are normally checked.

BIOS Features à Boot Sequence

Boot Sequence
A,C,SCSI
C,A,SCSI
C,CDROM,A
CDROM,C,A
D,A,SCSI
E,A,SCSI
F,A,SCSI
SCSI,A,C
SCSI,C,A
C only
LS/ZIP,C

This parameter allows you to specify the system boot up search sequence. The hard disk ID are listed below:

C: Primary master

D: Primary slave

E: Secondary master

F: Secondary slave

LS: LS120 drive

ZIP: IOMEGA ZIP drive

BIOS Features à Swap Floppy Drive

Swap Floppy Drive
Enabled
Disabled

This item allows you to swap floppy drives. For example, if you have two floppy drives (A and B), you can assign the first drive as drive B and the second drive as drive A or vice-versa.

BIOS Features à Boot Up NumLock Status

Boot Up NumLock Status
On
Off

Setting this parameter to On enables the numeric function of the numeric keypad. Set this parameter to Off to disregard the function. Disabling the numeric function allows you to use the numeric keypad for cursor control.

BIOS Features à Boot Up System Speed

Boot Up System Speed
High
Low

Select High or Low system speed after boot.

BIOS Features à Typematic Rate Setting

Typematic Rate Setting
Enabled
Disabled

Set this parameter to Enable/Disable the keyboard repeat function. When enabled, continually holding down a key on the keyboard will generate repeatedly keystrokes.

BIOS Features à Typematic Rate (Chars/Sec)

Typematic Rate
6
8
10
12
15
20
24
30

This item allows you to control the speed of repeated keystrokes. The default is 30 characters/sec.

BIOS Features à Typematic Delay (Msec)

Typematic Delay
250
500
750
1000

This parameter allows you to control the delay time between the first and the second keystroke (where the repeated keystrokes begin). The typematic delay settings are 250, 500, 750, and 1000 msec.

BIOS Features à Security Option

Security Option
Setup
System

The **System** option limits access to both the System boot and BIOS setup. A prompt asking you to enter your password appears on the screen every time you boot the system.

The **Setup** option limits access only to BIOS setup.

To disable the security option, select Password Setting from the main menu, don't type anything and just press <Enter>.

BIOS Features à PCI/VGA Palette Snoop

PCI/VGA Palette Snoop
Enabled
Disabled

Enabling this item informs the PCI VGA card to keep silent (and to prevent conflict) when palette register is updated (i.e., accepts data without responding any communication signals). This is useful only when two display cards use the same palette address and plugged in the PCI bus at the same time (such as MPEQ or Video capture). In such case, PCI VGA is silent while MPEQ/Video capture is set to function normally.

BIOS Features à OS Select for DRAM > 64MB

OS Select for DRAM > 64MB
OS/2
Non-OS/2

Set to OS/2 if your system is utilizing an OS/2 operating system and has a memory size of more than 64 MB.

BIOS Features à Video BIOS Shadow

Video BIOS Shadow
Enabled
Disabled

VGA BIOS Shadowing means to copy video display card BIOS into the DRAM area. This enhances system performance because DRAM access time is faster than ROM.

BIOS Features à C800-CBFF Shadow
BIOS Features à CC00-CFFF Shadow
BIOS Features à D000-D3FF Shadow
BIOS Features à D400-D7FF Shadow
BIOS Features à D800-DBFF Shadow
BIOS Features à DC00-DFFF Shadow

C8000-CBFFF Shadow
Enabled
Disabled

These six items are for shadowing ROM code on other expansion cards. Before you set these parameters, you need to know the specific addresses of that ROM code. If you do not know this information, enable all the ROM shadow settings.

Note: *The F000 and E000 segments are always shadowed because BIOS code occupies these areas.*

3.4 Chipset Features Setup

The "Chipset Features Setup" includes settings for the chipset dependent features. These features are related to system performance.

Caution: *Make sure you fully understand the items contained in this menu before you try to change anything. You may change the parameter settings to improve system performance . However, it may cause system unstable if the setting are not correct for your system configuration.*

Chipset Features à Auto Configuration

Auto Configuration
Enabled
Disabled

When **Enabled**, the DRAM and cache related timing are set to pre-defined value according to CPU type and clock. Select **Disable** if you want to specify your own DRAM timing.

Chipset Features à Refresh Cycle Time (us)

Refresh Cycle Time (us)
15.6
62.4
124.8
187.2

This option lets you set the cycle time for the chipset to refresh DRAM to avoid losing data. The unit is micro second (us).

Chipset Features à RAS Pulse Width Refresh

RAS Pulse Width Refresh
4T
5T
6T
7T

This parameter specifies the number of clocks required to assert the DRAM row address strobe (RAS) signal for refresh cycles.

Chipset Features à RAS Precharge Time

RAS Precharge Time
2T
3T
4T
5T

This parameter specifies the number of clocks required to deassert the RAS signal to prevent DRAM from losing data after performing a read. This operation is called Precharge.

Chipset Features à RAS to CAS Delay

RAS to CAS Delay
2T
3T
4T
5T

This option allows you to set the wait state between row address strobe (RAS) and column address strobe (CAS) signals.

Chipset Features à ISA Bus Clock Frequency

ISA Bus Clock Frequency
7.159MHz
PCICLK/4
PCICLK/3

This item lets you select the ISA bus clock. Normally, the PCI bus clock is the CPU bus (external) clock divided by 2, PCICLK=CPUCLK/2. For example, CPUCLK=66MHz, PCICLK=66/2=33MHz, ISA bus CLK=33/4=8.25MHz.

Chipset Features à SDRAM CAS Latency

SDRAM CAS Latency
2T
3T

This parameter speifies the number of clocks of SDRAM CAS Lateny. This is very important parameter affects SDRAM performance. If your SDRAM has unstable problem, set to 3T.

Chipset Features à System BIOS Cacheable

System BIOS Cacheable
Enabled
Disabled

Enabling this item allows you to cache the system BIOS to further enhance system performance.

Chipset Features à Video BIOS Cacheable

Video BIOS Cacheable
Enabled
Disabled

Allows the video BIOS to be cached to allow faster video performance.

Chipset Features à Memory Hole At 15M-16M

Memory Hole At 15M-16M
Enabled
Disabled

This option lets you reserve system memory area for special ISA cards. The chipset accesses code/data of these areas from the ISA bus directly. Normally, these areas are reserved for memory mapped I/O card.

3.5 Power Management Setup

The Power Management Setup screen enables you to control the mainboard green features. See the following screen.

Power Management à Power Management

Power Management
Max Saving
Mix Saving
User Defined
Disabled

This function allows you to set the default parameters of power-saving modes. Set to **Disable** to turn off power management function. Set to User Defined to choose your own parameters.

Mode	Doze	Standby	Suspend
Min Saving	40 min	40 min	40 min
Max Saving	20 sec	20 sec	20 sec

Power Management à PM Controlled by APM

PM Controlled by APM
Yes
No

If "Max Saving" is selected, you can turn on this item, transfer power management control to APM (Advanced Power Management) and enhance power saving function. For example, stop CPU internal clock.

Power Management à Video Off Option

Video Off Option
Always On
All Modes à Off
Suspend à Off
Susp, Standby à Off

To turn off video monitor at which power down mode.

Power Management à Break Switch

Break Switch
Enabled
Disabled

Setting this item to Enabled allows you to use the Turbo switch as Suspend switch. Pressing the Turbo switch changes nothings for a Pentium system, so we usually use this switch to act as a Suspend switch. The default value of this item is Disabled.

Power Management à HDD Off After

HDD Off After
Disabled
1 Min
2 Min
.....
15 Min

This option lets you specify the IDE HDD idle time before the device enters the power down state. This item is independent from the power states described in this section (Standby and Suspend).

Power Management à Doze Speed (div by)
Power Management à Stdby Speed (div by)

Doze Speed (div by)
1
2
3
4
5
6
7
8

These items let you set the system speed divisor to specify the rate at which the system speed will slow down once it enters the **Doze Mode** or **Standby Mode**. The options are from 1 to 8. To determine the exact rate of the system in Doze mode, take 2 as the divisor and 133MHz as the normal system speed. 133MHz/2 = 66MHz - this is the system speed in Doze mode.

Power Management à Suspend Mode Option

Suspend Mode Option
Power On Suspend
Suspend to Hard Drive

You can select suspend mode by this item. **Power On Suspend** is the traditional Green PC suspend mode, the CPU clock is stop, all other devices are shut off. But power must be kept On to detect activities from modem, keyboard/mouse and returns the system to full power. The system activities is detected by monitoring the IRQ signals. **Suspend to Hard Drive** saves system status, memory and screen image into hard disk, then the power can be totally Off. Next time, when power is turned On, the system goes back to your original work within just few seconds. You need utility ZVHDD to reserve disk space. Refer to section "Suspend to Hard Drive" for more information".

Power Management à **HDD Ports Activity**
Power Management à **COM Ports Activity**
Power Management à **LPT Ports Activity**
Power Management à **VGA Activity**

COM Ports Activity
Enabled
Disabled

To enable or disable the detection of COM port, LPT, HDD, VGA activities for power down state transition.

Power Management à **IRQ [3-7,9-15], NMI**

IRQ [3-7,9-15], NMI
Enabled
Disabled

To enable or disable the detection of IRQ3-7, IRQ9-15 or NMI interrupt events for power down state transition.

Power Management à **IRQ 8 Break Suspend**

IRQ 8 Break Suspend
Enabled
Disabled

To enable or disable the detection of IRQ8 (RTC) event for power down state transition. OS2 has periodically IRQ8 (RTC) interruptions, If IRQ8 is not set to **Disabled**, OS/2 may fail to go into Doze/Standby/Suspend mode.

3.6 PNP/PCI Configuration Setup

The PNP/PCI Configuration Setup allows you to configure the ISA and PCI devices installed in your system. The following screen appears if you select the option "PNP/PCI Configuration Setup" from the main menu.

PNP/PCI Configuration à PnP OS Installed

PnP OS Installed
Yes
No

Normally, the PnP resources are allocated by BIOS during POST (Power-On Self Test). If you are using a PnP operating system (such as Windows 95), set this item to Yes to inform BIOS to configure only the resources needed for booting (VGA/IDE or SCSI). The rest of system resources will be allocated by PnP operating system.

PNP/PCI Configuration à Resources Controlled By

Resources Controlled by
Auto
Manual

Setting this option to Manual allows you to individually assign the IRQs and DMAs to the ISA and PCI devices. Set this to **Auto** to enable the auto-configuration function.

PNP/PCI Configuration à Reset Configuration Data

Reset Configuration Data
Enabled
Disabled

In case conflict occurs after you assign the IRQs or after you configure your system, you can enable this function, allow your system to automatically reset your configuration and reassign the IRQs.

PNP/PCI Configuration à IRQ3 (COM2) assigned to
PNP/PCI Configuration à IRQ4 (COM1) assigned to
PNP/PCI Configuration à IRQ5 (Network/Sound) assigned to
PNP/PCI Configuration à IRQ7 (Printer or Others) assigned to
PNP/PCI Configuration à IRQ9 (Video or Others) assigned to
PNP/PCI Configuration à IRQ10 (SCSI or Others) assigned to
PNP/PCI Configuration à IRQ11 (SCSI or Others) assigned to
PNP/PCI Configuration à IRQ12 (PS/2 Mouse) assigned to
PNP/PCI Configuration à IRQ14 (IDE1) assigned to
PNP/PCI Configuration à IRQ15 (IDE2) assigned to

IRQ 3 assigned to
Legacy ISA
PCI/ISA PnP

If your ISA card is not PnP compatible and requires a special IRQ to support its function, set the selected IRQ to **Legacy ISA**. This setting informs the PnP BIOS to reserve the selected IRQ for the installed legacy ISA card. The default is **PCI/ISA PnP**. Take note that PCI cards are always PnP compatible (except old PCI IDE card).

PNP/PCI Configuration à **DMA 0 assigned to**
PNP/PCI Configuration à **DMA 1 assigned to**
PNP/PCI Configuration à **DMA 3 assigned to**
PNP/PCI Configuration à **DMA 5 assigned to**
PNP/PCI Configuration à **DMA 6 assigned to**
PNP/PCI Configuration à **DMA 7 assigned to**

DMA 0 assigned to
Legacy ISA
PCI/ISA PnP

If your ISA card is not PnP compatible and requires a special DMA channel to support its function, set the selected DMA channel to **Legacy ISA**. This setting informs the PnP BIOS to reserve the selected DMA channel for the installed legacy ISA card. The default is **PCI/ISA PnP**. Take note that PCI card does not require DMA channel.

PNP/PCI Configuration à **PCI IDE IRQ Map To**

PCI IDE IRQ Map To
ISA
PCI-Slot1
PCI-Slot2
PCI-Slot3
PCI-Slot4
PCI-Auto

Some old PCI IDE add-on cards are not fully PnP compatible. These cards require you to specify the slot in use to enable BIOS to properly configure the PnP resources. This function allows you to select the PCI slot for any PCI IDE add-on card present in your system. Set this item to **Auto** to allow BIOS to automatically configure the installed PCI IDE card(s).

PNP/PCI Configuration à **Primary IDE INT#**
PNP/PCI Configuration à **Secondary IDE INT#**

Primary IDE INT#
A
B
C
D

These two items, in conjunction with item "PCI IDE IRQ Map To", specify the IRQ routing of the primary or secondary channel of the PCI IDE add-on card (not the onboard IDE). Each PCI slot has four PCI interrupts aligned as listed in the table below. You must specify the slot in the "PCI IDE IRQ Map To", and set the PCI interrupt (INTx) here according to the interrupt connection on the card.

PCI Slot	Location 1	Location 2	Location 3	Location 4

	(pin A6)	(pin B7)	(pin A7)	(pin B8)
Slot 1	INTA	INTB	INTC	INTD
Slot 2	INTB	INTC	INTD	INTA
Slot 3	INTC	INTD	INTA	INTB
Slot 4	INTD	INTA	INTB	INTC
Slot 5 (if any)	INTD	INTA	INTB	INTC

PNP/PCI Configuration à **Slot1 IRQ No. (Right)**
PNP/PCI Configuration à **Slot2 IRQ No.**
PNP/PCI Configuration à **Slot3 IRQ No. (Left)**

Slot1 IRQ No.
3
4
5
7
9
10
11
12
14
15
Auto

This item is reserved for engineering purpose to let you assign an IRQ manually to the add-on card on each PCI slot. If you select Auto, system will automatically assign an available value to the device.

It is suggested to use default setting, which is Auto, in order to comply with PnP specification completely.

3.7 Load Setup Defaults

The "Load Setup Defaults" option loads optimized settings for optimum system performance. Optimal settings are relatively safer than the Turbo settings. We recommend you to use the Optimal settings if your system has large memory size and fully loaded with add-on card.

Optimal is not the slowest setting for this mainboard. If you need to verify a unstable problem, you may manually set the parameter in the "BIOS Features Setup" and "Chipset Features Setup" to get slowest and safer setting.

3.8 Load Turbo Defaults

The "Load Turbo Defaults" option gives better performance than Optimal values. However, Turbo values may not be the best setting of this mainboard but these values are qualified by the AOpen RD and QA department as the reliable settings especially if you have limited loading of add-on card and memory size (for example, a system that contains only a VGA/Sound card and two SIMMs).

To attain the best system performance, you may manually set the parameters in the "Chipset Features Setup" to get proprietary setting. Make sure that you know and understand the functions of every item in Chipset Setup menu. The performance difference of Turbo from Optimal is normally around 3% to 10%, depending on the chipset and the application.

3.9 Integrated Peripherals

The following screen appears if you select the option "Integrated Peripherals" from the main menu. This option allows you to configure the I/O features.

Integrated Peripherals à **Internal PCI/IDE**

Internal PCI IDE
Disabled
Primary
Secondary
Both

This parameter lets you enable or disable the on-chip primary or secondary IDE device.

Integrated Peripherals à **IDE Primary Master PIO**
Integrated Peripherals à **IDE Primary Slave PIO**
Integrated Peripherals à **IDE Secondary Master PIO**
Integrated Peripherals à **IDE Secondary Slave PIO**

IDE Primary Master PIO
Auto
Mode 0
Mode 1
Mode 2
Mode 3
Mode 4

Setting this item to **Auto** activates the HDD speed auto-detect function. The PIO mode specifies the data transfer rate of HDD. For example: mode 0 data transfer rate is 3.3MB/s, mode 1 is 5.2MB/s, mode 2 is 8.3MB/s, mode 3 is 11.1MB/s and mode 4 is 16.6MB/s. If your hard disk performance becomes unstable, you may manually try the slower mode.

Caution: *It is recommended that you connect the first IDE device of each channel to the endmost connector of the IDE cable. Refer to section 2.3 "Connectors" for details on how to connect IDE device(s).*

Integrated Peripherals à **Primary Master UltraDMA**
Integrated Peripherals à **Primary Slave UltraDMA**
Integrated Peripherals à **Secondary Master UltraDMA**
Integrated Peripherals à **Secondary Slave UltraDMA**

Primary Master UltraDMA
Auto
Disabled

This item allows you to set the Ultra DMA/33 mode supported by the hard disk drive connected to your primary IDE connector.

Integrated Peripherals à **IDE HDD Block Mode**

IDE HDD Block Mode
Enabled
Disabled

This feature enhances disk performance by allowing multisector data transfers and eliminates the interrupt handling time for each sector. Most IDE drives, except with old designs, can support this feature.

Integrated Peripherals à USB Controller

USB Controller
Enabled
Disabled

USB device is default to use PCI INTD#, the same as PCI slot4. If you installed PCI card on slot4 and require to use INTD#, set this item to Disabled. The USB device will then be disabled.

Note:*Normally, PCI VGA does not need PCI interrupt, you may put PCI VGA on slot4.*

Integrated Peripherals à USB Keyboard Support

USB Legacy Support
Enabled
Disabled

This item lets you enable or disable the USB keyboard driver within the onboard BIOS. The keyboard driver simulates legacy keyboard command and let you use USB keyboard during POST or after boot if you don't have USB driver in the operating system.

Caution*: You can not use both USB driver and USB legacy keyboard at the same time. Disable "USB Legacy Support" if you have USB driver in the operating system.*

Integrated Peripherals à Onboard FDC Controller

Onboard FDC Controller
Enabled
Disabled

Setting this parameter to **Enabled** allows you to connect your floppy disk drives to the onboard floppy disk connector instead of a separate controller card. Change the setting to Disabled if you want to use a separate controller card.

Integrated Peripherals à Onboard Serial 1
Integrated Peripherals à Onboard Serial 2

Onboard Serial 1
Auto
3F8/IRQ4
2F8/IRQ3
3E8/IRQ4
2E8/IRQ3
Disabled

This item allow you to assign address and interrupt for the board serial port. Default is **Auto**.

Note: *If you are using an network card, make sure that the interrupt does not conflict.*

Integrated Peripherals à Onboard UART 2 Mode

Onboard UART 2 Mode
Standard
HPSIR
ASKIR

This item is configurable only if the "Onboard UART 2" is enabled. This allows you to specify the mode of serial port2. The available mode selections are:

- **Standard -** Sets serial port 2 to operate in normal mode. This is the default setting.
- **HPSIR -** Select this setting if you installed an Infrared module in your system via IrDA connector (refer to section 2.3 "Connectors"). This setting allows infrared serial communication at a maximum baud rate of 115K baud.
- **ASKIR -** Select this setting if you installed an Infrared module via IrDA connector (refer to section 2.3 "Connectors"). This setting allows infrared serial communication at a maximum baud rate of 19.2K baud.

Integrated Peripherals à Onboard Parallel Port

Onboard Parallel Port
3BC/IRQ7
378/IRQ7
278/IRQ7
Disabled

This item controls the onboard parallel port address and interrupt.

Note: *If you are using an I/O card with a parallel port, make sure that the addresses and IRQ do not conflict.*

Integrated Peripherals à Parallel Port Mode

Parallel Port Mode
Normal
EPP
ECP
ECP + EPP

This item lets you set the parallel port mode. The mode options are **Normal** (Standard and Bidirection Parallel Port), EPP (Enhanced Parallel Port) and ECP (Extended Parallel Port). Normal is the IBM AT and PS/2 compatible mode. EPP enhances the parallel port throughput by directly writing/reading data to/from parallel port without latch. ECP supports DMA and RLE (Run Length Encoded) compression and decompression.

Integrated Peripherals à ECP Mode Use DMA

ECP Mode Use DMA
3
1

This item lets you set the DMA channel of ECP mode.

3.10 Password Setting

Password prevents unauthorized use of your computer. If you set a password, the system prompts for the correct password before boot or access to Setup.

To set a password:

1. At the prompt, type your password. Your password can be up to 8 alphanumeric characters. When you type the characters, they appear as asterisks on the password screen box.
2. After typing the password, press.
3. At the next prompt, re-type your password and press again to confirm the new password. After the password entry, the screen automatically reverts to the main screen.

To disable the password, press when prompted to enter the password. The screen displays a message confirming that the password has been disabled.

3.11 IDE HDD Auto Detection

If your system has an IDE hard drive, you can use this function to detect its parameters and enter them into the "Standard CMOS Setup" automatically.

This routine only detects one set of parameters for your IDE hard drive. Some IDE drives can use more than one set of parameters. If your hard disk is formatted using different parameters than those detected, you have to enter the parameters manually. If the parameters listed do not match the ones used to format the disk, the information on that disk will not be accessible. If the auto-detected parameters displayed do not match those that used for your drive, ignore them. Type N to reject the values and enter the correct ones manually from the Standard CMOS Setup screen.

3.12 Save & Exit Setup

This function automatically saves all CMOS values before leaving Setup.

3.13 Exit without Saving

Use this function to exit Setup without saving the CMOS value changes. Do not use this option if you want to save the new configuration.

3.14 NCR SCSI BIOS and Drivers

The NCR 53C810 SCSI BIOS resides in the same flash memory chip as the system BIOS. The onboard NCR SCSI BIOS is used to support NCR 53C810 SCSI control card without BIOS code. The NCR SCSI BIOS directly supports DOS, Windows 3.1 and OS/2. For better system performance, you may use the drivers that come with the NCR SCSI card or with your operating system. For details, refer to the installation manual of your NCR 53C810 SCSI card.

3.15 BIOS Flash Utility

The BIOS Flash utility allows you to upgrade the system BIOS. To get the AOpen Flash utility and the upgrade BIOS file, contact your local distributor or visit our homepage at **http://www.aopen.com.tw**. Please make sure that you have the correct BIOS ready, the BIOS filename is normally like AP58R110.BIN, which means model AP58 BIOS revision 1.10.

There are two useful programs, Checksum utility CHECKSUM.EXE and AOpen Flash utility AOFLASH.EXE. Follow the procedures below to upgrade your BIOS.

[CHECKSUM.EXE]

This utility will help you to determine if the BIOS has been downloaded correctly or not.

1. Execute
   C:> CHECKSUM Biosfile.bin
   Biosfile.bin is the filename of the BIOS code. (for example, AP58R110.BIN)
2. The utility will show "Checksum is ssss".

3. Compare the "ssss" with original checksum posted on Web or BBS. If they are different, please do not proceed any further and try to download the BIOS again.

[AOFLASH.EXE]

This utility will try to check the mainboard model, BIOS version and Super/Ultra IO chip model. To ensure the correct BIOS file for the correct mainboard and IO chip. This utility will permanently replace your original BIOS content after flashing.

1. Bootup DOS from floppy without loading any memory manager (HIMEM, EMM386, QEMM386, ...).
2. Execute

   C:> AOFLASH Biosfile.bin

   Biosfile.bin is the filename of the BIOS code. (for example, AP58R110.BIN)
3. After loading the new BIOS code, the utility will prompt you to save original BIOS code into your HDD or floppy. Please press "Y" to store it as "BIOS.OLD".
4. After the old BIOS has been successfully saved, press "Y" to replace BIOS.
5. DO NOT turn off the power during "FLASHING".
6. Reboot the system by turn off the power after "FLASHING".
7. Press "DEL" key to enter BIOS setup during POST.
8. Reload the "BIOS SETUP DEFAULT" and reconfigure other items as previous set.
9. Save & Exit. Done!

Warning: *DO NOT turn off the power during "FLASHING". If the BIOS programming is not successfully finished, the system will not be boot again, and you may need to physically replace the BIOS chip.*

Tip: *You may load back original BIOS "BIOS.OLD" by the same procedure.*

Appendix A

Frequently Asked Question

Note: *FAQ may be updated without notice. If you cannot find the information that you need in this appendix, visit our WWW home page (**http://www.aopen.com.tw**) and check the FAQ area and other new information.*

Q: How can I identify the mainboard BIOS version?

A: The AOpen mainboard BIOS version appears on the upper-left corner of the POST (Power-On Self Test) screen. Normally, it starts with R and is found in between the model name and the date. For example:

AP53/AX53 R3.80 Oct.22.1996

BIOS revision

Q: Why the AOpen mainboards (MB) do not have cache module expansion slot?

A: Faster CPU speed requires more difficult and complex MB timing design. Every trace and components delay must be taken into consideration. The expansion cache slot design will cause 2 or 3ns delay in PBSRAM timing, and the extended trace length to the cache module through the golden finger will further delay the timing by 1 or 2ns. This may result in unreliable system once the cache module and slot becomes worn. All AOpen MBs support 512KB PBSRAM onboard. For better performance (around 3% higher than 256KB), we strongly recommend you to use 512KB onboard. Otherwise, reliable 256KB is better than unreliable 512KB with cache module. AOpen is the first company to promote this concept since the fourth quarter of 1995.

Frequently Asked Questions

Q: What is MMX?

A: MMX is the new single-line multiple-instruction technology of the new Intel Pentium PP/MT (P55C) and Pentium II (Klamath) CPU. The AMD K6 and Cyrix M2 will support MMX, too. The MMX instructions are specifically useful for multimedia applications (such as 3D video, 3D sound, video conference). The performance can be improved if applications use these instructions. All AOpen MBs have at least dual power onboard to support MMX. It is not necessary to have special chipset for MMX CPU.

Q: Which version of the Windows '95 that I am using?

A: You may determine the version of Windows '95 by following steps.

1. Double click "System" in "Control Panel".
2. Click "General".
3. Look for "System" heading & refer to following,

4.00.950	Windows 95
4.00.950A	Windows 95 + Service Pack or OEM Service Release 1
4.00.950B	OEM Service Release 2 or OEM Service Release 2.1
4.00.950C	OEM Service Release 2.5

If you are running OSR 2.1, you may tell it from by checking "USB Supplement to OSR2" in the list of installed program of Add/Remove program tool under Control Panel, and checking for version 4.03.1212 of the Ntkern.vxd file in the Windows\System\Vmm32 folder.

Q: What is USB (Universal Serial Bus)?

A: USB is a new 4-pin serial peripheral bus that is capable of cascading low/medium speed peripherals (less than 10Mbit/s) such as keyboard, mouse, joystick, scanner, printer and modem/ISDN. With USB, the traditional complex cables from back panel of your PC can be eliminated.

You need the USB driver to support USB device(s). AOpen MBs are all USB ready, you may get latest BIOS from AOpen web site (http://www.aopen.com.tw). Our latest BIOS includes the keyboard driver (called Legacy mode), that simulates USB keyboard to act as AT or PS/2 keyboard and makes it possible to use USB keyboard if you don't have driver in your OS. For other USB devices, you may get the drivers from your device vendor or from OS (such as Win95). Be sure to turn off "USB Legacy Support" in BIOS "Chipset Setup" if you have another driver in your OS.

Frequently Asked Question

Q: How to install Windows 95 USB driver?

A: If you are Win'95 OSR 2.0 user (.950B, shows "PCI Universal Serial Devices"), you may obtain USBSUPP.EXE from Microsoft or your OEM system provider for installing Microsoft USB supplement which will create "USB Supplement to OSR2" in the list of Add/Remove program tool under Control Panel. After above installation, please run AOchip.exe provided by AOpen to create USB Controller under Device Manager.

If you are Win'95 OSR 2.1 or 2.5 user, only AOchip.exe installation is necessary.

If you are Win'95 retail user (.950 or .950A), there is no direct upgrade path available from Microsoft at this moment. It is expected to be implemented under Windows'98.

Q: What is P1394?

A: P1394 (IEEE 1394) is another standard of high-speed serial peripheral bus. Unlike low or medium speed USB, P1394 supports 50 to 1000Mbit/s and can be used for video camera, disk and LAN. Since P1394 is still under development, , there is no P1394 device currently available in the PC market. Also, there is no chipset that can support P1394. Probably in the near future, a card will be developed to support P1394 device.

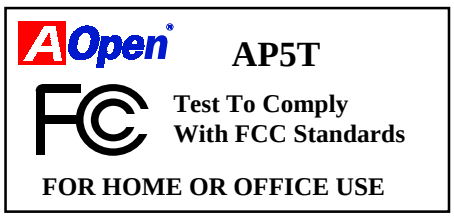
Frequently Asked Questions

Q: What is SMBus (System Management Bus, also called I2C bus)?

A: SMBus is a two-wire bus developed for component communication (especially for semiconductor IC). It is most useful for notebook to detect component status and replace hardware configuration pin (pull-high or pull-low). For example, disabling clock of DIMM that does not exist, or detecting battery low condition. 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. The SMBus may be used for jumpless mainboard, the components which support SMbus are not ready yet, we will keep eyes on it.

Q: What is FCC DoC (Declaration of Conformity)?

A: The DoC is new certification standard of FCC regulations. This new standard allows DIY component (such as mainboard) to apply DoC label separately without a shielding of housing. The rule to test mainboard for DoC is to remove housing and test it with regulation 47 CFR 15.31. The DoC test of mainboard is more difficult than traditional FCC test. If the mainboard passes DoC test, that means it has very low EMI radiation and you can use any kind of housing (even paper housing). Following is an example of DoC label.



Q: What is PBSRAM (Pipelined Burst SRAM)?

A: For Pentium CPU, the Burst means reading four QWord (Quad-word, 4x16 = 64 bits) continuously with only the first address decoded by SRAM. The PBSRAM will automatically send the remaining three QWord to CPU according to predefined sequence. The normal address decoding time for SRAM is 2 to 3 clocks. This makes the CPU data read timing of four QWord to be at least 3-2-2-2 and a total of 9 clocks if traditional asynchronous SRAM is used. However, with PBSRAM, there is no need to decode address for rest three Qword. Therefore, data read timing can be 3-1-1-1, that is equivalent to 6 clocks and is faster than asynchronous SRAM.

Q: What is EDO (Extended Data Output) memory?

A: The EDO DRAM technology of EDO is actually very similar to FPM (Fast Page Mode). Unlike traditional FPM that tri-states the memory output data to start the pre-charge activity, EDO DRAM holds the memory data valid until the next memory access cycle, that is similar to pipeline effect and reduces one clock state.

Q: What is SDRAM (Synchronous DRAM)?

A: The SDRAM is a new generation DRAM technology that allows DRAM to use the same clock as the CPU host bus (EDO and FPM are asynchronous and do not have clock signal). The idea is the same as "Burst" (refer to the previous Q & A). It requires only one clock for the 2nd, 3rd, and 4th QWord (for example, 5-1-1-1 compares with EDO 5-2-2-2). The SDRAM comes in 64-bit 168-pin DIMM (Dual-in-line Memory Module) and operates at 3.3V. Note that some old DIMMs are made by FPM/EDO and only operate at 5V. Do not confuse them with SDRAM DIMM. AOpen is the first company to support dual-SDRAM DIMMs onboard (AP5V), from Q1 1996.

Q: Can SDRAM DIMM work together with FPM/EDO SIMM?

A: The FPM/EDO operate at 5V while SDRAM operates at 3.3V. The current Motherboard design provides different power to DIMM and SIMM but connects the data bus together. If you combine SIMM and DIMM, the system will still work fine; however, only temporarily. After a few months, the SDRAM 3.3V data input will be damaged by 5V FPM/EDO data output line. Therefore, we strongly NOT recommend DIMM and SIMM combined together. There is one exception, if your SDRAM supports 5V tolerance (such as TI or Samsung), which accepts 5V signal at 3.3V operating power, you can combine them.

Q: What is Bus Master IDE (DMA mode)?

A: The traditional PIO (Programmable I/O) IDE requires the CPU to involve in all the activities of the IDE access including waiting for the mechanical events. To reduce the workload of the CPU, the bus master IDE device transfers data from/to memory without interrupting CPU, and releases CPU to operate concurrently while data is transferring between memory and IDE device. You need the bus master IDE driver and the bus master IDE HDD to support bus master IDE mode. Note that it is different with master/slave mode of the IDE device connection. For more details, refer to section 2.3 "Connectors".

Q: What is the Ultra DMA/33?

A: This is the new specification to improve IDE HDD data transfer rate. Unlike traditional PIO mode, which only uses the rising edge of IDE command signal to transfer data, the DMA/33 uses both rising edge and falling edge. Hence, the data transfer rate is double of the PIO mode 4 or DMA mode 2. (16.6MB/s x2 = 33MB/s).

The 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.

Mode	Clock per 33MHz PCI	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

Mode	Clock per 33MHz PCI	Clock count	Cycle time	Data Transfer rate
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
DMA/33	30ns	4	120ns	(1/120ns) x 2byte x2 = 33MB/s

Q: What is PnP (Plug and Play)?

A: In the past, the IRQ/DMA and memory or I/O space of add-on cards are normally set manually, i.e., by jumper or by proprietary utility. The user has to check the user's guide for the correct setting. Sometimes, resource conflict occurs and this leads to unstable system. The PnP specification suggests a standard register interface for both BIOS and OS (such as Win95). These registers are used by BIOS and OS to configure system resource and prevent any conflicts. The IRQ/DMA/Memory will be automatically allocated by PnP BIOS or OS.

Currently, almost all the PCI cards and most ISA cards are PnP compliant. If you are still using a Legacy ISA card that cannot support PnP, set the corresponding resource (IRQ/DMA/memory) to ISA in the BIOS "PCI/PnP Setup".

Q: Power Management Icon does not appear in the Windows 95 Control Panel even though the APM under BIOS Setup is enabled.

A: This problem occurs if you did not enable the APM function before you install Windows 95. If you have already installed Windows 95, re-install it after the BIOS APM function is enabled.

Q: Why does the system fail to go into suspend mode under Win95?

A: This problem may be caused by your CDROM settings. The CDROM Auto Insert Notification of Win95 is dafault enabled, the system will continue to monitor your CDROM, auto-execute application when a CD diskette is loaded, and prevents the system from entering into suspend mode. To resolve this, go into Control Panel è System è Device Manager è CDROM è Setting, and disable the "Auto Insert Notification" function.

Q: What is Windows 95 Registry?

A: The functions of Windows 95 Registry and the Windows 3.1 INI files are almost the same. Both store the hardware and software configurations. The only difference is that Registry is a database while INI is text file. You can run REGEDIT.EXE to further understand the Registry structure. Checking and studying the structure of this file will help you solve some configuration problems.

Frequently Asked Questions

Q: What is the benefit of using Resetable Fuse?

A: The traditional pico-fuse needs to be replaced once it is burned due to any abnormal surge current. It has to be replaced by qualified repairing engineer which is cost & time consuming. With the updated technology, AOpen motherboard starts to introduce new ?Resetable? fuse, which is ?PolySwitch?, to protect your keyboard & USB circuit. When there is surge current, this PolySwitch will reach high impedance within few m/seconds so that the circuit becomes opened. PolySwitch will be recovered to its original stage after surge current disappeared & the system is being cooled down for a while.

It is highly recommended to adopt ?Resetable? fuse in order to fully support ?Hot-Plug? feature on USB.

Q: How can I eliminate the "?" marks presented under Device Manager after installing Win'95 on TX/LX/BX/5582/5591 based system?

A: Even though your system will work fine with this "?" marks, we received many requests about how to eliminate it. AOpen software team spends few weeks to develop an utility AOchip.exe for the convenience of Win95 users. It is very user friendly and can be used on any TX/LX/BX/5582/5591 chipset based motherboard, not limited to AOpen products. You are welcome to distribute it, if you like it, simply say thanks to our software team. Note that you need USB driver for USB devices to work properly which is expected to be implemented on Windows'98.

Appendix B

Troubleshooting

In case you encounter any of the troubles listed below, follow the procedures accordingly to resolve the problem. If the first corrective action listed did not work, then try the next one.

Tip: *There are many useful information in our homepage, such as jumper settings, latest BIOS, drivers, and more FAQs. Visit our homepage to see if there is answer of your problem.*

Taiwan ***http://www.aopen.com.tw***

USA ***http://www.aopen-usa.com***

http://www.aopenusa.com

http://www.aopenamerica.com

Europe ***http://www.aopen.nl***

Important: *Make sure that you have tried listed procedures in this appendix before you call your distributor. If the problem still exist, fill out the attached* ***Technical Problem Report Form****. Please write down your configuration and error symptoms as detailed as possible. The more detailed information you give us, the faster we can identify and solve your problem. You can copy this form and fax it to your distributor or send the form via e-mail. For getting better efficiency, we don't recommand you report the problem through phone.*

Troubleshooting

No display.

a. Check all jumper settings to make sure that you have set the proper jumpers, especially those for CPU type, single/dual voltage (P54C/MMX), CPU frequency and ratio.

b. Check the power cord or power switch of your system. The simple way to identify power failure is to check the CPU fan and the power supply fan. If these are not working, then the power is down.

c. Is there a short on the motherboard? (Is the fan of the power supply working properly?)

d. Turn off the power and remove all add-on cards, IDE cables and floppy cables from your mainboard. Only install the VGA card to simplify the problem.

e. If you use a PCI VGA card, reinstall it to other PCI slot or try another card.

f. Check if the memory (SIMM/DIMM) were installed properly. Reinstall the SIMM/DIMM to other socket or try another SIMM/DIMM.

g. Make sure the flat cable matches pin1 of IDE connector and your IDE device.

There is display, but can 't enter BIOS Setup.

a. For checking if the keyboard works properly, press the <Num Lock> key to enable/disable the Num Lock function, and check if the LED will ON and OFF accordingly.

b. Check if Turbo Switch was released, don 't use Turbo Switch before system boots. (In fact, there is no Turbo function after Pentium machine. Now Turbo Switch usually acts as Suspend Switch.)

System sometimes auto reboots.

a. Clear CMOS. BIOS will load default setting, use the slowest and most reliable setting.

b. Repeat the steps in "No display" section carefully.

There is display, but can 't boot.

a. Check BIOS Setup if the HDD is set to LBA (more than 540MB) format.

b. Load default setting.

c. Boot system from floppy drive. If pass, the problem should be caused by the IDE cable or HDD itself.

HDD Controller Fail, can't detect HDD.

a. Make sure the Master/Slaver setting for HDD is correct.

b. Check IDE cable or try another HDD.

Mouse/Printer/Floppy is not working properly.

a. Check if Serial/Parallel/Floppy cable was installed properly.

b. If possible, use another peripheral to double check if the mainboard is defective.

Keyboard has no response when system boots, or BIOS shows the message "Keyboard Controller Error ".

a. Press the <Num Lock> key to enable and disable Num Lock function, check if the LED will ON and OFF accordingly.

b. Is the mainboard fuse burned? (Use an multi-meter to check. The fuse is usually located near the keyboard socket. It is usually green and marked as F1,3A/125V.)

COMS data lost, or Battery Low

a. Does the voltage of the onboard battery is lower than 2.5V?

b. Make sure the Clear CMOS jumper is set correctly.

Technical Problem Report Form	
Model Name: **Serial Number:**	
Contact:	**Name:** **TEL:** **FAX:** **Email Address:**
Error Symptom:	
System Configuration: **(Please list model name and version.)**	**OS:** **BIOS:** **CPU:** **SIMM:** **HDD:** **CDROM:** **VGA:** **Sound:** **Modem:** **Others:**

Appendix C

Jumper Table Summary

Setting the CPU Voltage

S4	S5	S6	S7	S8	Vcore
ON	ON	ON	ON	OFF	3.52V
OFF	ON	ON	ON	OFF	3.45V
ON	OFF	ON	ON	OFF	3.3V
OFF	OFF	ON	ON	OFF	3.2V
ON	OFF	OFF	ON	OFF	2.9V
OFF	OFF	OFF	ON	OFF	2.8V
OFF	ON	OFF	OFF	OFF	2.2V
OFF	ON	OFF	ON	ON	1.8V

SW1 is used to select CPU core voltage (Vcore) and ratio, there are totally eight switches on this DIP. After installing a CPU, remember to set the switch 4-8 to specify a proper Vcore.

JP12	I/O Voltage (Vio)
1-2	3.3V (default)
3-4	3.43V

Warning: *Please make sure that you have installed CPU fan properly if Intel PP/MT-233 or AMD K6 CPU is being selected to use. It may cause your system unstable if you can not meet the heat dissipation requirement from above CPU type. It is recommended to adopt larger fan on these CPU for better air flow in the system. Please refer to AOpen's web site (http://www.aopen.com.tw) to choose a proper CPU fan.*

Warning*: If your CPU is IDT C6, note that this processor supports one of two voltage range, 3.135 ~ 3.465V (3.45V) and 3.45 ~ 3.6V (3.52V). See the CPU specification to set the correct voltage.*

CPU	Type	S4	S5	S6	S7	S8	Vcore

Jumper Table Summary

INTEL P54C	Single Voltage	OFF	ON	ON	ON	OFF	3.45V
INTEL MMX P55C	Dual Voltage	OFF	OFF	OFF	ON	OFF	2.8V
AMD K5	Single Voltage	ON	ON	ON	ON	OFF	3.52V
AMD K6-166/200	Dual Voltage	ON	OFF	OFF	ON	OFF	2.9V
AMD K6-233	Dual Voltage	OFF	OFF	ON	ON	OFF	3.2V
AMD K6-266/300	Dual Voltage	OFF	ON	OFF	OFF	OFF	2.2V
Cyrix 6x86	Single Voltage	ON	ON	ON	ON	OFF	3.52V
Cyrix 6x86L	Dual Voltage	OFF	OFF	OFF	ON	OFF	2.8V
Cyrix M2	Dual Voltage	ON	OFF	OFF	ON	OFF	2.9V
IDT C6	Single Voltage	ON ON	ON OFF	ON ON	ON ON	OFF OFF	3.52V 3.3V

Selecting the CPU Frequency

S1	**S2**	**S3**	**CPU Frequency Ratio**
OFF	OFF	OFF	1.5x (3.5x)
ON	OFF	OFF	2x
ON	ON	OFF	2.5x (1.75x)
OFF	ON	OFF	3x
ON	OFF	ON	4x
ON	ON	ON	4.5x
OFF	ON	ON	5x

The ratio of Core/Bus frequency is selected by the switch 1-3 of **SW1**.

JP6	**JP5**	**JP4**	**SDRAM**	**PCI**	**AGP**
2-3	2-3	2-3	60MHz	30MHz	60MHz
1-2	2-3	2-3	66MHz	33MHz	66MHz
2-3	2-3	1-2	75MHz	32MHz	64MHz
1-2	1-2	2-3	75MHz	37MHz	75MHz
1-2	2-3	1-2	83MHz	32MHz	64MHz
2-3	1-2	1-2	90MHz	30MHz	60MHz
1-2	1-2	1-2	100MHz	33MHz	66MHz

Warning: *SIS 5591 chipset supports maximum 83MHz external CPU bus clock, the 90MHz and 100MHz settings are for internal test only, set to 90MHz or 100MHz exceeds the specification of*

5591 chipset, which may cause serious system damage.

Note: *Intel PP/MT MMX 233MHz is using 1.5x jumper setting for 3.5x frequency ratio, and AMD PR166 is using 2.5x setting for 1.75x frequency ratio.*

INTEL Pentium	**CPU Core Frequency**	**Ratio**	**External Bus Clock**	**S1**	**S2**	**S3**	**JP6 & JP5 & JP4**
P54C 90	90MHz =	1.5x	60MHz	OFF	OFF	OFF	2-3 & 2-3 & 2-3
P54C 100	100MHz =	1.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3
P54C 120	120MHz =	2x	60MHz	ON	OFF	OFF	2-3 & 2-3 & 2-3
P54C 133	133MHz =	2x	66MHz	ON	OFF	OFF	1-2 & 2-3 & 2-3
P54C 150	150MHz =	2.5x	60MHz	ON	ON	OFF	2-3 & 2-3 & 2-3
P54C 166	166MHz =	2.5x	66MHz	ON	ON	OFF	1-2 & 2-3 & 2-3
P54C 200	200MHz =	3x	66MHz	OFF	ON	OFF	1-2 & 2-3 & 2-3

INTEL Pentium MMX	**CPU Core Frequency**	**Ratio**	**External Bus Clock**	**S1**	**S2**	**S3**	**JP6 & JP5 & JP4**
PP/MT 150	150MHz =	2.5x	60MHz	ON	ON	OFF	2-3 & 2-3 & 2-3
PP/MT 166	166MHz =	2.5x	66MHz	ON	ON	OFF	1-2 & 2-3 & 2-3
PP/MT 200	200MHz =	3x	66MHz	OFF	ON	OFF	1-2 & 2-3 & 2-3
PP/MT 233	233MHz =	3.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3

AMD K5	**CPU Core Frequency**	**Ratio**	**External Bus Clock**	**S1**	**S2**	**S3**	**JP6 & JP5 & JP4**
PR90	90MHz =	1.5x	60MHz	OFF	OFF	OFF	2-3 & 2-3 & 2-3
PR100	100MHz =	1.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3
PR120	90MHz =	1.5x	60MHz	OFF	OFF	OFF	2-3 & 2-3 & 2-3
PR133	100MHz =	1.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3
PR166	116MHz =	1.75x	66MHz	ON	ON	OFF	1-2 & 2-3 & 2-3

AMD K6	**CPU Core Frequency**	**Ratio**	**External Bus Clock**	**S1**	**S2**	**S3**	**JP6 & JP5 & JP4**
PR2-166	166MHz =	2.5x	66MHz	ON	ON	OFF	1-2 & 2-3 & 2-3
PR2-200	200MHz =	3x	66MHz	OFF	ON	OFF	1-2 & 2-3 & 2-3
PR2-233	233MHz =	3.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3
PR2-266	266MHz=	4x	66MHz	ON	OFF	ON	1-2 & 2-3 & 2-3
PR2-300	300MHz=	4.5x	66MHz	ON	ON	ON	1-2 & 2-3 & 2-3

Jumper Table Summary

Cyrix 6x86 & 6x86L	CPU Core Frequency	Ratio	External Bus Clock	S1	S2	S3	JP6 & JP5 & JP4
P150+	120MHz =	2x	60MHz	ON	OFF	OFF	2-3 & 2-3 & 2-3
P166+	133MHz =	2x	66MHz	ON	OFF	OFF	1-2 & 2-3 & 2-3
P200+	150MHz =	2x	75MHz	ON	OFF	OFF	2-3 & 2-3 & 1-2

Cyrix M2	CPU Core Frequency	Ratio	External Bus Clock	S1	S2	S3	JP6 & JP5 & JP4
MX-PR166	150MHz =	2.5x	60MHz	ON	ON	OFF	2-3 & 2-3 & 2-3
MX-PR200	166MHz =	2.5x	66MHz	ON	ON	OFF	1-2 & 2-3 & 2-3
	150MHz=	2x	75MHz	ON	OFF	OFF	2-3 & 2-3 & 1-2
MX-PR233	200MHz =	3x	66MHz	OFF	ON	OFF	1-2 & 2-3 & 2-3
	166MHz=	2x	83.3MHz	ON	OFF	OFF	1-2 & 2-3 & 1-2
MX-PR266	233MHz =	3.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3
MX-PR300	225MHz =	3x	75MHz	OFF	ON	OFF	2-3 & 2-3 & 1-2
	233MHz =	3.5x	66MHz	OFF	OFF	OFF	1-2 & 2-3 & 2-3
	240MHz =	4x	60MHz	ON	OFF	ON	2-3 & 2-3 & 2-3

IDT C6	CPU Core Frequency	Ratio	External Bus Clock	S1	S2	S3	JP6 & JP5 & JP4
C6-150	150MHz =	2x	75MHz	ON	OFF	OFF	2-3 & 2-3 & 1-2
C6-180	180MHz =	3x	60MHz	OFF	ON	OFF	2-3 & 2-3 & 2-3
C6-200	200MHz =	3x	66MHz	OFF	ON	OFF	1-2 & 2-3 & 2-3
C6-225	225MHz =	3x	75MHz	OFF	ON	OFF	2-3 & 2-3 & 1-2
C6-240	240MHz =	4x	60MHz	ON	OFF	ON	2-3 & 2-3 & 2-3

Clear CMOS

JP14	Clear CMOS
1-2	Normal operation (default)
2-3	Clear CMOS