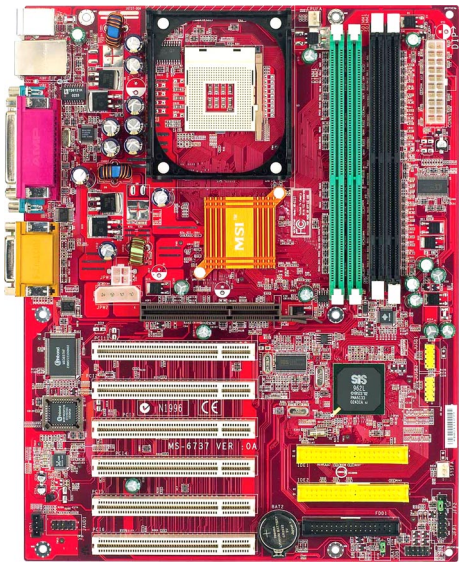
645 Combo

MS-6737 (v1.X) ATX Mainboard



Version 1.0
G52-M6737X1-G22

Manual Rev: 1.0
Release Date: Dec. 2002

CE N1996

FCC-B Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Notice 1
The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Notice 2
Shielded interface cables and A.C. power cord, if any, must be used in order to comply with the emission limits.

VOIR LA NOTICE D'INSTALLATION AVANT DE RACCORDER AU RESEAU.

Micro-Star International MS-6737

FC **Tested to comply with FCC Standard**

For Home or Office Use

Copyright Notice

Trademarks

Revision History

Revision	Revision History	Date
V1.0	First release for PCB 1.X	Dec. 2002

Technical Support

If a problem arises with your system and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor. Alternatively, please try the following help resources for further guidance.

- Visit the MSI website for FAQ, technical guide, BIOS updates, driver updates, and other information: **http://www.msi.com.tw/**
- Contact our technical staff at: **support@msi.com.tw**

Safety Instructions

1. Always read the safety instructions carefully.
2. Keep this User's Manual for future reference.
3. Keep this equipment away from humidity.
4. Lay this equipment on a reliable flat surface before setting it up.
5. The openings on the enclosure are for air convection hence protects the equipment from overheating. DO NOT COVER THE OPENINGS.
6. Make sure the voltage of the power source and adjust properly 110/220V before connecting the equipment to the power inlet.
7. Place the power cord such a way that people can not step on it. Do not place anything over the power cord.
8. Always Unplug the Power Cord before inserting any add-on card or module.
9. All cautions and warnings on the equipment should be noted.
10. Never pour any liquid into the opening that could damage or cause electrical shock.
11. If any of the following situations arises, get the equipment checked by a service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment has not work well or you can not get it work according to User's Manual.
    - The equipment has dropped and damaged.
    - The equipment has obvious sign of breakage.
12. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT UNCONDITIONED, STORAGE TEMPERATURE ABOVE 60^0C (140^0F), IT MAY DAMAGE THE EQUIPMENT.

CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.

CONTENTS

Getting Started

Thank you for choosing the 645 Combo (MS-6737 v1.X) ATX mainboard. The 645 Combo is based on **SiS® 645** & **962L** chipsets for optimal system efficiency. Designed to fit the advanced **Intel® Pentium® 4** processors in 478 pin package, the 645 Combo delivers a high performance and professional desktop platform solution.

Mainboard Specifications

CPU

➤ Supports Intel® Pentium® 4 /Celeron® (Williamette 478/Northwood 478) processors in the 478 pin package.
➤ FSB @ 400MHz, can be auto negotiated to 533MHz through BIOS for better system efficiency.
➤ Supports up to 2.8GHz or higher speed.

Chipset

➤ SiS®645 Chipset (702 BGA)
- High performance host interface 400MHz.
- 64-bit high performance DDR 333/266 memory controller.
- Support AGP 4X/2X interface with fast write transaction.
- High throughput SiS MuTIOL connect to SiS962L MuTIOL Media I/O.

➤ SiS®962L MuTIOL Media I/O (371 BGA)
- Dual IDE ATA 66/100/133 controllers.
- Integrated USB 2.0/1.1 host controller and Fast Ethernet MAC controller.
- Integrated audio controller with AC97 interface.
- Advanced power management and PC2001 compliance.
- Integrated PCI to LPCC bridge.

Main Memory

➤ Supports two 184-pin unbuffered PC2700/PC2100/PC1600 DDR SDRAM or two 168-pin unbuffered PC100/133 SDRAM.
➤ Supports up to 2GB memory size.

Slots

➤ One AGP (Accelerated Graphics Port) slot.
- Supports AGP v2.0 2x/4x.

➤ Six 32-bit Master PCI bus slots (support 3.3v/5v PCI bus interface).

On-Board IDE

➤ Dual IDE controllers on the SiS962L chipset provides IDE HDD/CD-ROM with PIO, Bus Master and Ultra DMA133/100/66 operation modes.
➤ Can connect up to four IDE devices.

On-Board Peripherals

➤ On-Board Peripherals include:

- 1 floppy port supports 2 FDDs with 360K, 720K, 1.2M, 1.44M and 2.88Mbytes
- 2 serial ports (COM A + COM B)
- 1 parallel port supports SPP/EPP/ECP mode
- 1 audio/game port
- 6 USB 2.0 ports (Rear * 2/ Front * 4)
- 1 RJ45 LAN jack (Optional)

Audio

➤ AC'97 link controller integrated in SiS962L.
➤ RealTek ALC650 6-channel audio.
- Compliance with AC'97 v2.2 spec.
- Meets PC2001 audio performance requirement.

LAN (Optional)

➤ SiS962L integrated MAC + RealTek 8201BL PHY.
- Supports 10Mbps and 100Mbps auto-negotiation operation.
- Supports ACPI power management.

BIOS

➤ The mainboard BIOS provides "Plug & Play" BIOS which detects the peripheral devices and expansion cards of the board automatically.
➤ The mainboard provides a Desktop Management Interface (DMI) function which records your mainboard specifications.

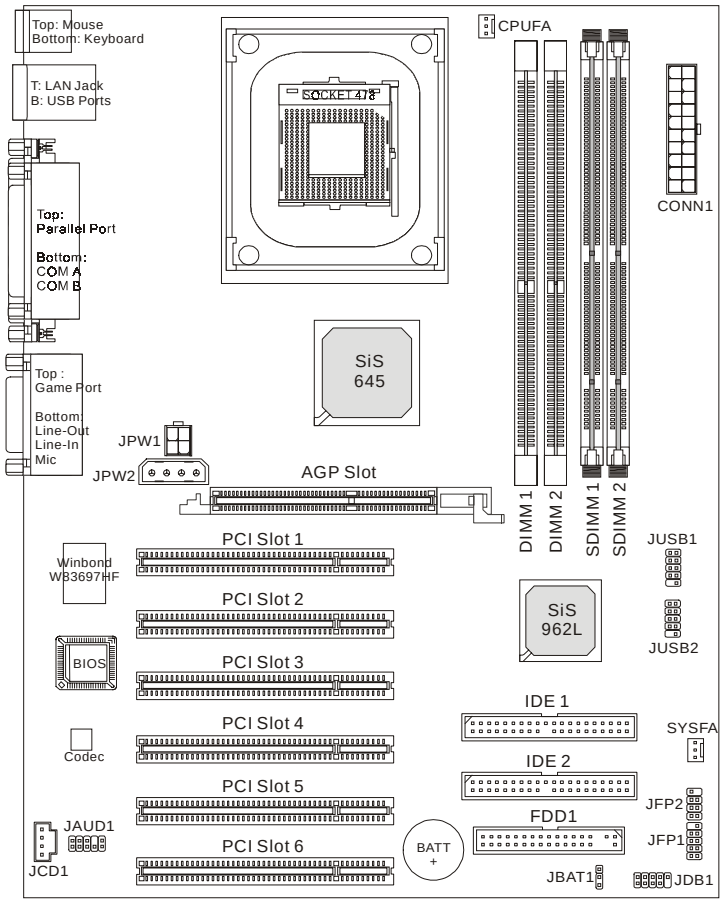
Dimension

➤ ATX Form Factor: 29.5 cm (L) x 23 cm (W).

Mounting

➤ 6 mounting holes.

Mainboard Layout

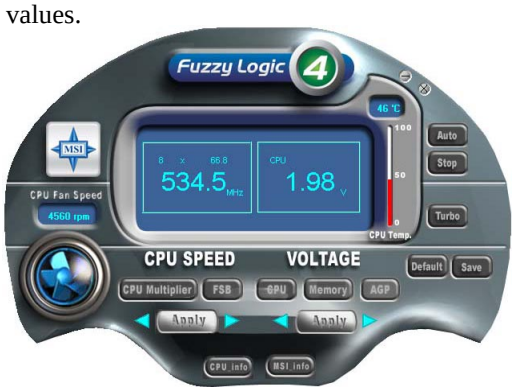


645 Combo (MS-6737 v1.X) ATX Mainboard

MSI Special Features

Fuzzy Logic™ 4

The *Fuzzy Logic™ 4* utility is a user friendly tool that allows users to view and adjust the current system status. To overclock the CPU FSB (Front Side Bus) frequency under the Windows operating system, click ***FSB*** and use the right and left arrow keys to select the desired FSB, and then click ***Apply*** to apply the new setup value. To enable the system running at the specified FSB every time when you click ***Turbo***, click ***Save*** to save the desired FSB first. If you want to know the maximal CPU overclocking value, click ***Auto*** to start testing. The CPU FSB will automatically increase the testing value until the PC reboots. After rebooting, click ***Turbo*** to apply the test result. Click ***Default*** to restore the default values.



Features:

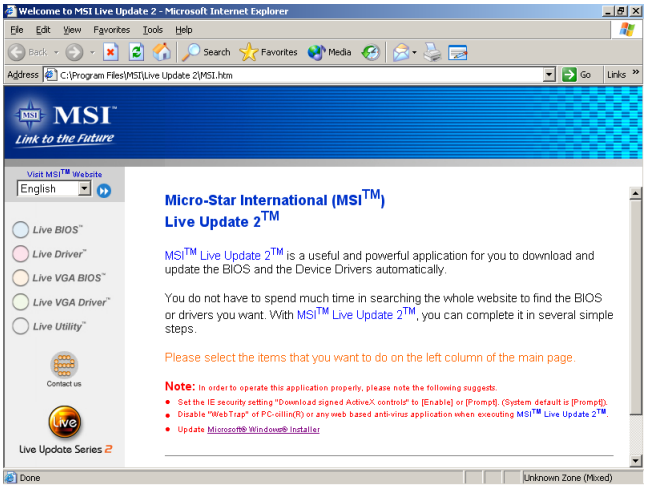
- ✦ MSI Logo — links to the MSI Web site
- ✦ CPU Speed — allows users to adjust the CPU speed through CPU Multiplier and FSB
- ✦ Voltage — allows user to adjust the voltage of CPU/Memory/AGP
- ✦ MSI Info — provides information about the mainboard, BIOS and OS
- ✦ CPU Info — provides detailed information about the CPU
- ✦ CPU Fan Speed — shows the current running speed of CPU Fan
- ✦ CPU Temp. — shows the current CPU temperature

MSI Reminds You...
*To adjust the options under **CPU Speed** and **Voltage**, use the right and left arrow keys to select the desired value and then click **Apply** to run the setup value.*

Live BIOS™/Live Driver™

The Live BIOS™/Live Driver™ is a tool used to detect and update your BIOS/drivers online so that you don't need to search for the correct BIOS/driver version throughout the Web site. To use the function, you need to install the "MSI Live Update 2" application. After installation, the "MSI Live Update 2" icon (as shown on the right) will appear on the screen.

Double click the "MSI Live Update 2" icon, and the following screen will appear:



Five buttons are placed on the leftmost pane of the screen. Click the desired button to start the update process.

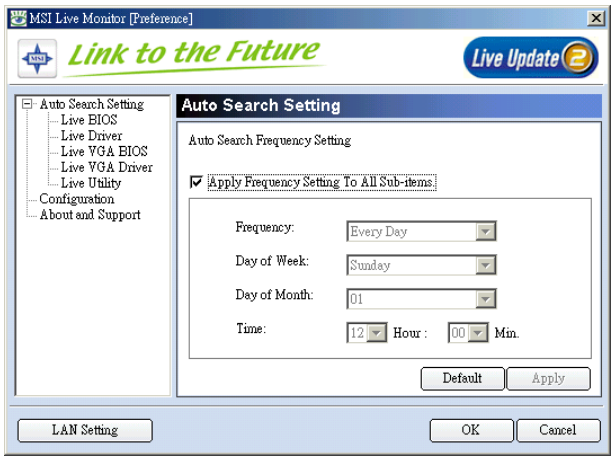
- **Live BIOS** – Updates the BIOS online.
- **Live Driver** – Updates the drivers online.
- **Live VGA BIOS** – Updates the VGA BIOS online.
- **Live VGA Driver** – Updates the VGA driver online.
- **Live Utility** – Updates the utilities online.

If the product you purchased does not support any of the functions listed above, a "sorry" message is displayed. For more information on the update instructions, insert the companion CD and refer to the "Live Update Guide" under the "Manual" Tab.

Live Monitor™

The Live Monitor™ is a tool used to schedule the search for the latest BIOS/drivers version on the MSI Web site. To use the function, you need to install the "MSI Live Update 2" application. After installation, the "MSI Live Monitor" icon (as shown on the right) will appear on the screen. Double click this icon to run the application.

Double click the "MSI Live Monitor" icon  at the lower-right corner of the taskbar, and the following dialog box will appear. You can specify how often the system will automatically search for the BIOS/drivers version, or change the LAN settings right from the dialog box.



You can right-click the MSI Live Monitor icon  to perform the functions listed below:

- **Auto Search** – Searches for the BIOS/drivers version you need immediately.
- **View Last Result** – Allows you to view the last search result if there is any.
- **Preference** – Configures the Search function, including the Search schedule.
- **Exit** – Exits the Live Monitor™ application.
- **FAQ** – Provides a link to a database which contents various possible questions about MSI's products for users to inquire.

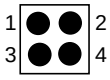
D-Bracket™ 2 (Optional)

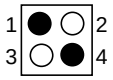
D-Bracket™ 2 is an external USB bracket integrating four Diagnostic LEDs, which use graphic signal display to help users understand their system. The LEDs provide up to 16 combinations of signals to debug the system. The 4 LEDs can debug all problems that fail the system, such as VGA, RAM or other failures. This special feature is very useful for the overclocking users. These users can use the feature to detect if there are any problems or failures.

D-Bracket™ 2 supports both USB 1.1 & 2.0 spec.

D-Bracket™ 2

● **Red** ○ **Green**

D-Bracket™2	Description
	System Power ON - The D-LED will hang here if the processor is damaged or not installed properly.
	Early Chipset Initialization
	Memory Detection Test - Testing onboard memory size. The D-LED will hang if the memory module is damaged or not installed properly.
	Decompressing BIOS image to RAM for fast booting.
	Initializing Keyboard Controller.
	Testing VGA BIOS - This will start writing VGA sign-on message to the screen.

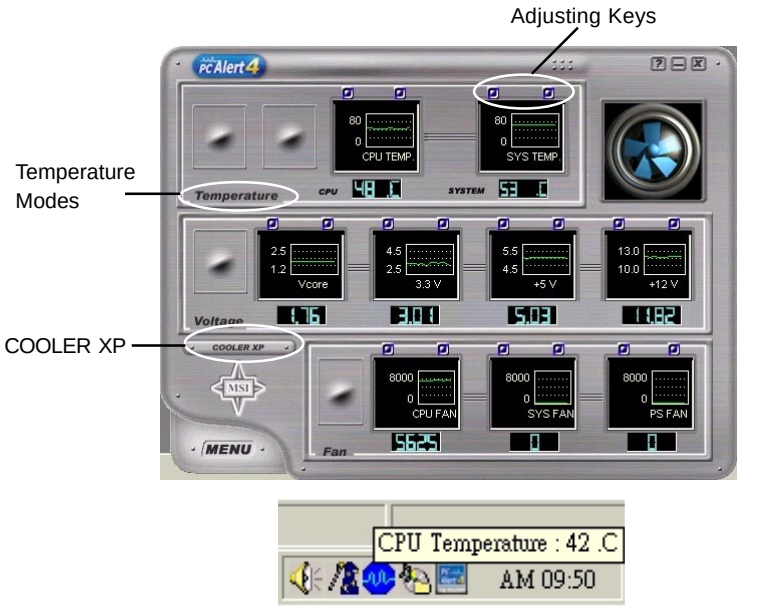
D-Bracket™2	Description
	Processor Initialization - This will show information regarding the processor (like brand name, system bus, etc…)
	Testing RTC (Real Time Clock)
	Initializing Video Interface - This will start detecting CPU clock, checking type of video onboard. Then, detect and initialize the video adapter.
	BIOS Sign On - This will start showing information about logo, processor brand name, etc….
	Testing Base and Extended Memory - Testing base memory from 240K to 640K and extended memory above 1MB using various patterns.
	Assign Resources to all ISA.
	Initializing Hard Drive Controller - This will initialize IDE drive and controller.
	Initializing Floppy Drive Controller - This will initializing Floppy Drive and controller.
	Boot Attempt - This will set low stack and boot via INT 19h.
	Operating System Booting

PC Alert™ 4

The PC Alert™ 4 is a utility you can find in the CD-ROM disk. The utility is just like your PC doctor that can detect the following PC hardware status during real time operation:

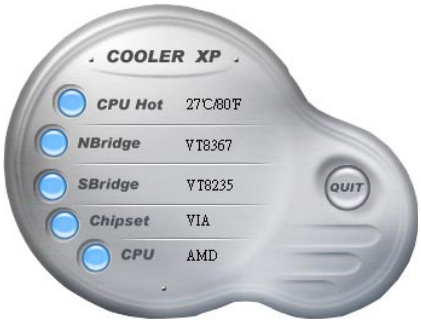
- ✦ monitor CPU & system temperatures
- ✦ monitor fan speeds
- ✦ monitor system voltages

If one of the items above is abnormal, the program main screen will be immediately shown on the screen, with the abnormal item highlighted in red. This will continue to be shown until the condition returns to the normal status.



Users can use the Adjusting Keys to change the minimum and maximum threshold of each item for the system to send out a warning message. Click *Temperature* to select the temperature modes of either Fahrenheit (°F) or Celsius (°C). The PC Alert™ 4 icon on the Status Area will show the current CPU temperature.

To better protect the CPU from overheating, a new feature, **COOLER XP**, has been added to decrease the temperature of AMD Athlon™ XP CPU. To do so, simply click **COOLER XP** and the screen will show the **Cute** skin (as shown below) with information about the CPU and chipset. Right-click the mouse to select the skin you want to switch to.



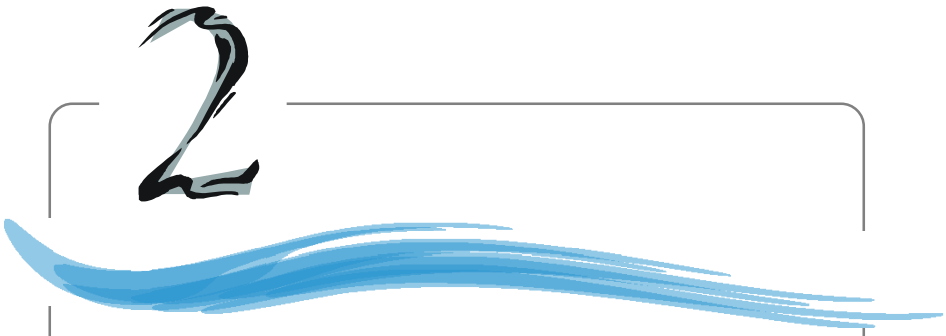
Cute

MSI Reminds You...

*1. The new feature **COOLER XP** will work only if your mainboard supports AMD Athlon XP CPU.*

2. Items shown on PC Alert 4 vary depending on your system's status.

3. Whenever the minimum or maximum threshold of each item has been changed, please close the PC Alert 4 program for the new settings to take effect.

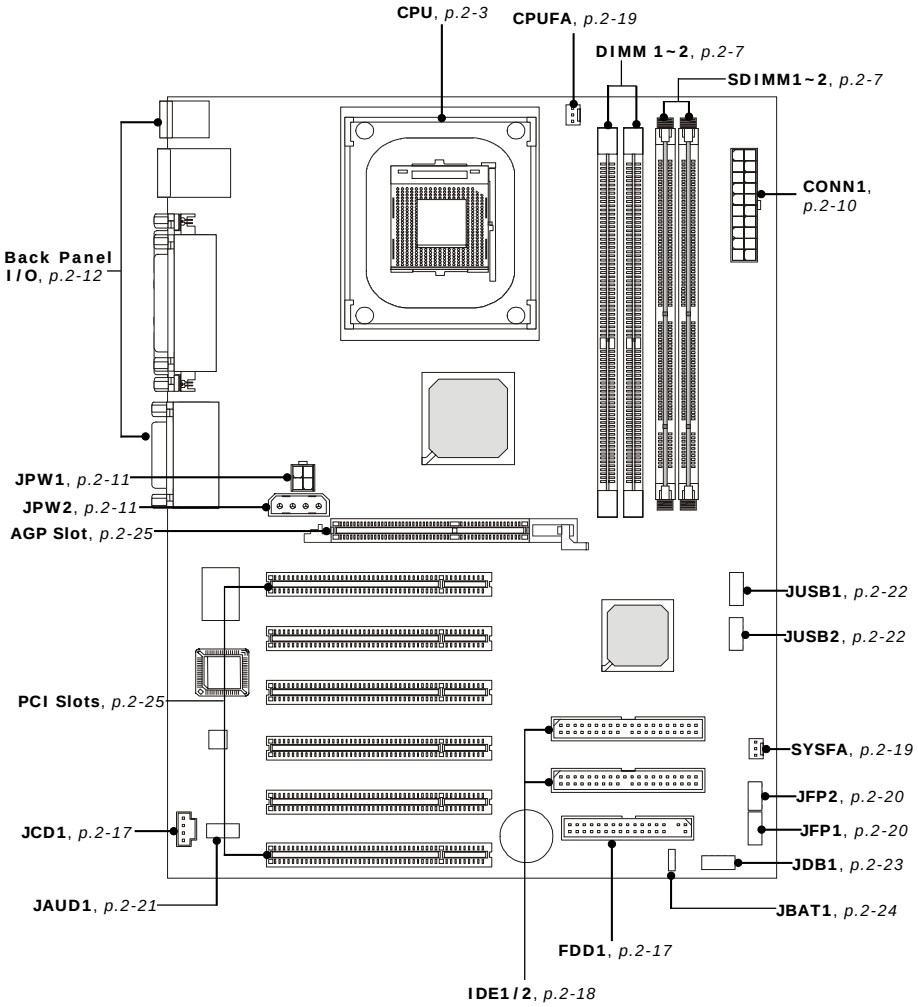


Hardware Setup

This chapter provides you with the information about hardware setup procedures. While doing the installation, be careful in holding the components and follow the installation procedures. For some components, if you install in the wrong orientation, the components will not work properly.

Use a grounded wrist strap before handling computer components. Static electricity may damage the components.

Quick Components Guide



Central Processing Unit: CPU

The mainboard supports Intel® Pentium® 4 processors in the 478 pin package. The mainboard uses a CPU socket called PGA478 for easy CPU installation. When you are installing the CPU, **make sure the CPU has a heat sink and a cooling fan attached on the top to prevent overheating.** If you do not find the heat sink and cooling fan, contact your dealer to purchase and install them before turning on the computer.

CPU Core Speed Derivation Procedure

If	CPU Clock	=	100MHz
	Core/Bus ratio	=	14
then	CPU core speed	=	Host Clock x Core/Bus ratio
		=	100MHz x 14
		=	1.4 GHz

MSI Reminds You...

Overheating

Overheating will seriously damage the CPU and system, always make sure the cooling fan can work properly to protect the CPU from overheating.

Replacing the CPU

While replacing the CPU, always turn off the ATX power supply or unplug the power supply's power cord from grounded outlet first to ensure the safety of CPU.

Overclocking

This motherboard is designed to support overclocking. However, please make sure your components are able to tolerate such abnormal setting, while doing overclocking. Any attempt to operate beyond product specifications is not recommended. ***We do not guarantee the damages or risks caused by inadequate operation or beyond product specifications.***

CPU Installation Procedures for Socket 478

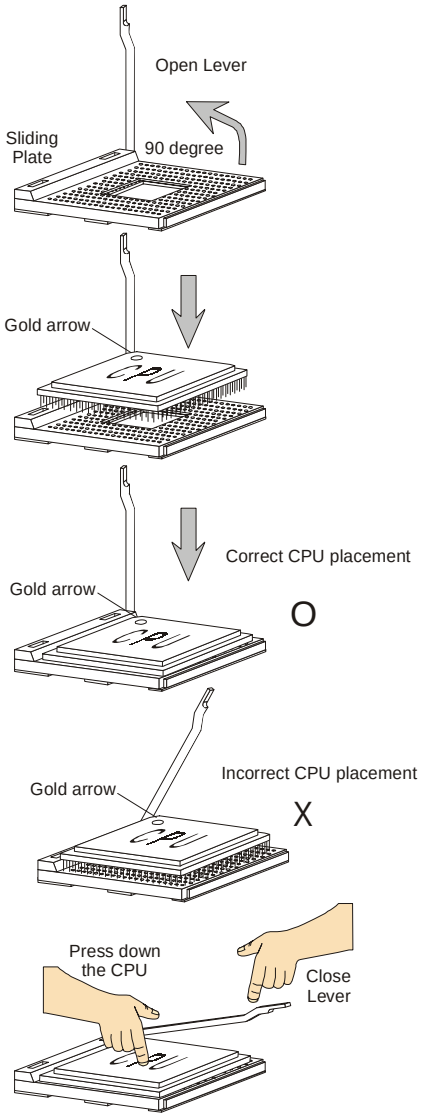
1. Please turn off the power and unplug the power cord before installing the CPU.

2. Pull the lever sideways away from the socket. Make sure to raise the lever up to a 90-degree angle.

3. Look for the gold arrow. The gold arrow should point towards the lever pivot. The CPU can only fit in the correct orientation.

4. If the CPU is correctly installed, the pins should be completely embedded into the socket and can not be seen. Please note that any violation of the correct installation procedures may cause permanent damages to your mainboard.

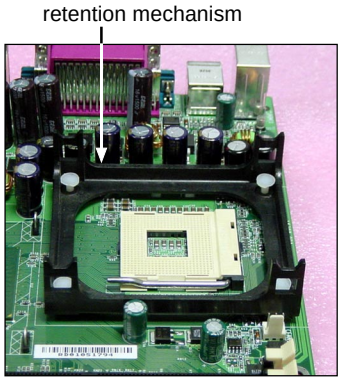
5. Press the CPU down firmly into the socket and close the lever. As the CPU is likely to move while the lever is being closed, always close the lever with your fingers pressing tightly on top of the CPU to make sure the CPU is properly and completely embedded into the socket.



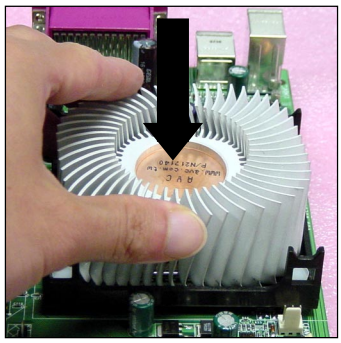
Installing the CPU Fan

As processor technology pushes to faster speeds and higher performance, thermal management becomes increasingly important. To dissipate heat, you need to attach the CPU cooling fan and heatsink on top of the CPU. Follow the instructions below to install the Heatsink/Fan:

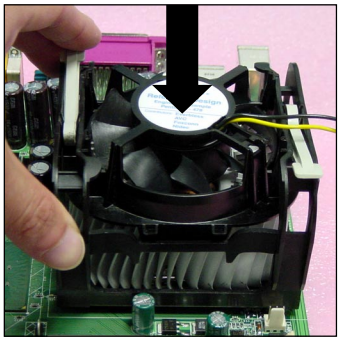
1. Locate the CPU and its retention mechanism on the motherboard.



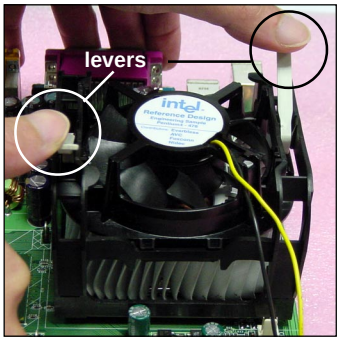
2. Position the heatsink onto the retention mechanism.



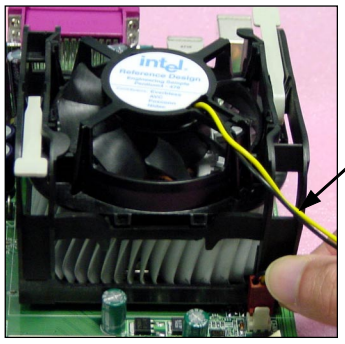
3. Mount the fan on top of the heatsink. Press down the fan until its four clips get wedged in the holes of the retention mechanism.



4. Press the two levers down to fasten the fan. Each lever can be pressed down in only ONE direction.



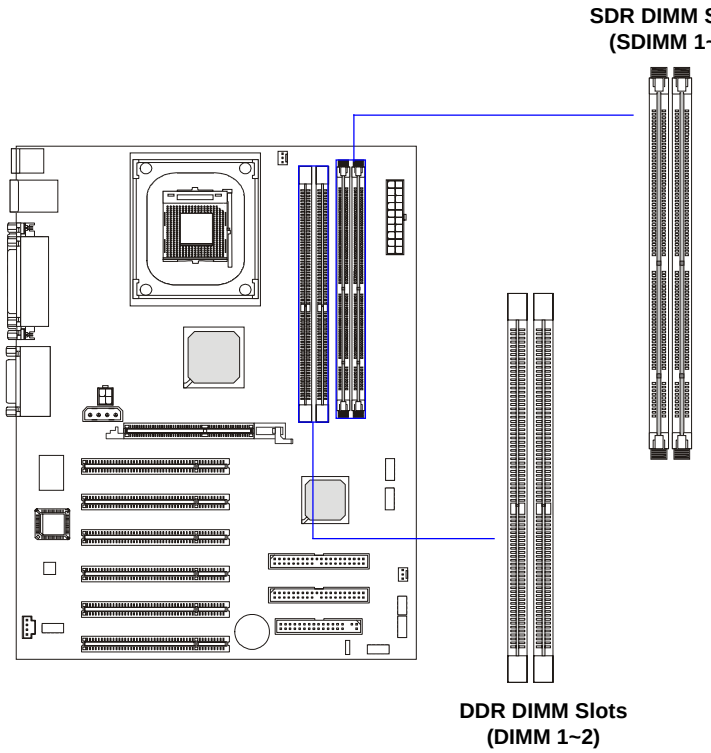
5. Connect the fan power cable from the mounted fan to the 3-pin fan power connector on the board.



NOTES

Memory

The mainboard provides two 184-pin unbuffered PC2700/PC2100/ PC1600 DDR SDRAM or two 168-pin unbuffered PC100/133 SDRAM and supports the memory size up to 2GB. To operate properly, at least one DIMM module must be installed.



MSI Reminds You...

Make sure that you install ***only one type of memory modules (either SDR or DDR) at one time****. DO NOT install both types at the same time. For security reason, the system will automatically power off if you simultaneously install SDR & DDR memory modules onboard.*

DDR Module Combination

Install at least one DIMM module on the slots. Memory modules can be installed on the slots in any order. You can install either single- or double-sided modules to meet your own needs.

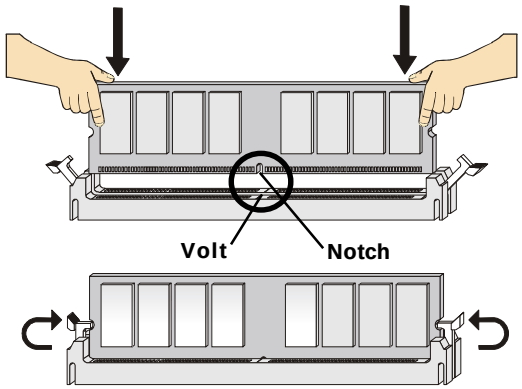
Memory modules can be installed in any combination as follows:

Slot	Memory Module	Total Memory
DDR 1 (Bank 0 & 1)	S/D	64MB~1GB
DDR 2 (Bank 2 & 3)	S/D	64MB~1GB
Maximum System Memory Supported		64MB~2GB

S: Single Side **D: Double Side**

Installing DDR Modules

1. The DDR DIMM has only one notch on the center of module. The module will only fit in the right orientation.
2. Insert the DIMM memory module vertically into the DIMM slot. Then push it in until the golden finger on the memory module is deeply inserted in the socket.
3. The plastic clip at each side of the DIMM slot will automatically close.



MSI Reminds You...

You can barely see the golden finger if the module is properly inserted in the socket.

SDR Module Combination

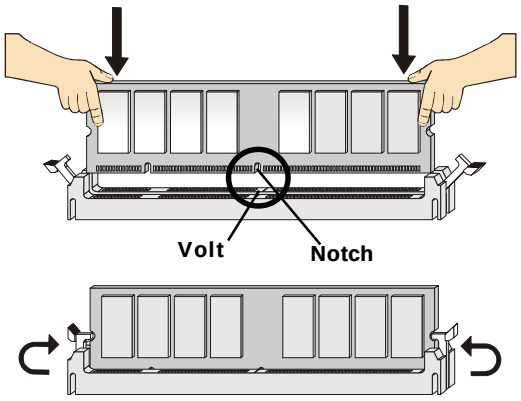
At least one DIMM module should be installed on the motherboard. Memory modules can be installed on the slots in any order. The single-/double-sided memory modules that each DIMM slot supports are listed as below:

Slot	Memory Module	Total Memory
DIMM 1 (Bank 0 & 1)	S/D	64MB~1GB
DIMM 2 (Bank 2 & 3)	S/D	64MB~1GB
Maximum System Memory Supported		64MB~2GB

S: Single Side **D: Double Side**

Installing SDR Modules

1. The SDR DIMM slot has 2 Notch Keys "VOLT and DRAM", so the DIMM memory module can only fit in one direction.
2. Insert the DIMM memory module vertically into the DIMM slot. Then push it in.
3. The plastic clip at each side of the DIMM slot will automatically close.



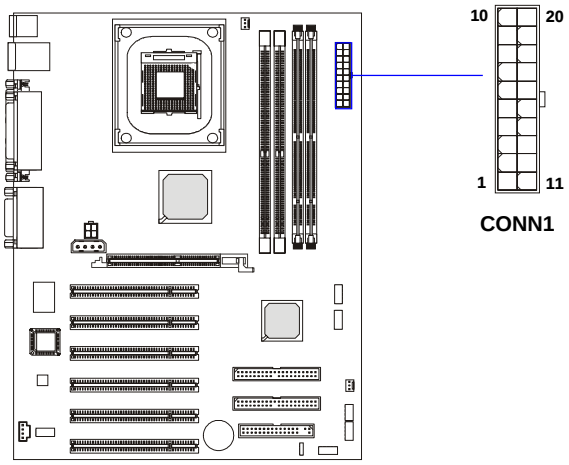
MSI Reminds You...
You can barely see the golden finger if the module is properly inserted in the socket.

Power Supply

The mainboard supports ATX power supply for the power system. Before inserting the power supply connector, always make sure that all components are installed properly to ensure that no damage will be caused.

ATX 20-Pin Power Connector: CONN1

This connector allows you to connect to an ATX power supply. To connect to the ATX power supply, make sure the plug of the power supply is inserted in the proper orientation and the pins are aligned. Then push down the power supply firmly into the connector.



CONN1 Pin Definition

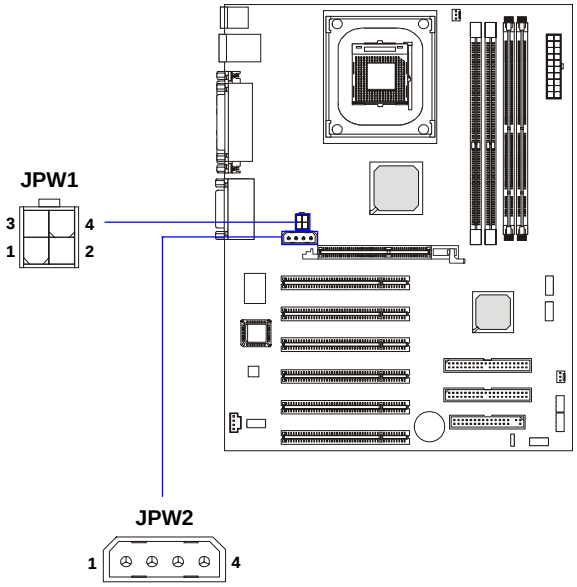
PIN	SIGNAL	PIN	SIGNAL
1	3.3V	11	3.3V
2	3.3V	12	-12V
3	GND	13	GND
4	5V	14	PS_ON
5	GND	15	GND
6	5V	16	GND
7	GND	17	GND
8	PW_OK	18	-5V
9	5V_SB	19	5V
10	12V	20	5V

ATX 12V Power Connector: JPW1

This 12V power connector is used to provide power to the CPU.

ATX 5V/12V Power Connector: JPW2

This 5V/12V power connector is used to provide power to the components on the mainboard.



JPW1 Pin Definition

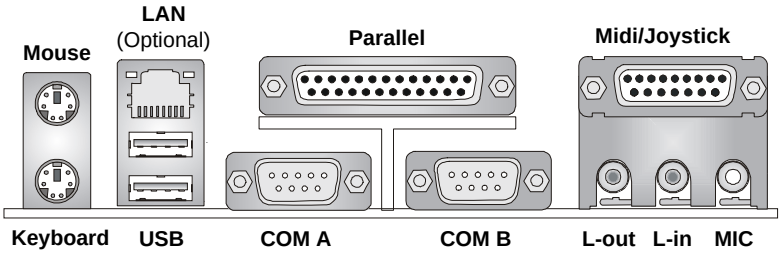
PIN	SIGNAL
1	GND
2	GND
3	12V
4	12V

JPW2 Pin Definition

PIN	SINGAL
1	5V
2	GND
3	GND
4	12V

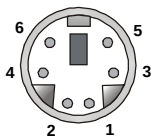
Back Panel

The back panel provides the following connectors:



Mouse Connector

The mainboard provides a standard PS/2® mouse mini DIN connector for attaching a PS/2® mouse. You can plug a PS/2® mouse directly into this connector. The connector location and pin assignments are as follows:



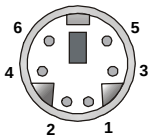
PS/2 Mouse (6-pin Female)

Pin Definition

PIN	SIGNAL	DESCRIPTION
1	Mouse DATA	Mouse DATA
2	NC	No connection
3	GND	Ground
4	VCC	+5V
5	Mouse Clock	Mouse clock
6	NC	No connection

Keyboard Connector

The mainboard provides a standard PS/2® keyboard mini DIN connector for attaching a PS/2® keyboard. You can plug a PS/2® keyboard directly into this connector.



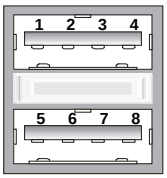
PS/2 Keyboard (6-pin Female)

Pin Definition

PIN	SIGNAL	DESCRIPTION
1	Keyboard DATA	Keyboard DATA
2	NC	No connection
3	GND	Ground
4	VCC	+5V
5	Keyboard Clock	Keyboard clock
6	NC	No connection

USB Connectors

The mainboard provides a OHCI (Open Host Controller Interface) Universal Serial Bus root for attaching USB devices such as keyboard, mouse or other USB-compatible devices. You can plug the USB device directly into the connector.



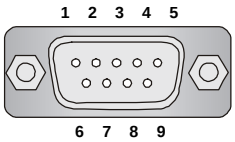
USB Ports

USB Port Description

PIN	SIGNAL	DESCRIPTION
1	VCC	+5V
2	-Data 0	Negative Data Channel 0
3	+Data0	Positive Data Channel 0
4	GND	Ground
5	VCC	+5V
6	-Data 1	Negative Data Channel 1
7	+Data 1	Positive Data Channel 1
8	GND	Ground

Serial Port Connectors: COM A & COM B

The mainboard offers two 9-pin male DIN connectors as serial port COM A & COM B. The ports are 16550A high speed communication ports that send/receive 16 bytes FIFOs. You can attach a serial mouse or other serial devices directly to the connectors.



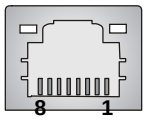
9-Pin Male DIN Connector

Pin Definition

PIN	SIGNAL	DESCRIPTION
1	DCD	Data Carry Detect
2	SIN	Serial In or Receive Data
3	SOUT	Serial Out or Transmit Data
4	DTR	Data Terminal Ready)
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicate

RJ-45 LAN Jack (Optional)

The mainboard provides one standard RJ-45 jack for connection to Local Area Network (LAN). You can connect a network cable to the LAN jack.



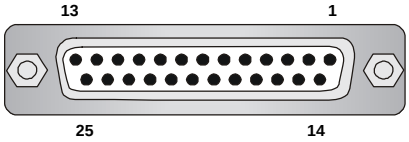
RJ-45 LAN Jack

Pin Definition

PIN	SIGNAL	DESCRIPTION
1	TDP	Transmit Differential Pair
2	TDN	Transmit Differential Pair
3	RDP	Receive Differential Pair
4	NC	Not Used
5	NC	Not Used
6	RDN	Receive Differential Pair
7	NC	Not Used
8	NC	Not Used

Parallel Port Connector: LPT1

The mainboard provides a 25-pin female centronic connector as LPT. A parallel port is a standard printer port that supports Enhanced Parallel Port (EPP) and Extended Capabilities Parallel Port (ECP) mode.

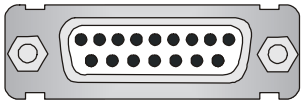


Pin Definition

PIN	SIGNAL	DESCRIPTION
1	STROBE	Strobe
2	DATA0	Data0
3	DATA1	Data1
4	DATA2	Data2
5	DATA3	Data3
6	DATA4	Data4
7	DATA5	Data5
8	DATA6	Data6
9	DATA7	Data7
10	ACK#	Acknowledge
11	BUSY	Busy
12	PE	Paper End
13	SELECT	Select
14	AUTO FEED#	Automatic Feed
15	ERR#	Error
16	INIT#	Initialize Printer
17	SLIN#	Select In
18	GND	Ground
19	GND	Ground
20	GND	Ground
21	GND	Ground
22	GND	Ground
23	GND	Ground
24	GND	Ground
25	GND	Ground

Joystick/Midi Connector

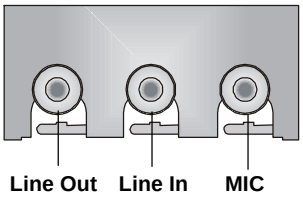
You can connect a joystick or game pad to this connector.



Audio Port Connectors

Line Out is a connector for Speakers or Headphones. **Line In** is used for external CD player, Tape player, or other audio devices. **Mic** is a connector for microphones.

1/8" Stereo Audio Connectors



MSI Reminds You...

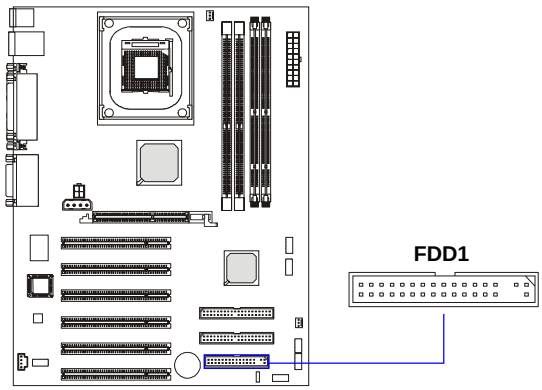
*For advanced audio application, RealTek ALC650 audio chip is provided to offer support for **6-channel audio operation** and can turn rear audio connectors from 2-channel to 4-/6-channel audio. For more information on **6-channel audio operation**, please refer to Appendix. Using 4- or 6-Channel Audio Function.*

Connectors

The mainboard provides connectors to connect to FDD, IDE HDD, case, audio, LAN, USB Ports, and CPU/System fans.

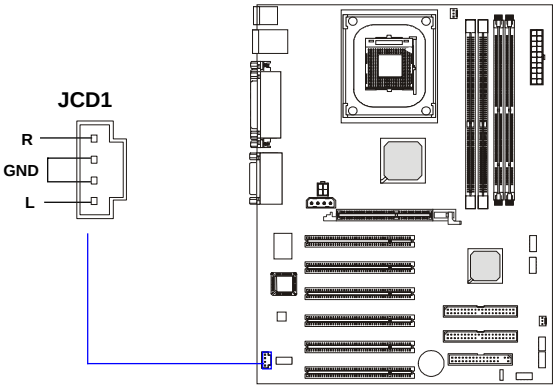
Floppy Disk Drive Connector: FDD1

The mainboard provides a standard floppy disk drive connector that supports 360K, 720K, 1.2M, 1.44M and 2.88M floppy disk types.



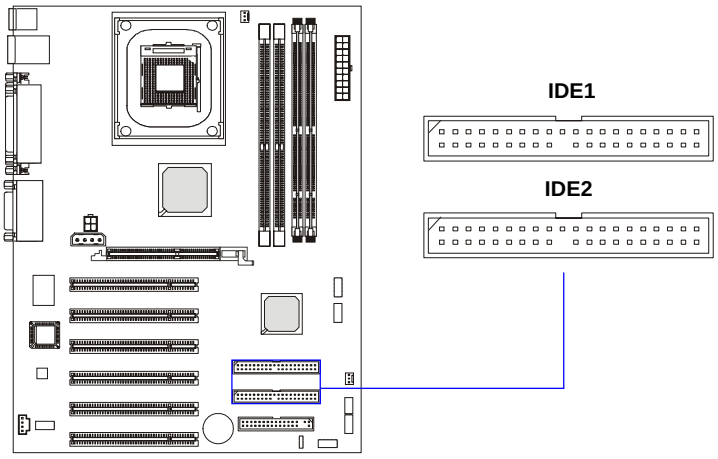
CD-In Connector: JCD1

This connector is for connection to CD-ROM audio.



Hard Disk Connectors: IDE1/IDE2

The mainboard has a 32-bit Enhanced PCI IDE and Ultra DMA 33/66/100/133 controller that provides PIO mode 0~4, Bus Master, and Ultra DMA 33/66/100/133 function. You can connect up to four hard disk drives, CD-ROM, 120MB Floppy (reserved for future BIOS) and other devices. These connectors support the provided IDE hard disk cable.



IDE1 (Primary IDE Connector)

The first hard drive should always be connected to IDE1. IDE1 can connect a Master and a Slave drive. You must configure second hard drive to Slave mode by setting the jumper accordingly.

IDE2 (Secondary IDE Connector)

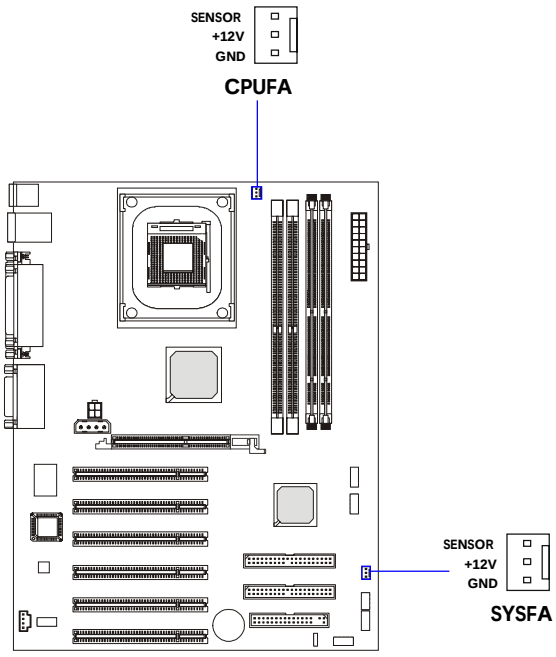
IDE2 can also connect a Master and a Slave drive.

MSI Reminds You...

If you install two hard disks on cable, you must configure the second drive to Slave mode by setting its jumper. Refer to the hard disk documentation supplied by hard disk vendors for jumper setting instructions.

Fan Power Connectors: CPUFA/SYSFA

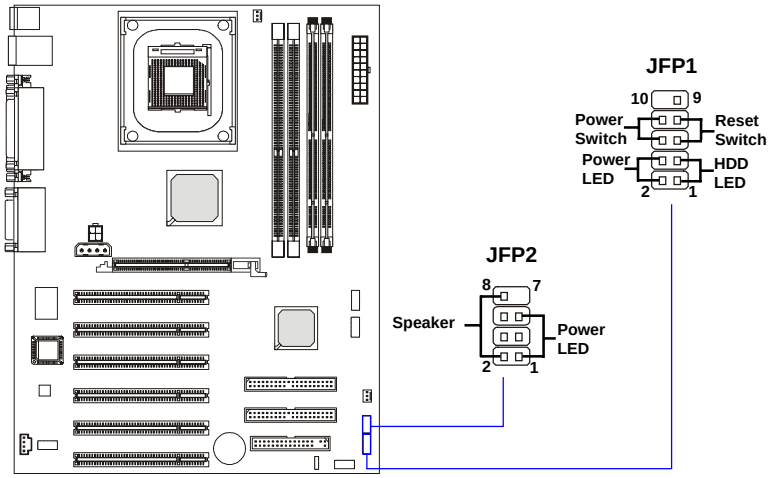
The CPUFA (processor fan) & SYSFA (system fan) support system cooling fan with +12V. It supports three-pin head connector. When connecting the wire to the connectors, always take note that the red wire is the positive and should be connected to the +12V, the black wire is Ground and should be connected to GND. If the mainboard has a System Hardware Monitor chipset on-board, you must use a specially designed fan with speed sensor to take advantage of the CPU fan control.



MSI Reminds You...
Always consult the vendors for proper CPU cooling fan.

Front Panel Connectors: JFP1/JFP2

The mainboard provides two front panel connectors for electrical connection to the front panel switches and LEDs. JFP1 is compliant with Intel® Front Panel I/O Connectivity Design Guide.



JFP1 Pin Definition

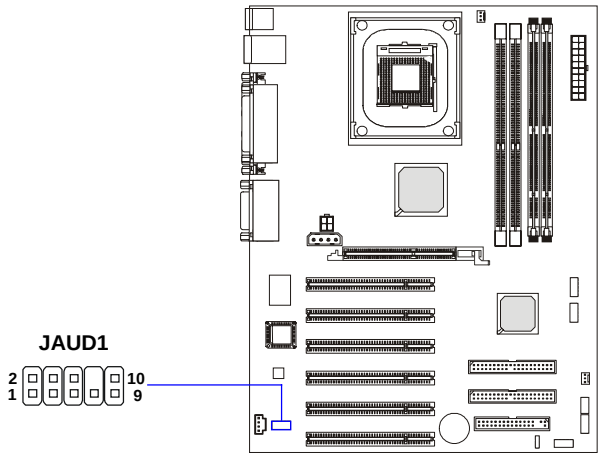
PIN	SIGNAL	DESCRIPTION
1	HD_LED_P	Hard disk LED pull-up
2	FP PWR/SLP	MSG LED pull-up
3	HD_LED_N	Hard disk active LED
4	FP PWR/SLP	MSG LED pull-up
5	RST_SW_N	Reset Switch low reference pull-down to GND
6	PWR_SW_P	Power Switch high reference pull-up
7	RST_SW_P	Reset Switch high reference pull-up
8	PWR_SW_N	Power Switch low reference pull-down to GND
9	RSVD_DNU	Reserved. Do not use.

JFP2 Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	GND	2	SPK-
3	SLED	4	BUZ+
5	PLED	6	BUZ-
7	NC	8	SPK+

Front Panel Audio Connector: JAUD1

The JAUD1 front panel audio connector allows you to connect to the front panel audio and is compliant with Intel® Front Panel I/O Connectivity Design Guide.

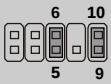


Pin Definition

PIN	SIGNAL	DESCRIPTION
1	AUD_MIC	Front panel microphone input signal
2	AUD_GND	Ground used by analog audio circuits
3	AUD_MIC_BIAS	Microphone power
4	AUD_VCC	Filtered +5V used by analog audio circuits
5	AUD_FPOUT_R	Right channel audio signal to front panel
6	AUD_RET_R	Right channel audio signal return from front panel
7	HP_ON	Reserved for future use to control headphone amplifier
8	KEY	No pin
9	AUD_FPOUT_L	Left channel audio signal to front panel
10	AUD_RET_L	Left channel audio signal return from front panel

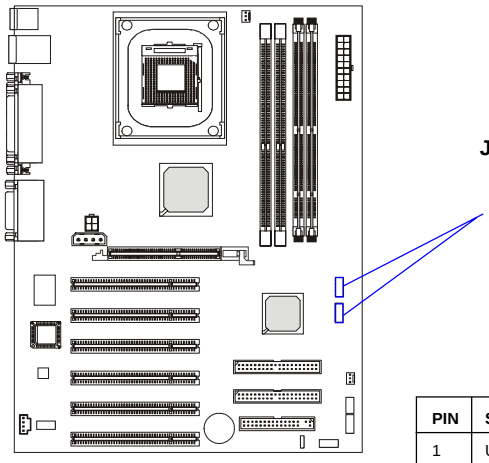
MSI Reminds You...

If you don't want to connect to the front audio header, pins 5 & 6, 9 & 10 have to be jumpered in order to have signal output directed to the rear audio ports. Otherwise, the Line-Out connector on the back panel will not function.



Front USB Connectors: JUSB1/JUSB2

The mainboard provides two USB 2.0 pin headers *JUSB1* & *JUSB2* (optional USB 2.0 bracket available) that are compliant with Intel® I/O Connectivity Design Guide. USB 2.0 technology increases data transfer rate up to a maximum throughput of 480Mbps, which is 40 times faster than USB 1.1, and is ideal for connecting high-speed USB interface peripherals such as **USB HDD**, **digital cameras**, **MP3 players**, **printers**, **modems and the like**.

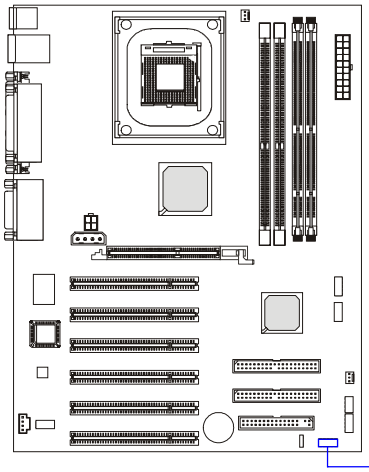


JUSB1/2 Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	USBPWR	2	USBPWR
3	USBP2-	4	USBP3-
5	USBP2+	6	USBP3+
7	GND	8	GND
9	NC	10	USBOC

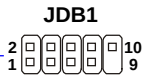
D-Bracket™ 2 Connector: JDB1

The mainboard comes with a JDB1 connector for you to connect to D-Bracket™ 2. D-Bracket™ 2 is a USB Bracket that supports both USB1.1 & 2. 0 spec. It integrates four LEDs and allows users to identify system problem through 16 various combinations of LED signals. For definitions of 16 signal combinations, please refer to *D-Bracket™ 2 (Optional)* in *Chapter 1*.



Pin Definition

Pin	Signal
1	DBG1 (high for green color)
2	DBR1 (high for red color)
3	DBG2 (high for green color)
4	DBR2 (high for red color)
5	DBG3 (high for green color)
6	DBR3 (high for red color)
7	DBG4 (high for green color)
8	DBR4 (high for red color)
9	Key
10	NC

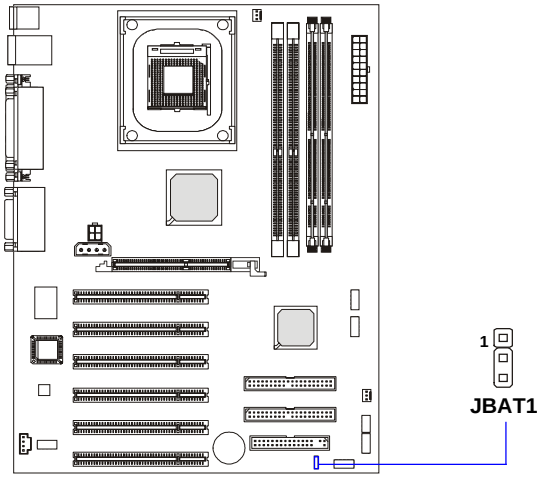


Jumpers

The motherboard provides the following jumpers for you to set the computer's function. This section will explain how to change your motherboard's function through the use of jumpers.

Clear CMOS Jumper: JBAT1

There is a CMOS RAM on board that has a power supply from external battery to keep the data of system configuration. With the CMOS RAM, the system can automatically boot OS every time it is turned on. If you want to clear the system configuration, use the JBAT1 (Clear CMOS Jumper) to clear data. Follow the instructions below to clear the data:

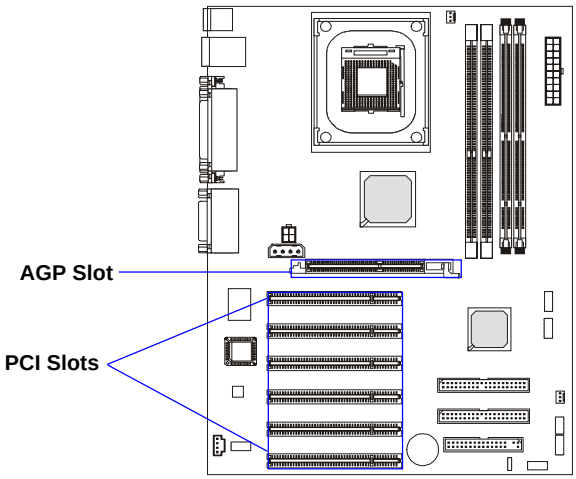


MSI Reminds You...

You can clear CMOS by shorting 2-3 pin while the system is off. Then return to 1-2 pin position. Avoid clearing the CMOS while the system is on; it will damage the mainboard.

Slots

The motherboard provides one AGP slot and six 32-bit Master PCI bus slots.



AGP (Accelerated Graphics Port) Slot

The AGP Pro slot allows you to insert the AGP graphics card. AGP is an interface specification designed for the throughput demands of 3D graphics. It introduces a 66MHz, 32-bit channel for the graphics controller to directly access main memory.

PCI (Peripheral Component Interconnect) Slots

The PCI slots allow you to insert the expansion cards to meet your needs. When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to make any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.

PCI Interrupt Request Routing

The IRQ, acronym of interrupt request line and pronounced I-R-Q, are hardware lines over which devices can send interrupt signals to the microprocessor. The PCI IRQ pins are typically connected to the PCI bus INT A# ~ INT D# pins as follows:

	Order 1	Order 2	Order 3	Order 4
PCI Slot 1	INT B#	INT C#	INT D#	INT A#
PCI Slot 2	INT C#	INT D#	INT A#	INT B#
PCI Slot 3	INT D#	INT A#	INT B#	INT C#
PCI Slot 4	INT A#	INT B#	INT C#	INT D#
PCI Slot 5	INT B#	INT C#	INT D#	INT A#
PCI Slot 6	INT C#	INT D#	INT A#	INT B#

BIOS Setup

This chapter provides information on the BIOS Setup program and allows you to configure the system for optimum use. You may need to run the Setup program when:

- An error message appears on the screen during the system booting up, and requests you to run SETUP.
- You want to change the default settings for customized features.

Entering Setup

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <DEL> key to enter Setup.

DEL:Setup F11:Boot Menu F12:Network boot TAB:Logo

If the message disappears before you respond and you still wish to enter Setup, restart the system by turning it OFF and On or pressing the RESET button. You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

Selecting the First Boot Device

You are allowed to select the 1st boot device without entering the BIOS setup utility by pressing <F11>. When the same message as listed above appears on the screen, press <F11> to trigger the boot menu.

The POST messages might pass by too quickly for you to respond in time. If so, restart the system and press <F11> after around 2 or 3 seconds to activate the boot menu similar to the following.

Select First Boot Device		
Floppy	: 1st Floppy	
IDE-0	: IBM-DTLA-307038	
CDROM	: ATAPI CD-ROM DRIVE 40X M	
[Up / Dn] Select	[RETURN] Boot	[ESC] cancel

The boot menu will list all the bootable devices. Select the one you want to boot from by using arrow keys and then pressing <Enter>. The system will boot from the selected device. The selection will not make changes to the settings in the BIOS setup utility, so next time when you power on the system, it will still use the original first boot device to boot up.

Control Keys

<↑>	Move to the previous item
<↓>	Move to the next item
<←>	Move to the item in the left hand
<→>	Move to the item in the right hand
<Enter>	Select the item
<Esc>	Jumps to the Exit menu or returns to the main menu from a submenu
<+/PU>	Increase the numeric value or make changes
<-/PD>	Decrease the numeric value or make changes
<F6>	Load High Performance Defaults
<F7>	Load Optimal Defaults
<F10>	Save all the CMOS changes and exit

Getting Help

After entering the Setup utility, the first screen you see is the Main Menu.

Main Menu

The main menu displays the setup categories the BIOS supplies. You can use the arrow keys (↑↓) to select the item. The on-line description for the selected setup category is displayed at the bottom of the screen.

Default Settings

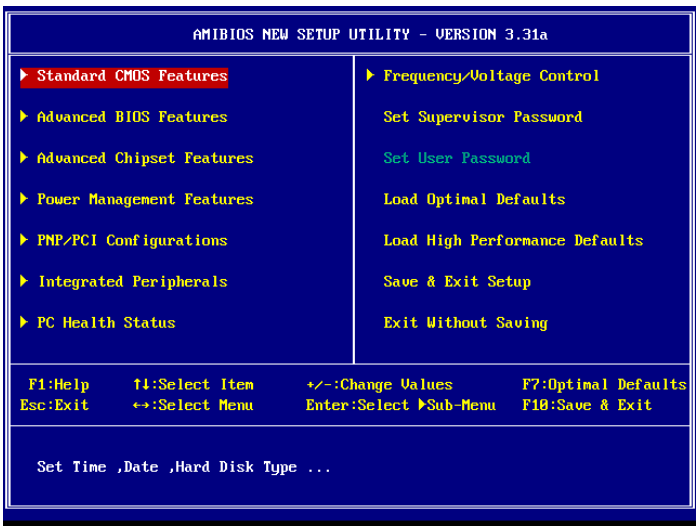
The preset Optimal Defaults of the BIOS setup program provide optimal performance settings for all devices and the system.

MSI Reminds You...

The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.

The Main Menu

Once you enter AMIBIOS NEW SETUP UTILITY, the Main Menu will appear on the screen. The Main Menu displays eleven configurable functions and two exit choices. Use arrow keys to move among the items and press <Enter> to enter the sub-menu.



Standard CMOS Features
Use this menu for basic system configurations, such as time, date etc.

Advanced BIOS Features
Use this menu to setup the items of AMI® special enhanced features.

Advanced Chipset Features
Use this menu to change the values in the chipset registers and optimize your system's performance.

Power Management Features
Use this menu to specify your settings for power management.

PNP/PCI Configurations
This entry appears if your system supports PnP/PCI.

Integrated Peripherals
Use this menu to specify your settings for integrated peripherals.

PC Health Status
This entry shows the status of your CPU, fan, warning for overall system status.

Frequency/Voltage Control
Use this menu to specify your settings for frequency/voltage control.

Set Supervisor Password
Use this menu to set Supervisor Password.

Set User Password
Use this menu to set User Password.

Load Optimal Defaults
Use this menu to load the factory default settings for optimal & stable system performance.

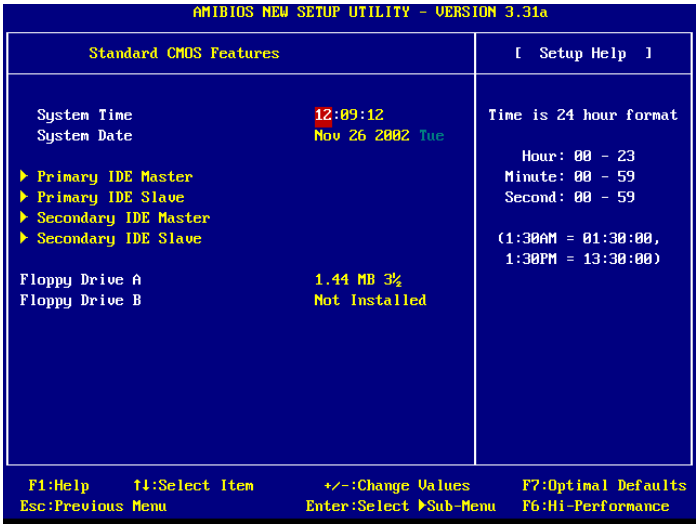
Load High Performance Defaults
Use this menu to load the BIOS values for the best system performance, but the system stability may be affected.

Save & Exit Setup
Save changes to CMOS and exit setup.

Exit Without Saving
Abandon all changes and exit setup.

Standard CMOS Features

The items inside STANDARD CMOS SETUP menu are divided into 9 categories. Each category includes none, one or more setup items. Use the arrow keys to highlight the item you want to modify and use the <PgUp> or <PgDn> keys to switch to the value you prefer.



System Time
This allows you to set the system time that you want (usually the current time). The time format is <hour> <minute> <second>.

System Date
This allows you to set the system to the date that you want (usually the current date). The format is <month> <date> <year> <day>.

month The month from Jan. through Dec.
date The date from 1 to 31 can be keyed by numeric function keys.
year The year can be adjusted by users.
day Day of the week, from Sun to Sat, determined by BIOS. Read only.

Primary/Secondary IDE Master/Slave

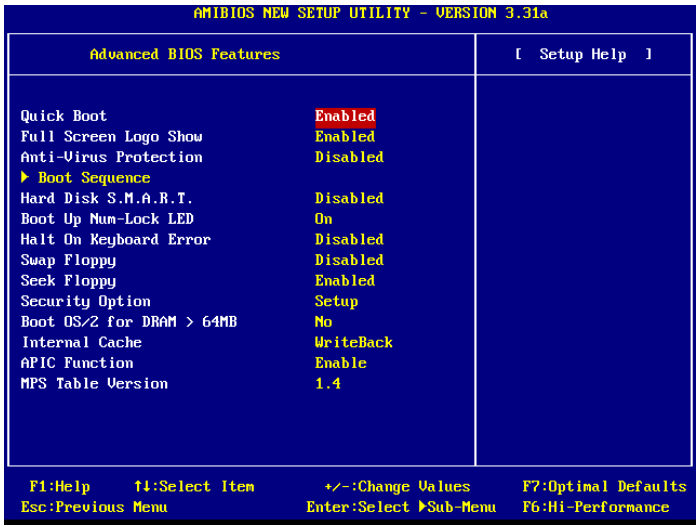
Press PgUp/<+> or PgDn/<-> to select the hard disk drive type. The specification of hard disk drive will show up on the right hand according to your selection.

Type	Select how to define the HDD parameters
Cylinders	Enter cylinder number
Heads	Enter head number
Write Precompensation	Enter write precomp cylinder
Sectors	Enter sector number
Maximum Capacity	Read the maximal HDD capacity
LBA Mode	Select *Auto* for a hard disk > 512 MB under Windows and DOS, or *Disabled* under Netware and UNIX
Block Mode	Select *Auto* to enhance the hard disk performance
Fast Programmed I/O Modes	Select Auto to enhance hard disk performance by optimizing the hard disk timing
32 Bit Transfer Mode	Enable 32 bit to maximize the IDE hard disk data transfer rate

Floppy Drive A/B

This item allows you to set the type of floppy drives installed. Available options: *Not Installed, 1.2 MB 5¼, 720 KB 3½, 1.44 MB 3½* and *2.88 MB 3½.*

Advanced BIOS Features



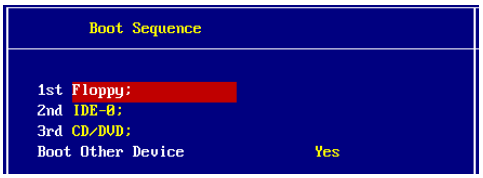
Quick Boot
Setting the item to *Enabled* allows the system to boot within 5 seconds since it will skip some check items. Available options: *Enabled*, *Disabled*.

Full Screen Logo Show
This setting enables you to show the company logo on the bootup screen. Setting options:

Disabled	Shows the POST messages at boot.
Enabled	Shows a still image (logo) on the full screen at boot.

Anti-Virus Protection
The item is to set the Virus Warning feature for IDE Hard Disk boot sector protection. When *Enabled*, BIOS will issue a virus warning message and beep if a write to the boot sector or the partition table of the HDD is attempted. Setting options: *Disabled* and *Enabled*.

Boot Sequence
Press <Enter> and the following sub-menu appears.



1st/2nd/3rd
The items allow you to set the sequence of boot devices where AMIBIOS attempts to load the operating system. The settings are:

IDE-0 The system will boot from the first HDD.
IDE-1 The system will boot from the second HDD.
IDE-2 The system will boot from the third HDD.
IDE-3 The system will boot from the fourth HDD.
Floppy The system will boot from floppy drive.
ARMD-FDD The system will boot from any ARMD device, such as LS-120 or ZIP drive, that functions as a floppy drive.
ARMD-HDD The system will boot from ARMD device, such as MO or ZIP drive, that functions as hard disk drive.
CDROM The system will boot from the CD-ROM.
Legacy SCSI The system will boot from the SCSI.
Legacy Network The system will boot from the Network drive.
BBS-0 The system will boot from the first BBS (BIOS Boot Specification) compliant device.
BBS-1 The system will boot from the second BBS (BIOS Boot Specification) compliant device.
BBS-2 The system will boot from the third BBS (BIOS Boot Specification) compliant device.
BBS-3 The system will boot from the fourth BBS (BIOS Boot Specification) compliant device.
USB FDD The system will boot from USB-interfaced floppy drive.
USB CDROM The system will boot from the USB-interfaced CD-ROM.
USB HDD The system will boot from the USB-interfaced HDD.
USB RMD-FDD The system will boot from any USB-interfaced ARMD device, such as LS-120 or ZIP drive, that functions as a floppy drive.

USB RMD-HDD The system will boot from USB-interfaced ARMD device, such as MO or ZIP drive, that functions as hard disk drive.

Disabled Disable this sequence.

MSI Reminds You...

Available settings for "1st/2nd/3rd Boot Device" vary depending on the bootable devices you have installed. For example, if you did not install a floppy drive, the setting "Floppy" does not show up.

Boot Other Device

Setting the option to *Yes* allows the system to try to boot from other devices if the system fails to boot from the 1st/2nd/3rd boot device.

Hard Disk S.M.A.R.T.

This allows you to activate the S.M.A.R.T. (Self-Monitoring Analysis & Reporting Technology) capability for the hard disks. S.M.A.R.T is a utility that monitors your disk status to predict hard disk failure. This gives you an opportunity to move data from a hard disk that is going to fail to a safe place before the hard disk becomes offline. Settings: *Enabled*, *Disabled*.

Boot Up Num-Lock LED

This item is to set the Num Lock status when the system is powered on. Setting to *On* will turn on the Num Lock key when the system is powered on. Setting to *Off* will allow end users to use the arrow keys on the numeric keypad. Setting options: *On*, *Off*.

Halt On Keyboard Error

This setting determines whether the system will stop if an error at the keyboard is detected. Setting options: *Enabled, Disabled.*

Swap Floppy

Setting to *Enabled* will swap floppy drives A: and B:.

Seek Floppy

This setting causes the BIOS to search for floppy disk drives at boot time. When enabled, the BIOS will activate the floppy disk drives during the boot process: the drive activity light will come on and the head will move back and

forth once. First A: will be done and then B: if it exists. Setting options: *Disabled, Enabled.*

Security Option
This specifies the type of AMIBIOS password protection that is implemented. Setting options are described below.

Option	Description
Setup	The password prompt appears only when end users try to run Setup.
Always	A password prompt appears every time when the computer is powered on or when end users try to run Setup.

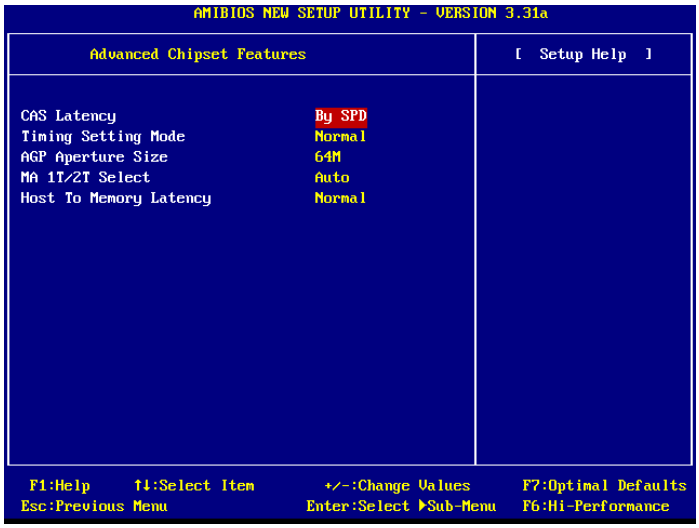
Boot OS/2 for DRAM > 64MB
This allows you to run the OS/2® operating system with DRAM larger than 64MB. When you choose *No*, you cannot run the OS/2® operating system with DRAM larger than 64MB. But it is possible if you choose *Yes*.

Internal Cache
Cache memory is additional memory that is much faster than conventional DRAM (system memory). When the CPU requests data, the system transfers the requested data from the main DRAM into cache memory, for even faster access by the CPU. The setting controls the internal cache (also known as L1 or level 1 cache). Setting options: *Disabled, WriteBack, Write Thru. WriteBack* & *WriteThru* refer to the cache's write policy, which determines how it handles writes to memory locations that are currently being held in cache. The *WriteBack* cache policy will produce the best performance.

APIC Function
This field is used to enable or disable the APIC (Advanced Programmable Interrupt Controller). Due to compliance to PC2001 design guide, the system is able to run in APIC mode. Enabling APIC mode will expand available IRQs resources for the system. Settings: *Enabled, Disabled.*

MPS Table Version
This field allows you to select which MPS (Multi-Processor Specification) version to be used for the operating system. You need to select the MPS version supported by your operating system. To find out which version to use, consult the vendor of your operating system. Settings: *1.4, 1.1.*

Advanced Chipset Features



MSI Reminds You...
Change these settings only if you are familiar with the chipset.

CAS Latency
The field controls the CAS latency, which determines the timing delay before SDRAM starts a read command after receiving it. Setting options: *By SPD, 3T, 2.5T, 2T*. *2T* increases system performance while 2.5T provides more stable system performance. Setting to By SPD enables DRAM CAS# Latency automatically to be determined by BIOS based on the configurations of the SPD (Serial Presence Detect) EEPROM on the DRAM module.

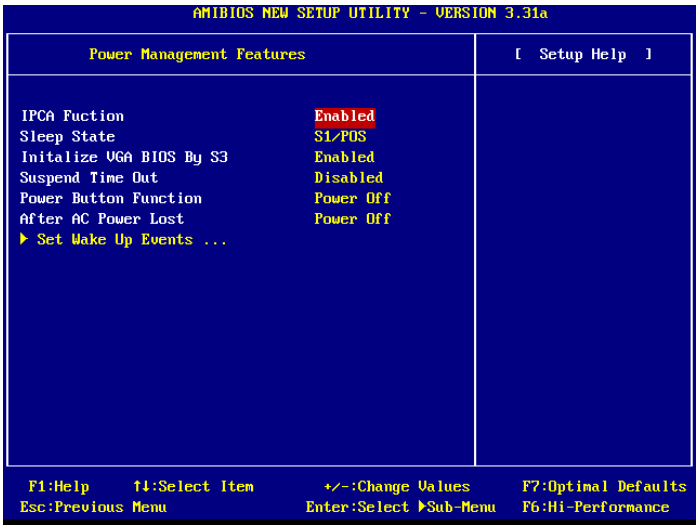
Timing Setting Mode
The DRAM timing is controlled by the DRAM Timing Registers. The Timings programmed into this register are dependent on the system design. Slower rates may be required in certain system designs to support loose layouts or slower memory. Setting options: *Safe, Normal, Fast, Turbo, Ultra*.

AGP Aperture Size
The field selects the size of the Accelerated Graphics Port (AGP) aperture. Aperture is a portion of the PCI memory address range dedicated for graphics memory address space. Host cycles that hit the aperture range are forwarded to the AGP without any translation. Available setting options of the aperture size will vary depending on the system memory installed.

MA 1T/2T Select
This setting controls the SDRAM command rate. Setting to *Auto* allows the the SDRAM command rate to be determined by the BIOS. Selecting *MA 1T/ MA 2T* makes SDRAM signal controller run at 1T/2T rate. 1T is faster than 2T. Setting options: *Auto, MA 2T, MA 1T.*

Host To Memory Latency
Setting this function to *Fast* will improve overall system performance. Please especially note that this function can be set to *Fast* only when the Host and DRAM clock are in phase and running at synchronous mode. Setting options: *Normal, Fast.*

Power Management Features



MSI Reminds You...
S3-related functions described in this section are available only when your BIOS supports S3 sleep mode.

IPCA Function
This item is to activate the ACPI (Advanced Configuration and Power Management Interface) function. If your operating system is ACPI-aware, such as Windows 98SE/2000/ME/XP, select *Enabled*. Available options: *Disabled*, *Enabled*.

Sleep State
This item specifies the power saving modes for ACPI function. If your operating system supports ACPI, such as Windows 98SE/2000/ME/XP, you can choose to enter the Standby mode in S1(POS) or S3(STR) fashion through the setting of this field. Options are:

S1/POS The S1 sleep mode is a low power state. In this state, no

system context is lost (CPU or chipset) and hardware maintains all system context.

S3/STR The S3 sleep mode is a lower power state where the in formation of system configuration and open applications/ files is saved to main memory that remains powered while most other hardware components turn off to save energy. The information stored in memory will be used to restore the system when a "wake up" event occurs.

Auto The BIOS automatically determines the power saving mode.

Initialize VGA BIOS By S3

Selecting *Enabled* allows BIOS to call VGA BIOS to initialize the VGA card when system wakes up (resumes) from S3 sleep state. The system resume time is shortened when you disable the function, but system will need an AGP driver to initialize the VGA card. Therefore, if the AGP driver of the card does not support the initialization feature, the display may work abnormally or not function after resuming from S3.

Suspend Time Out

After the selected period of system inactivity, all devices except the CPU shut off. Settings: *Disabled, 1 min, 2 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 30 min.*

Power Button Function

This feature sets the function of the power button. Settings are:

Power Off The power button functions as normal power off button.

Suspend When you press the power button, the computer enters the suspend/sleep mode, but if the button is pressed for more than four seconds, the computer is turned off.

After AC Power Lost

This setting specifies whether your system will reboot after a power failure or interrupt occurs. Available settings are:

Power Off Leaves the computer in the power off state.

Power On Reboots the computer.

Last State Restores the system to the previous status before power failure or interrupt occurred.

Set Wake Up Events
Press <Enter> and the following sub-menu appears.

USB Wakeup From S1/S3
This setting allows the activity of the USB device to wake up the system from S1 & S3 sleep state. Setting options: *Enabled, Disabled.*

Wake Up By Keyboard From S3
The item specifies how the system will be awakened from power saving mode when input signal of the keyboard is detected. If set to *Specific Key*, <Ctrl+Alt+BackSpace> is the only one Power On event. If set to *Password*, please press <Enter> to input password and its maximum password is 5 character. Setting options: *Disabled, Any Key, Specific Key, Password.*

Wake Up By PS/2 Mouse From S3
The item specifies how the system will be awakened from power saving mode when input signal of the PS/2 mouse is detected. Setting options: *Enabled, Disabled*.

PS2 Mouse Wake Select Mode
This setting specifies the PS2 mouse wake-up mode and works only when the *Wake Up By PS/2 Mouse From S3* setting is set to *Enabled*. Setting options: *Click & Move, Click.*

Wake Up On PME#
When setting to *Enabled*, this setting allows your system to be awakened

from the power saving modes through any event on PME (Power Management Event). Setting options: *Enabled, Disabled.*

Resume By Alarm
This is used to enable or disable the feature of booting up the system on a scheduled time/date from the S3, S4, and S5 state. Settings: *Enabled, Disabled.*

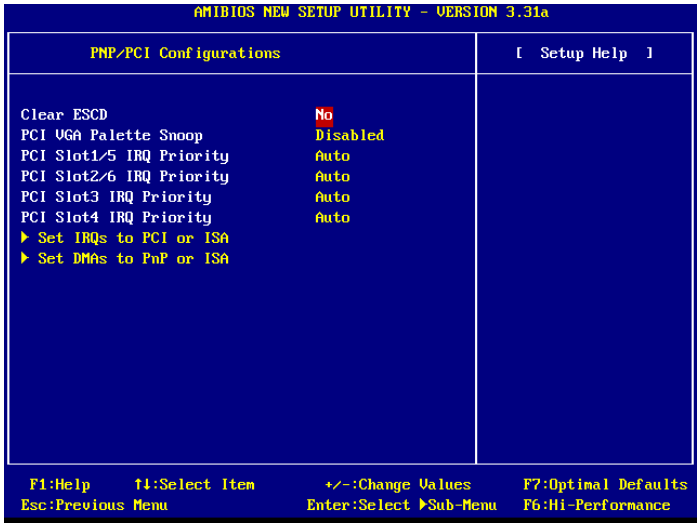
Alarm Date/Hour/Minute/Second
If *Resume By Alarm* is set to *Enabled*, the system will automatically resume (boot up) on a specific date/hour/minute/second specified in these fields. Available settings for each item are:

Alarm Date	*01 ~ 31, Every Day*
Alarm Hour	*00 ~ 23*
Alarm Minute	*00 ~ 59*
Alarm Second	*00 ~ 59*

MSI Reminds You...
If you have changed this setting, you must let the system boot up until it enters the operating system, before this function will work.

PNP/PCI Configurations

This section describes configuring the PCI bus system and PnP (Plug & Play) feature. PCI, or **P**eripheral **C**omponent **I**nterconnect, is a system which allows I/O devices to operate at speeds nearing the speed the CPU itself uses when communicating with its special components. This section covers some very technical items and it is strongly recommended that only experienced users should make any changes to the default settings.



Clear ESCD

The ESCD (Extended System Configuration Data) NVRAM (Non-volatile Random Access Memory) is where the BIOS stores resource information for both PNP and non-PNP devices in a bit string format. When the item is set to *Yes*, the system wil reset ESCD NVRAM right after the system is booted up and then set the setting of the item back to *No* automatically.

PCI/VGA Palette Snoop

When set to *Enabled*, multiple VGA devices operating on different buses can handle data from the CPU on each set of palette registers on every video device. Bit 5 of the command register in the PCI device configuration space is

the VGA Palette Snoop bit (0 is disabled). For example, if there are two VGA devices in the computer (one PCI and one ISA) and the:

VGA Palette Snoop Bit Setting	Action
Disabled	Data read or written by the CPU is only directed to the PCI VGA device's palette registers.
Enabled	Data read or written by the CPU is directed to both the PCI VGA device's palette registers and the ISA VGA device's palette registers, permitting the palette registers of both VGA devices to be identical.

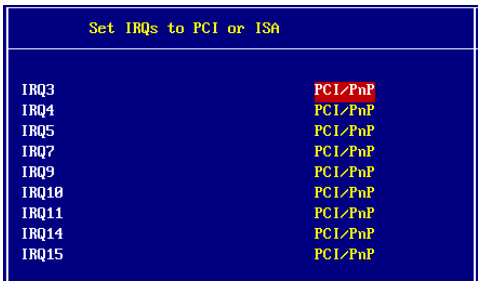
The setting must be set to *Enabled* if any ISA bus adapter in the system requires VGA palette snooping.

PCI Slot 1/5 IRQ Priority, PCI Slot 2/6 IRQ Priority, PCI Slot 3 IRQ Priority, PCI Slot 4 IRQ Priority

These items specify the IRQ line for each PCI slot. Setting options: *3*, *4*, *5*, *7*, *9*, *10*, *11*, *Auto*. Selecting *Auto* allows BIOS to automatically determine the IRQ line for each PCI slot.

Set IRQs to PCI or ISA

Press <Enter> to enter the sub-menu and the following screen appears:



IRQ 3/4/5/7/9/10/11/14/15

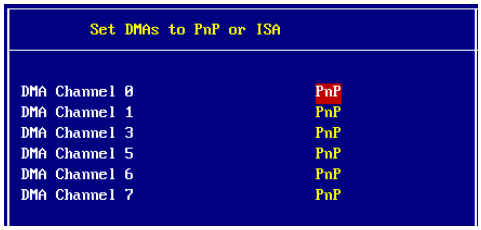
These items specify the bus where the specified IRQ line is used.

The settings determine if AMIBIOS should remove an IRQ from the pool of available IRQs passed to devices that are configurable by the

system BIOS. The available IRQ pool is determined by reading the ESCD NVRAM. If more IRQs must be removed from the IRQ pool, the end user can use these settings to reserve the IRQ by assigning an *ISA/EISA* setting to it. Onboard I/O is configured by AMIBIOS. All IRQs used by onboard I/O are configured as *PCI/PnP*. If all IRQs are set to ISA/EISA, and IRQ 14/15 are allocated to the onboard PCI IDE, IRQ 9 will still be available for PCI and PnP devices. available settings: *ISA/EISA* and *PCI/PnP*.

Set DMAs to PnP or ISA

Press <Enter> to enter the sub-menu and the following screen appears:

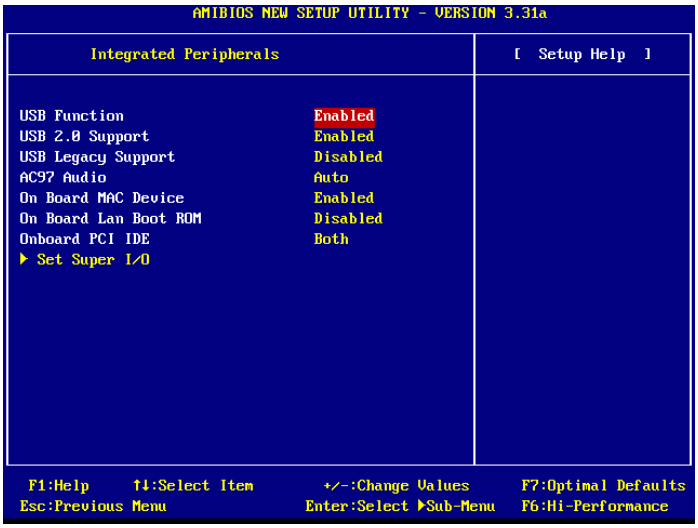


DMA Channel 0/1/3/5/6/7

These items specify the bus that the system DMA (Direct Memory Access) channel is used.

The settings determine if AMIBIOS should remove a DMA from the available DMAs passed to devices that are configurable by the system BIOS. The available DMA pool is determined by reading the ESCD NVRAM. If more DMAs must be removed from the pool, the end user can reserve the DMA by assigning an *ISA/EISA* setting to it.

Integrated Peripherals



USB Function
This setting is used to enable/disable the onboard USB controllers. Setting options: *Enabled, Disabled.*

USB 2.0 Support
This setting disables/enables the support for USB 2.0 technology. USB 2.0 technology increases data transfer rate up to a maximum throughput of 480Mbps, which is 40 times faster than USB 1.1 and is ideal for connecting high-speed USB interface peripherals such as USB HDD, digital cameras, MP3 players, printers, modems and the like. Setting options: *Disabled, Enabled.*

USB Legacy Support
This setting is used to enable/disable the BIOS support for USB devices under conventional operating systems (DOS and etc.) that do not have built-in USB drivers.

AC'97 Audio
This item is used to enable or disable the onboard AC'97 (Audio Codec'97) feature. Selecting *Auto* allows the mainboard to detect whether an audio de-

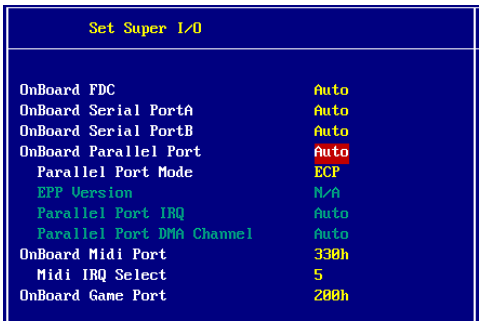
vice is used. If an audio device is detected, the onboard AC'97 controller will be enabled; if not, the controller is disabled. Disable the function if you want to use other controller cards to connect an audio device. Settings: *Disabled* and *Auto*.

Onboard MAC Device
This setting is used to enable/disable the onboard MAC device. Setting options: *Enabled, Disabled.*

Onboard LAN Boot ROM
This setting enables/disables the initialization of the onboard LAN Boot ROM during bootup. Selecting *Disabled* will speed up the boot process.

Onboard PCI IDE
This setting controls the onboard PCI IDE controllers. Setting options: *Disabled, Primiary, Secondary, Both.*

Set Super I/O
Press <Enter> to enter the sub-menu and the following screen appears:



Onboard FDC
The item is used to enable or disable the onboard Floppy controller. Select *Enabled* when you have installed a floppy disk drive and want to use it. Options: *Auto, Enabled, Disabled.*

Onboard Serial Port A/B
The items specify the base I/O port address and IRQ for the onboard Serial Port A / Serial Port B. Selecting *Auto* allows BIOS to automati-

cally determine the correct base I/O port address. Settings: *Disabled, 3F8/COM1, 2F8/COM2, 3E8/COM3, 2E8/COM4, Auto*.

Onboard Parallel Port
These items specify the base I/O port addresses of the onboard parallel port. Selecting *Auto* allows AMIBIOS to automatically determine the correct base I/O port address. Settings: *Auto, 378h, 278h and Disabled.*

Parallel Port Mode
This item specifies the operation mode for the onboard parallel port: *ECP, Normal, Bi-Dir or EPP*.

EPP Version
The item specifies the EPP version used by the parallel port if the port is set to *EPP* mode. Settings: *EPP1.7* and *EPP1.9*.

Parallel Port IRQ
When *Parallel Port* is set to *Auto*, the item shows *Auto* indicating that BIOS determines the IRQ for the parallel port automatically.

Parallel Port DMA Channel
This feature needs to be configured only when *Parallel Port Mode* is set to the *ECP* mode. When Parallel Port is set to *Auto*, the field will show *Auto* indicating that BIOS automatically determines the DMA channel for the parallel port.

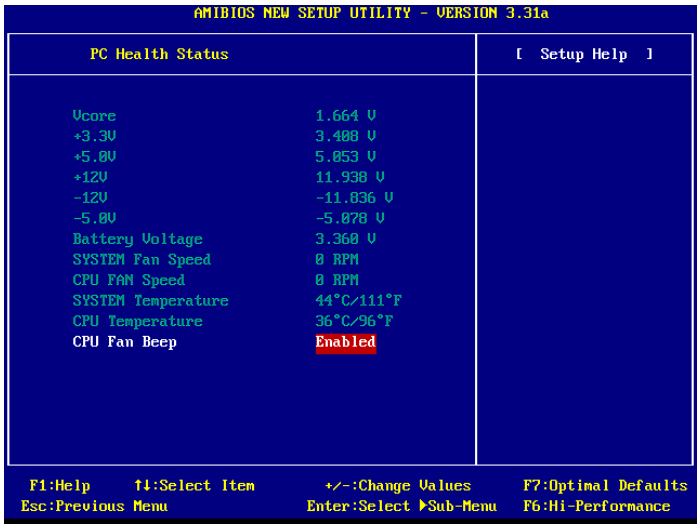
Onboard Midi Port
The field specifies the base I/O port address for the onboard Midi Port.

Midi IRQ Select
The item is used to select the IRQ line for onboard Midi port.

Onboard Game Port
This item is used to specify the address for the onboard game port.

PC Health Status

This section shows the status of your CPU, fan, overall system status, etc. Monitor function is available only if there is hardware monitoring mechanism onboard.



Vcore, +3.3V, +5.0V, +12V, -12V, -5.0V, Battery Voltage, System/CPU Fan Speed, System/CPU Temperature

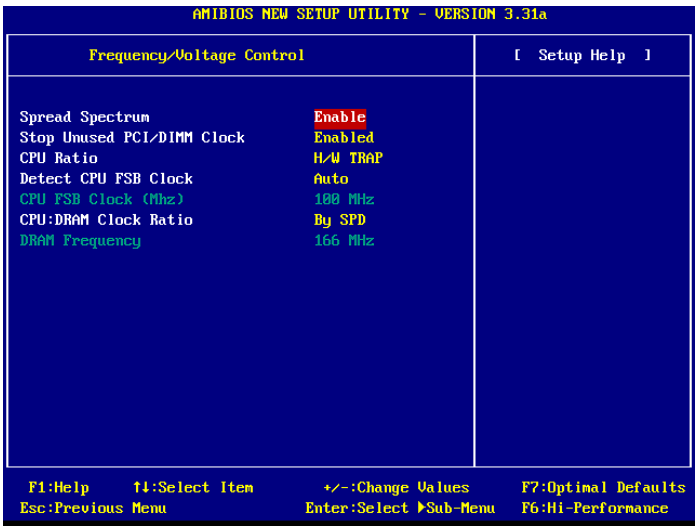
These items display the current status of all of the monitored hardware devices/components such as system voltages, temperatures and fan speeds.

CPU Fan Beep

This setting allows you to monitor the operation of the CPU fan. Setting to *Enabled* will activate the warning beep once the system detects the malfunction/halt of the CPU fan.

Frequency/Voltage Control

Use this menu to specify your settings for frequency/voltage control.



Spread Spectrum
When the motherboard's clock generator pulses, the extreme values (spikes) of the pulses creates EMI (Electromagnetic Interference). The Spread Spectrum function reduces the EMI generated by modulating the pulses so that the spikes of the pulses are reduced to flatter curves. If you do not have any EMI problem, leave the setting at *Disabled* for optimal system stability and performance. But if you are plagued by EMI, setting to *Enabled* for EMI reduction. Remember to disable Spread Spectrum if you are overclocking because even a slight jitter can introduce a temporary boost in clockspeed which may just cause your overclocked processor to lock up.

Stop Unused PCI/DIMM Clock
This setting enables you to stop or activate the unused PCI slot & DIMM clock. Setting options: *Enabled, Disabled.*

CPU Ratio
This setting controls the multiplier that is used to determine the internal clock speed of the processor relative to the external or motherboard clock speed.

Detect CPU FSB Clock
This setting determines whether the CPU FSB frequency will be automatically detected by the BIOS or manually set by users. Setting options: *Auto, Manual.*

CPU FSB Clock (Mhz)
This setting allows you to select the CPU Front Side Bus clock frequency and only works if the *Detect CPU FSB Clock* setting is set to *Disabled.*

CPU : DRAM Clock Ratio
This setting controls the ratio of CPU FSB Clock & DRAM Frequency to enable the CPU & DRAM to run at different frequency combinations. Please note that the setting options vary according to the CPU FSB Clock preset. Setting options: *100MHz~200MHz* at 1MHz increment.

CPU FSB Clock	Setting Options
100MHz	*1:1, 3:4, 3:5, 2:3, By SPD*
101~132MHz	*1:1, 3:4, 3:5, 2:3*
133~160MHz	*4:3, 1:1, 4:5, By SPD*
161~200MHz	*Auto*

DRAM Frequency
This setting shows the DRAM frequency controlled by *CPU : DRAM Clock Ratio* & *CPU FSB Clock (Mhz)* preset.

Set Supervisor/User Password

When you select this function, a message as below will appear on the screen:

Type the password, up to six characters in length, and press <Enter>. The password typed now will replace any previously set password from CMOS memory. You will be prompted to confirm the password. Retype the password and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.

To clear a set password, just press <Enter> when you are prompted to enter the password. A message will show up confirming the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup without entering any password.

When a password has been set, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also have AMIBIOS to request a password each time the system is booted. This would prevent unauthorized use of your computer. The setting to determine when the password prompt is required is the *Security Option* of the ADVANCED BIOS FEATURES menu. If the *Security Option* is set to *Always*, the password is required both at boot and at entry to Setup. If set to *Setup*, password prompt only occurs when you try to enter Setup.

MSI Reminds You...

About Supervisor Password & User Password:

Supervisor password:	*Can enter and change the settings of the setup menu.*
User password:	*Can only enter but do not have the right to change the settings of the setup menu.*

Load Optimal/High Performance Defaults

The two options on the main menu allow users to restore all of the BIOS settings to High Performance Defaults or Optimal Defaults. The High Performance Defaults are the values set by the mainboard manufacturer for the best system performance but probably will cause a stability issue. The Optimal Defaults are the default values also set by the mainboard manufacturer for stable performance of the mainboard.

When you select Load Optimal Defaults, a message as below appears:

Pressing 'Enter' loads the default values that are factory settings for stable system performance.

When you select Load High Performance Defaults, a message as below appears:

Pressing 'Enter' loads the default BIOS values that enable the best system performance but may lead to a stability issue.

MSI Reminds You...

The option is for power or overclocking users only. *Use of high performance defaults will tighten most timings to increase the system performance. Therefore, a high-end system configuration is a must, which means you need high-quality VGA adapter, RAM and so on.* ***We don't recommend that users should apply the high performance defaults in their regular systems.*** *Otherwise, the system may become unstable or even crash. If the system crashes or hangs after enabling the feature, please CLEAR CMOS DATA to resolve the problem. For more information, refer to "Clear CMOS Jumper:JBAT1" in Chapter 2.*

Appendix: Using 4- or 6-Channel Audio Function

The motherboard is equipped with Realtek ALC650 chip, which provides support for 6-channel audio output, including 2 Front, 2 Rear, 1 Center and 1 Subwoofer channel. ALC650 allows the board to attach 4 or 6 speakers for better surround sound effect. The section will tell you how to install and use 4-/6-channel audio function on the board.

TOPICS

Using 4- or 6-Channel Audio Function

Installing the Audio Driver

1. Insert the companion CD into the CD-ROM drive. The CD will run automatically and the setup screen will appear.
2. Click **Avance ALC650 Sound Drivers** and follow the on-screen instructions to complete the installation.
3. After completion of the installation, please restart your computer.

Using 4- or 6-Channel Audio Function

In addition to a default 2-Channel analog audio output function, the audio connectors on the Back Panel also provide 4- or 6-Channel analog audio output function if a proper setting is made in the software utility.

Read the following steps to have the Multi-Channel Audio Function properly set in the software utility, and have your speakers correctly connected to the Back Panel:

Configuration in the Software Utility

1. Click the audio icon  from the window tray at the lower-right corner of the screen.

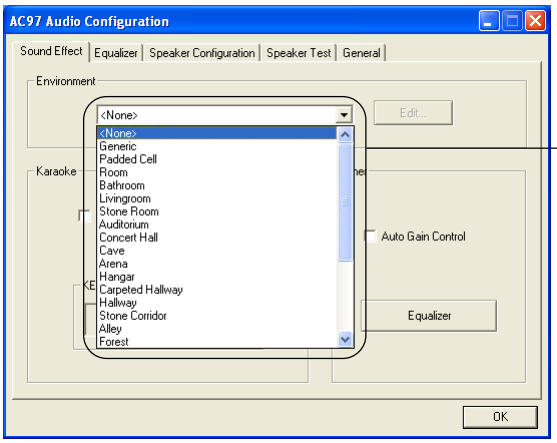
2. Select a desired surround sound effect from the “Environment” drop-down menu.

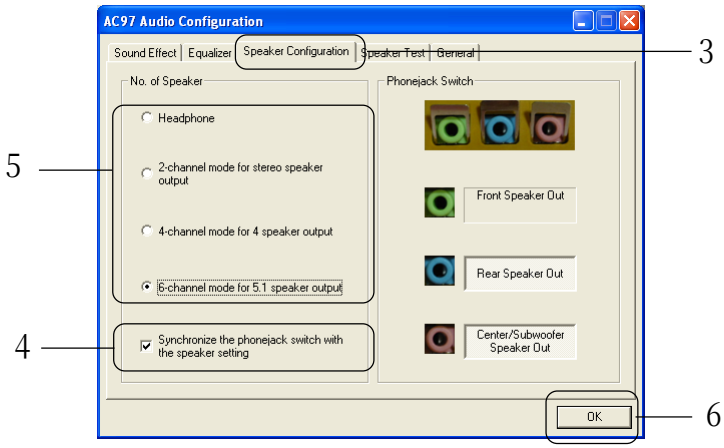
3. Click the **Speaker Configuration** tab.

4. Select **Synchronize the phonejack switch with the settings**.

5. Select a desired multi-channel operation from **No. of Speakers**.
   a. Headphone
   b. 2-Channel Mode for Stereo-Speaker Output
   c. 4-Channel Mode for 4-Speaker Output
   d. 6-Channels Mode for 5.1-Speaker Output

6. Click **OK** to close this window.


AC97 Audio Configuration
Sound Effect
Equalizer
Speaker Configuration
Speaker Test
General
Environment
<None>
Edit...
<None>
Generic
Padded Cell
Room
Bathroom
Livingroom
Stone Room
Auditorium
Concert Hall
Cave
Arena
Hangar
Carpeted Hallway
Hallway
Stone Corridor
Alley
Forest
Karaoke
Auto Gain Control
Equalizer
OK
2


AC97 Audio Configuration
Sound Effect
Equalizer
Speaker Configuration
Speaker Test
General
3
No. of Speaker
Headphone
2-channel mode for stereo speaker output
4-channel mode for 4 speaker output
6-channel mode for 5.1 speaker output
5
Synchronize the phonejack switch with the speaker setting
4
Phonejack Switch
Front Speaker Out
Rear Speaker Out
Center/Subwoofer Speaker Out
OK
6

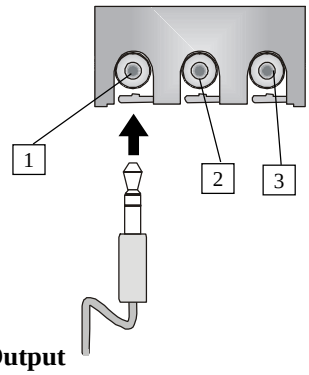
Connecting the Speakers

When you have set the Multi-Channel Audio Function mode properly in the software utility, connect your speakers to the correct phonejacks in accordance with the setting in software utility.

■ **2-Channel Mode for Stereo-Speaker Output**

Refer to the following diagram and caption for the function of each phonejack on the back panel when 2-Channel Mode is selected.

1 Line Out *(Front channels)*
2 Line In
3 MIC

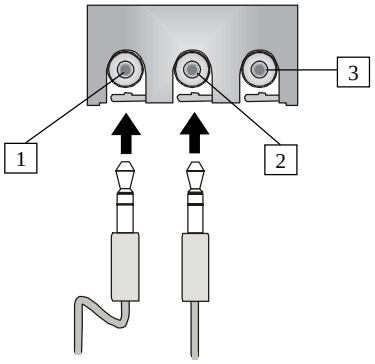


■ **4-Channel Mode for 4-Speaker Output**

The audio jacks on the back panel always provide 2-Channel analog audio output function, however these audio jacks can be transformed to 4- or 6- channels analog audio jacks by selecting the corresponding multi-channel operation from **No. of Speakers**.

Refer to the following diagram and caption for the founction of each jack on the back panel when 4-Channel Mode is selected.

1 Line Out *(Front channels)*
2* Line Out *(Rear channels)*
3 MIC

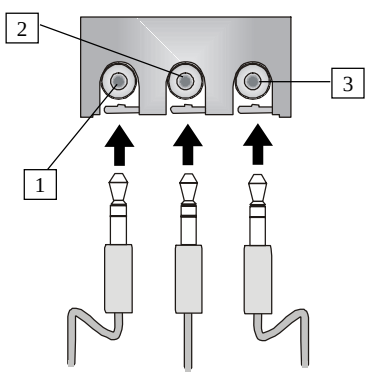


* Line In function is converted to Line Out function when 4-Channel Mode for 4-Speaker Output is selected.

■ **6-Channel Mode for 6-Speaker Output**

Refer to the following diagram and caption for the founction of each jack on the back panel when 6-Channel Mode is selected.

1 Line Out *(Front channels)*
2* Line Out *(Rear channels)*
3* Line Out *(Center and Subwoofer channel)*



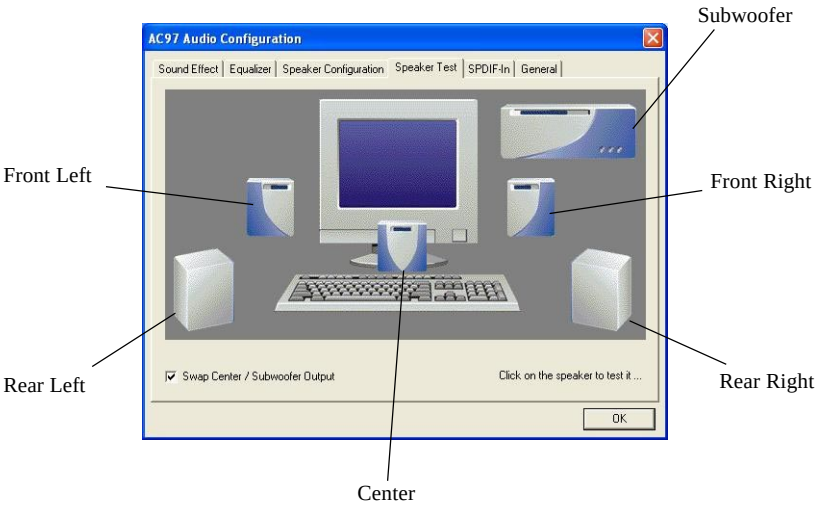
* Both Line In and MIC function are converted to Line Out function when 4-Channel Mode for 6-Speaker Output is selected.

Testing the Connected Speakers

To ensure that 4- or 6-channel audio operation works properly, you may need to test each connected speaker to make sure every speaker work properly. If any speaker fails to sound, then check whether the cable is inserted firmly to the connector or replace the bad speakers with good ones.

Testing Each Speaker

1. Click the audio icon from the window tray at the lower-right corner of the screen.
2. Click the **Speaker Test** tab.
3. The following window appears. Select the speaker which you want to test by clicking it.



MSI Reminds You...

6 speakers appear on the "Speaker Test" window only when you select "6 channels mode" in the "No. of Speakers" column. If you select "4 channels mode", only 4 speakers appear on the window. Or, If you select "Headphone", only a headphone appears on the window.

4. While you are testing the speakers in 6-Channel mode, if the sound coming from the center speaker and subwoofer is swapped, you should select **Swap Center/Subwoofer Output** to readjust these two channels**.**

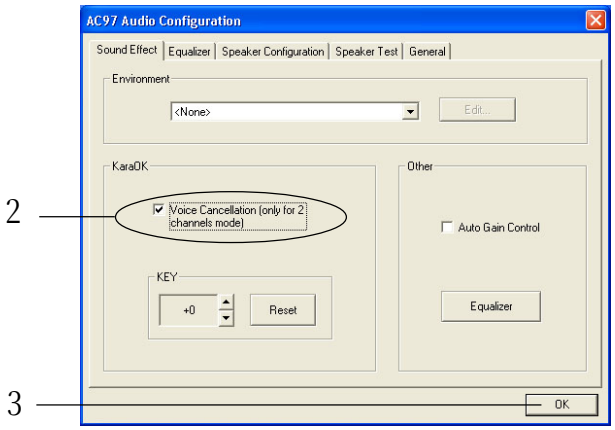
Select this function

Playing KaraOK

The KaraOK function will automatically remove human voice (lyrics) and leave melody for you to sing the song. **This function applies only to 2-channel audio operation,** so make sure "2-Channel Mode" is selected in the "No. of Speakers" column before playing KaraOK.

Playing KaraOK

1. Click the audio icon from the window tray at the lower-right corner of the screen.
2. Select **Voice Cancellation** in the "KaraOK" column under the Sound Effect tab.
3. Click **OK** to close this window.



Troubleshooting

Q: Where can I find the model number of the mainboard?

A: There are two places where you can find the model number of the mainboard: 1. Somewhere between the PCI slots you shall find MS-xxxx or the marketing name like “K7T Turbo”. You can also find the version number beside it. 2. At the back cover of the user's manual.

Q: What do you mean by PCB version 1?

A: PCB is printed circuit board. Saying PCB version 1 is the same as saying motherboard version 1.

Q: Why is my motherboard BIOS sticker "Phoenix BIOS" while I see "Award BIOS" during system boot-up?

A: Phoenix & Award already merged as one company. All MSI motherboards using Award BIOS come with Phoenix logo stickers.

Q: How do I know what MSI D-LED or D-bracket light mean?

A: Please follow the special tech issue, http://www.msi.com.tw/support/techexpress/special_tech/smartled.htm

Q: I used my MSI motherboard and got an error message, "Primary IDE Channel No 80 Conductor Cable Installed" while the system detected hard drives.

A: This is not a problem. It merely means that you're using an ATA-66 or ATA-100 HDD, but you're using the conductor 40 ATA-33 cable.

Q: I have high speed CPU cooling fan like Taisol CGK760092, Vantec CCK-6035D & GlobalWin WBK38. Can I install the fan directly to the motherboard?

A: We strongly recommend that you do NOT connect those described CPU fan directly to your motherboard, as it draws so much power, that it could damage it. Please use a 3-Pin to 4-Pin Cable that comes together with the fan.

Q: Can I use more than 512MB memory on Win9x or WinME?

A: No, you can't. You can only use more than 512MB memory on Win2000 or WinXP. This is a Microsoft OS issue. Please check http://support/microsoft.com/support/kb/articles/Q108/0/79.ASP

Q: I have tried to download the MSI Live Update utility from http://www.msi.com.tw/support/liveupdate/livedriver.htm but it keeps on failing?

A: This can be solved by one of the following suggestions: 1. Dont install zonealarm 2. Disable "WebTrap" of PC-cillion 2000 3. Disable any web based anti-virus Software.

Q: Can Live Update Series support WinXP?

A: Live Update Series version 215 can support WinXP. Download it from http://www.msi.com.tw/support/liveupdate/livedriver.htm

Q: After flashing the BIOS, my system for unknown reason fails to boot. What should I do?

A: Please refer to the following suggestions: 1. Try the BIOS boot recovery feature as described in http://www.msi.com.tw/support/bios/boot.htm 2. Try to clear the CMOS If problem still persists, ask your reseller for new BIOS chip or contact one of MSI office near your place for new BIOS chip http://www.msi.com.tw/contact/main.htm

Q: Should I update my BIOS, once a new BIOS is released?

A: A new BIOS is usually released due to the following reasons:

1. New function is supported

2. New BIOS source code
3. Bugs are found
4. Customer-specific request

When we release a new BIOS, there's usually a release note attached which lists the reason for the release. Refer to this release note and decide for yourself if upgrading to the new BIOS will be worth it. A word of advice, though, do not upgrade to the new BIOS, unless you really have to.

Q: How do I update the BIOS?

A: Please refer to http://www.msi.com.tw/support/bios/note.htm for details.

Q: How do I identify the BIOS version?

A: Upon boot-up, the 1st line appearing after the memory count is the BIOS version. It is usually in the format:

1. For older model number:

AG76 091096 where:

1st digit refers to BIOS maker as A = AMI(R) W = AWARD(R) P = PHOENIX (R).

2nd digit refers to the internal chipset code.

3rd digit refers to the processor class as 5 = 486, 7 = 586, 8 = 686.

4th digit is incremental.

091096 refers to the date this BIOS is released.

2. For newer model number:

W5139MS V1.0 091096 where:

1st digit refers to BIOS maker as A = AMI(R) W = AWARD(R) P = PHOENIX (R).

2nd - 5th digit refers to the model number.

6th - 7th digit refers to the customer as MS = all standard customers.

V1.0 refers to the BIOS version.

091096 refers to the date this BIOS is released.

Q: After I flashed the BIOS and rebooted the system, the screen went blank.

A: ***For AMI BIOS***

Rename the desired AMI BIOS file to AMIBOOT.ROM and save it on a floppy disk. e.g. Rename A569MS23.ROM to AMIBOOT.ROM

Insert this floppy disk in the floppy drive. Turn On the system and press and hold Ctrl-Home to force update. It will read the AMIBOOT.ROM file and recover the BIOS from the A drive.

When 4 beeps are heard you may remove the floppy disk and restart the computer.

For Award BIOS

Make a bootable floopy disk

Copy the Award flash utility & BIOS file to the said floppy disk

Create an autoexec.bat with "awdfl535 biosfilename" in the content e.g. awdfl535a619mj21.bin

Boot up system with the said floppy (it will take less than 2 minutes before screen comes out)

Re-flash the BIOS & reboot.

Glossary

ACPI *(Advanced Configuration & Power Interface)*
This power management specification enables the OS (operating system) to control the amount of power given to each device attached to the computer. Windows 98/98SE, Windows 2000 and Windows ME can fully support ACPI to allow users managing the system power flexibly.

AGP *(Accelerated Graphics Port)*
A new, high-speed graphics interface that based on PCI construction and designed especially for the throughput demands of 3-D graphics. AGP provides a direct channel (32-bit wide bus) between the display controller and main memory for high graphics quality and performance.

Bluetooth
Bluetooth refers to a worldwide standard for the wireless exchange of data between two devices. Bluetooth requires that a low-cost transceiver chip be included in each device. The tranceiver transmits and receives in a previously unused frequency band of 2.45 GHz that is available globally (with some variation of bandwidth in different countries). In addition to data, up to three voice channels are available. Each device has a unique 48-bit address from the IEEE 802 standard. Connections can be point-to-point or multipoint. The maximum range is 10 meters. Data can be exchanged at a rate of 1 megabit per second (up to 2 Mbps in the second generation of the technology).

BIOS *(Basic Input/Output System)*
On PCs, an essential software that contains all the control code of input/output interface (such as keyboard, disk drives, etc.). It executes hardware test on booting the system, starts the OS, and provides an interface between the OS and the components. The BIOS is stored in a ROM chip.

Bus
A set of hardware lines within the computer system, through which the data is transferred among different components. In a PC, the term ***bus*** usually refers to a local bus that connects the internal components to the CPU and main memory.

Cache
A special memory subsystem that is used to speed up the data transfer. It stores the

contents of frequently accessed RAM locations and the addresses where these data items are stored.

Chipset
A collection of integrated chips designed to perform one or more related functions. For example, a modem chipset contains all the primary circuits for transmitting and receiving data; a PC chipset provides the electronic interfaces between all subsystems.

Clock Cycle
Clock cycle (or tick) is the smallest unit of time recognized by a device. For personal computers, clock cycles generally refer to the main system clock, which runs at 66 MHz. This means that there are 66 million clock cycles per second. Since modern CPUs run much faster (up to 533 MHz), the CPU can execute several instructions in a single clock tick.

CMOS *(Complementary Metal-Oxide Semiconductor)*
CMOS is a widely used type of semiconductor, which features high speed and low power consumption. PCs usually contain a small amount of battery-powered CMOS memory to retain the date, time, and system setup parameters.

DRAM *(Dynamic RAM)*
A most common type of computer memory. It usually uses one transistor and a capacitor to represent a bit. As the development of technology, the memory type and specification used in computer becomes variety, such as SDRAM, DDR SDRAM, and RDRAM. For further instruction, please see the table below:

Dynamic RAM (DRAM) Memory Technologies

Type	First Used	Clock Rate	Bus* Width	Peak Bandwidth	Volts
FPM (60,70ns)	1990	25MHz	64 bits	200 MBps	5v
EDO (50,60,70ns)	1994	40MHz	64 bits	320 MBps	5v
SDRAM (66MHz)	1996	66MHz	64 bits	528 MBps	3.3v
SDRAM (100MHz)	1998	100MHz	64 bits	800 MBps	3.3v
SDRAM (133MHz)	1999	133MHz	64 bits	1.1 GBps	3.3v
RDRAM (Direct Rambus)	1999	400MHz	16 bits	1.6 GBps	2.5v
DDR SDRAM (100MHz)	2000	100MHz	64 bits	1.6 GBps	3.3v
DDR SDRAM (133MHz)	2000	133MHz	64 bits	2.1 GBps	3.3v

* Memory channel width (64 bits started with 75MHz Pentium)

Source: Computer Desktop Encyclopedia

ECC Memory *(Error Correcting Code Memory)*
A type of memory that contains special circuitry for testing the accuracy of data and correcting the errors on the fly.

EEPROM
Acronym for Electrically Erasable Programmable Read-Only Memory. An EEPROM is a special type of PROM that can be erased by exposing it to an electrical charge. Like other types of PROM, EEPROM retains its contents even when the power is turned off. Also like other types of ROM, EEPROM is not as fast as RAM. EEPROM is similar to flash memory (sometimes called flash EEPROM). The principal difference is that EEPROM requires data to be written or erased one byte at a time whereas flash memory allows data to be written or erased in blocks. This makes flash memory faster.

EIDE
Short for Enhanced IDE, a newer version of the IDE mass storage device interface standard developed by Western Digital Corporation. It supports data rates of between 4 and 16.6 MBps, about three to four times faster than the old IDE standard. In addition, it can support mass storage devices of up to 8.4 gigabytes, whereas the old standard was limited to 528 MB. Because of its lower cost, enhanced EIDE has replaced SCSI in many areas. There are four EIDE modes defined. The most common is Mode 4, which supports transfer rates of 16.6 MBps. There is also a new mode, called ATA-3 or Ultra ATA, that supports transfer rates of 33 MBps.

EISA *(Extended Industry Standard Architecture)*
EISA is a standard bus (computer interconnection) architecture that extends the ISA standard to a 32-bit interface. It was developed in part as an open alternative to the proprietary Micro Channel Architecture (MCA) that IBM introduced in its PS/2 computers. EISA data transfer can reach a peak of 33 megabytes per second.

ESCD *(Extended System Configuration Data)*
It is a format for storing information about Plug-and-Play (PnP) devices in the BIOS. Windows and the BIOS access the ESCD area each time you re-boot your computer

External Cache
Short for Level 2 cache, cache memory that is external to the microprocessor. In general, L2 cache memory, also called the secondary cache, resides on a separate chip from the microprocessor chip. Although, more and more microprocessors are including L2 caches into their architectures.

IDE *(Integrated Drive Electronics)*
A type of disk-drive interface widely used to connect hard disks, CD-ROMs and tape drives to a PC, in which the controller electronics is integrated into the drive itself, eliminating the need for a separate adapter card. The IDE interface is known as the ATA (AT Attachment) specification.

IEEE 1394
A new, high speed external bus standard, also known as ***FireWire*** or ***iLink***, which supports data transfer rates of up to 400 Mbps for connecting up to 63 external devices.

Internal Cache
Short for Level 1 cache, a memory cache built into the microprocessor. The L1 cache is also called the primary cache.

IrDA *(Infrared Data Association)*
A group of device vendors, including computer, component and telecommunications, who have developed a standard for transmitting data via infrared light waves. This enables you to transfer data from one device to another without any cables.

IRQ *(Interrupt Request Line)*
IRQs are hardware lines over which devices can send interrupt signals to the microprocessor. When you add a new device to a PC, you sometimes need to set its IRQ number by setting a DIP switch. This specifies which interrupt line the device may use. IRQ conflicts used to be a common problem when adding expansion boards, but the Plug-and-Play specification has removed this headache in most cases.

ISA *(Industry Standard Architecture)*
ISA is a standard bus (computer interconnection) architecture that is associated with the IBM AT motherboard. It allows 16 bits at a time to flow between the motherboard circuitry and an expansion slot card and its associated device(s). Also see EISA and MCA.

LAN *(Local Area Network)*
A computer network that covers a relatively smaller area, such as in a building or an enterprise. It is made up of servers, workstations, shared resources, a network operating system and a communications link. These individual PCs and devices on a LAN are known as “nodes”, and are connected by cables to access data and devices anywhere on the LAN, so that many users can share expensive devices and data.

LBA *(Logical Block Addressing)*
Logical block addressing is a technique that allows a computer to address a hard disk larger than 528 megabytes. A logical block address is a 28-bit value that maps to a specific cylinder-head-sector address on the disk. 28 bits allows sufficient variation to specify addresses on a hard disk up to 8.4 gigabytes in data storage capacity. Logical block addressing is one of the defining features of Enhanced IDE (EIDE), a hard disk interface to the computer bus or data paths.

LED *(Light Emitting Diode)*
A semiconductor device that converts electrical energy into light. Since it lights up (usually red) when electricity is passed through it, it is usually used for the activity lights on computer's component, such as disk drivers.

LPT *(Line Printer Terminal)*
Logical device name for a line printer; a name reserved by the MS-DOS for up to three parallel printer ports: LPT1, LPT2, and LPT3. It is frequently used by the OS to identify a printer.

Overclocking
Overclocking is resetting your computer so that the microprocessor runs faster than the manufacturer-specified speed (for example, setting an Intel 166 MHz (megahertz) microprocessor to run at 200 Mhz).

PCI *(Peripheral Component Interconnect)*
A local bus standard developed by Intel that first appeared on PCs in late 1993. PCI provides "plug and play" capability and allows IRQs to be shared. The PCI controller can exchange data with the system's CPU either 32 bits or 64 bits at a time.

PnP *(Plug and Play)*
A set of specifications that allows a PC to configure itself automatically to work with peripherals. The user can "plug" in a peripheral device and "play" it without configuring the system manually. To implement this useful feature, both the BIOS that supports PnP and a PnP expansion card are required.

POST *(Power On Self Test)*
During booting up your system, the BIOS executes a series of diagnostic tests, include checking the RAM, the keyboard, the disk drives, etc., to see if they are properly connected and operating.

PS/2 Port
A type of port developed by IBM for connecting a mouse or keyboard to a PC. The PS/2 port supports a mini DIN plug containing just 6 pins. Most modern PCs equipped with PS/2 ports so that the special port can be used by another device, such as a modem.

RAID
RAID (Redundant Array of Independent Disks; originally Redundant Array of Inexpensive Disks) is a way of storing the same data in different places (thus, redundantly) on multiple hard disks. By placing data on multiple disks, I/O operations can overlap in a balanced way, improving performance. Since multiple disks increases the mean time between failure (MTBF), storing data redundantly also increases fault-tolerance.

SCSI
Acronym for Small Computer System Interface. Pronounced "scuzzy," SCSI is a parallel interface standard used by Apple Macintosh computers, PCs, and many UNIX systems for attaching peripheral devices to computers. SCSI interfaces provide for faster data transmission rates (up to 80 megabytes per second) than standard serial and parallel ports. In addition, you can attach many devices to a single SCSI port, so that SCSI is really an I/O bus rather than simply an interface.

USB *(Universal Serial Bus)*
A hardware interface for low-speed peripherals such as the keyboard, mouse, joystick, etc. USB provides a maximum bandwidth of 12 Mbit/sec (Mbps) for connecting up to 127 peripheral devices to PC. USB features hot swap capability and multiple data streams, allows external devices to be plugged in and unplugged without turning the system off.

Virus
A program or a piece of code that infects computer files by inserting in those files copies of itself. The virus code is buried within an existing program, and is activated when that program is executed. All the viruses are man-made, and often have damaging side effects.

WLAN
Acronym for wireless local-area network. Also referred to as LAWN. A type of local-area network that uses high-frequency radio waves rather than wires to communicate between nodes.