MSI 845E Max2 Series

MICRO-STAR INTERNATIONAL

MS-6398E (v1.X) ATX Mainboard

Version 1.0
G52-MA00566

Manual Rev: 1.0
Release Date: March 2002

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-6398E

Tested to comply with FCC Standard

For Home or Office Use

Edition

March 2002

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Revision History

Revision	Revision History	Date
V1.0	First release	March 2002

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.

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Getting Started 1

Thank you for purchasing the MS-6398E v1.X ATX mainboard. The MS-6398E v1.X is based on Intel® Brookdale-E & ICH4 chipsets for optimal system efficiency. Designed to fit the advanced Intel® Pentium® 4 processors in the 478 pin package, the MS-6398E delivers a high performance and professional desktop platform solution.

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Mainboard Specification *1-2*
Mainboard Layout *1-4*
Quick Components Guide *1-5*
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Mainboard Specification

CPU

- Supports Intel® Pentium® 4 processor in 478 pin package.
- Supports 1.5GHz, 1.6GHz, 1.7GHz, 1.8GHz, 1.9GHz, 2GHz, 2.1GHz, 2.2GHz and up.

Chipset

- Intel® Brookdale-E chipset
  - Support 100MHz/133MHz system clock.
  - Intel NetBurst micro-architecture supports 400MHz/533MHz system bus.
  - 1.5V AGP interface with 4x data transfer and 4x fast write capability.
- Intel® ICH4 chipset
  - 2 channel Ultra ATA 100 bus Master IDE controller.
  - PCI Master 2.2.
  - I/O APIC.
  - AC'97 2.2 interface.
  - 3 UHCI Host controllers and 1 EHCI Host controller.

Main Memory

- Supports four memory banks using three 184-pin DDR DIMM.
- Supports up to 2GB PC2100/PC1600 DDR SDRAMs.
- Supports 2.5v DDR SDRAM.

Slots

- One AGP (Accelerated Graphics Port) 4x slot (1.5V only).
- Six PCI 2.2 32-bit Master PCI bus slots (support 3.3V/5V PCI bus interface).
- One CNR (Communication Network Riser) slot.

On-Board IDE

- An IDE controller on the ICH4 chipset provides IDE HDD/CD-ROM with PIO, Bus Master and Ultra DMA66/100 operation modes.
- Can connect up to four IDE devices.
- ATA133 RAID supported by Promise PDC20276.

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 IrDA connector for SIR/ASKIR/HPSIR.
- 1 D-Bracket™ pin header.
- 1 S-Bracket pin header.
- 1 audio/game port.

Audio

- Realtek ALC650 6-channel audio
  - SPDIF out (through S-Bracket only).

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 30.5cm x 23cm**.**

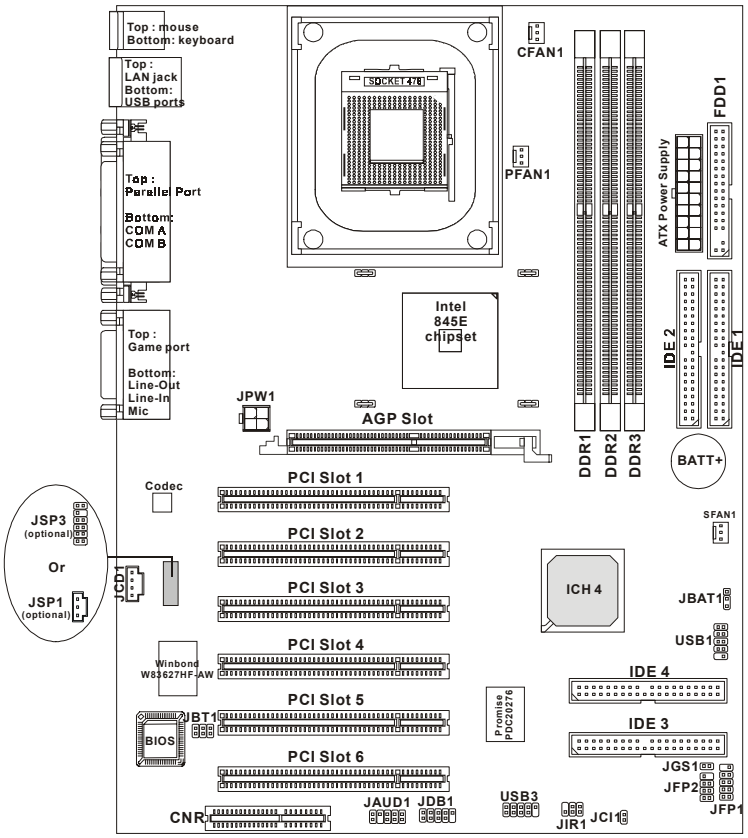
Mounting

- 6 mounting holes.

Others

- Modem (External/Internal) Ring Wake Up Function.
- LAN Wake Up Function.
- Suspend to RAM/Disk.
- PC2001 Compliant.

Mainboard Layout



845E Max2 Series (MS-6398E v1.X) ATX Mainboard

Quick Components Guide

Component	Function	Reference
JWR1	ATX 20-pin power connector	See p. 2-7
JPW1	ATX 12V power connector	See p. 2-7
JKBMS1	Mouse connector	See p. 2-8
JKBMS1	Keyboard connector	See p. 2-9
USB Connectors	Connecting to USB devices	See p. 2-9
COM A & COM B	Serial port connector	See p. 2-10
RJ-45 LAN Jack (optional)	Connecting to network device	See p. 2-10
LPT1	Parallel port connector	See p. 2-11
FDD1	Floppy disk drive connector	See p. 2-13
IDE1~ IDE2	Hard disk connectors	See p. 2-14
IDE3~IDE4 (optional)	ATA133 RAID connectors	See p. 2-15
JCD1	CD-in connector	See p. 2-16
JIR1	IrDA infrared module connector	See p. 2-16
CFAN1/SFAN1/PFAN1	Fan power connectors	See p. 2-17
JGS1	Power saving switch connector	See p. 2-18
JCI1	Chassis intrusion switch	See p. 2-18
JBT1 (optional)	Bluetooth connector	See p. 2-19
JFP1/JFP2	Front panel connector	See p. 2-20
JAUD1	Front panel audio connector	See p. 2-21
USB1/USB3	Front USB connectors	See p. 2-22
JSP1/JSP3	SPDIF connector	See p. 2-24
JDB1	D-Bracket™ 2 connector	See p. 2-26
JBAT1	Clear CMOS jumper	See p. 2-27
AGP Slot	Connecting to AGP cards	See p. 2-28
PCI Slots	Connecting to expansion cards	See p. 2-28
CNR Slot	Connecting to expansion cards	See p. 2-29

MSI Special Features

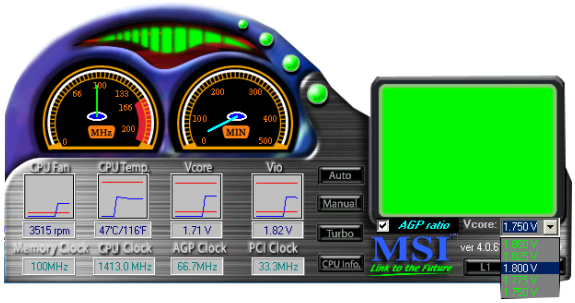
Fuzzy Logic™ III

The Fuzzy Logic™ III utility allows users to overclock the CPU FSB (Front Side Bus) frequency under the Windows operating system. Select the CPU frequency you prefer and click ***Go*** to apply the new setup value or click ***Save*** to allow the system running at the specified frequency each time when you click ***Turbo***. 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.

In the latest Fuzzy Logic™ III utility, we have added two new functions, **AGP Ratio** and **Adjust CPU Vcore**.

To enable the new function, **AGP Ratio**, select the AGP ratio check box and the utility will automatically adjust the AGP ratio and overclock to a higher frequency.

The other function, **Adjust CPU Vcore**, allows you to adjust the CPU Vcore for a more stable voltage control and better overclocking effects.



Features:

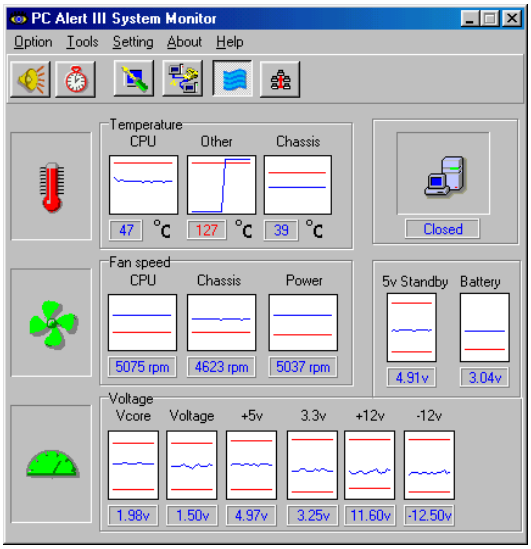
- Display Current System Status
  - CPU Fan
  - CPU Temp.
  - Vcore/Vio
  - Memory/CPU/AGP/PCI Clock
- Adjust CPU FSB Frequency
- Adjust AGP Ratio (applicable only if CPU clock generator supports this function)
- Adjust CPU Vcore

PC Alert™ III

The PC Alert™ III 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 speed(s)
* monitor system voltage
* monitor chassis intrusion

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 users disable the warning.

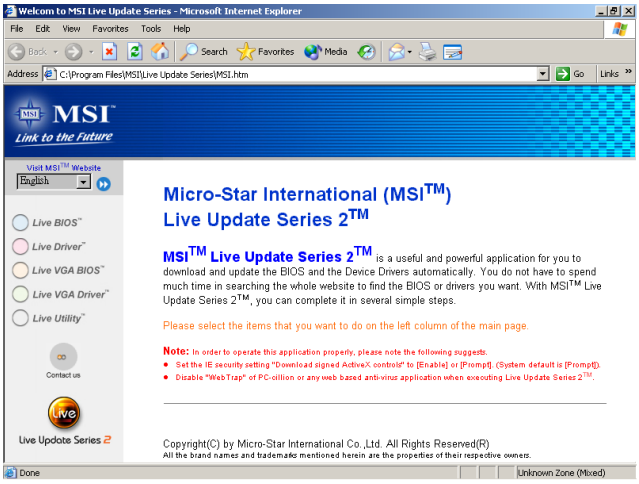


Note: *Items shown on PC Alert III vary depending on your system's status.*

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 whole Web site. To use the function, you need to install the "MSI Live Update Series 2" application. After installation, the "MSI Live Update Series 2" icon (as shown on the right) will appear on the screen.

Double click the "MSI Live Update Series 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.

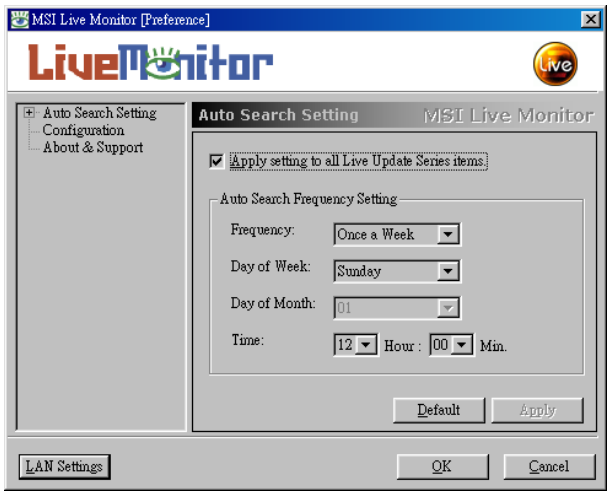
- **Live BIOS** – Updates the BIOS online.
- **Live Driver** – Updates the drivers online.
- **Live VGA BIOS** – Updates the VGA BIOS online.
- **Live VGA Driver** – Updates the VGA driver online.
- **Live Utility** – Updates the utilities online.

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 Series 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 Series 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.



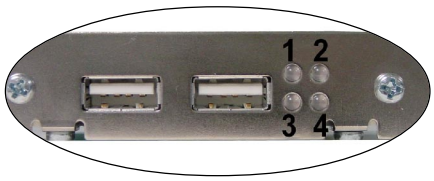
You can right-click the MSI Live Monitor icon to perform the functions listed below:

- **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.

D-Bracket™2 (Optional)

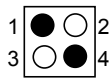
D-Bracket™ 2 is an external USB bracket that supports both USB 1.1 & USB 2.0 spec. It integrates four Diagnostic LEDs, which use graphic signal display to help users understand their system. The LEDs provide up to 16 combinations of signals to debug the system. The 4 LEDs can debug all problems that 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



● **Red** ○ **Green**

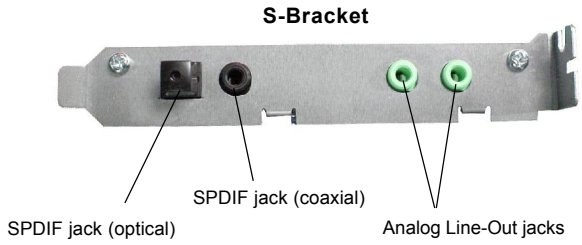
D-Bracket™2	Description
	System Power ON - The D-LED will hang here if the processor is damaged or not installed properly.
	Early Chipset Initialization
	Memory Detection Test - Testing onboard memory size. The D-LED will hang if the memory module is damaged or not installed properly.
	Decompressing 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

S-Bracket (Optional)

S-Bracket is a bracket which provides 2 SPDIF jacks for digital audio transmission and 2 analog Line-Out connectors for additional 4-channel analog audio output. With the S-Bracket, your system will be able to perform 6-channel audio operation for wonderful surround sound effect, or connect to Sony & Philips Digital Interface (SPDIF) speakers for audio transmission with better quality.

The S-Bracket offers two types of SPDIF connectors: one for optical fiber and the other for coaxial connection. Select the appropriate one to meet your own need. For more information on S-Bracket, refer to *Appendix. Using 4- or 6-Channel Audio Function*.



2 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.

TOPICS

Central Processing Unit: CPU	*2-2*
Memory	*2-5*
Power Supply	*2-7*
Back Panel	*2-8*
Connectors	*2-13*
Jumpers	*2-27*
Slots	*2-28*

Central Processing Unit: CPU

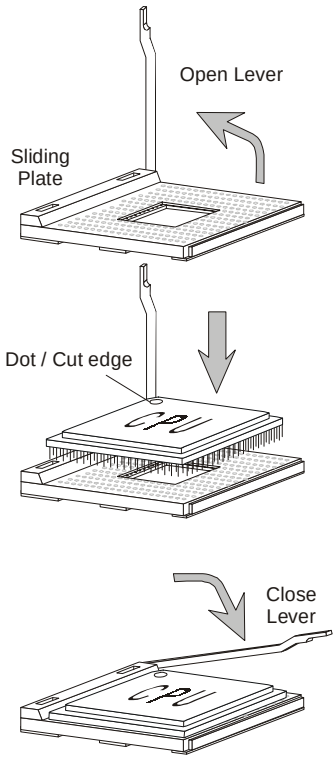
The mainboard supports Intel® Pentium® 4 processor in the 478 pin package. The mainboard uses a CPU socket called PGA478 for easy CPU installation. When you are installing the CPU, **make sure the CPU has a heat sink and a cooling fan attached on the top to prevent overheating.** If you do not find the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

CPU Installation Procedures

1. Pull the lever sideways away from the socket. Then, raise the lever up to a 90-degree angle.

2. Look for the dot/cut edge. The dot/cut edge should point towards the lever pivot. The CPU will only fit in the correct orientation.

3. Hold the CPU down firmly, and then close the lever to complete the installation.

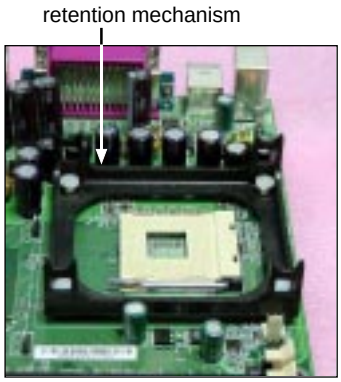


WARNING! *Overheating will seriously damage the CPU and system, always make sure the cooling fan can work properly to protect the CPU from overheating.*

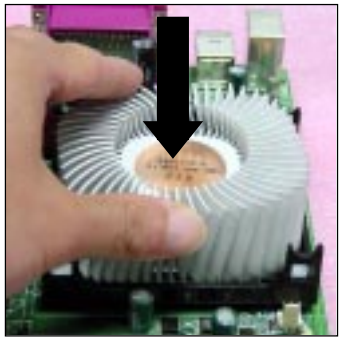
Installing the CPU Fan

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:

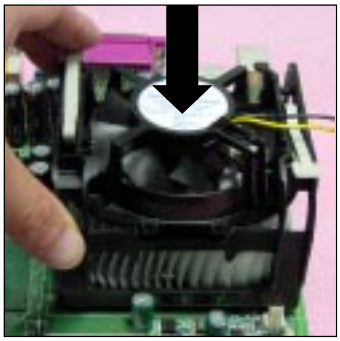
1. Locate the CPU and its retention mechanism on the motherboard.



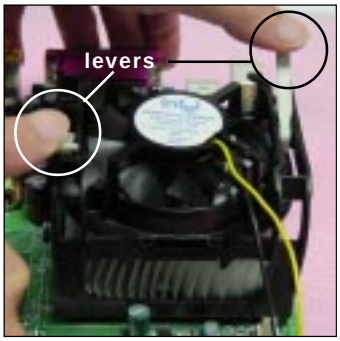
2. Position the heatsink onto the retention mechanism.



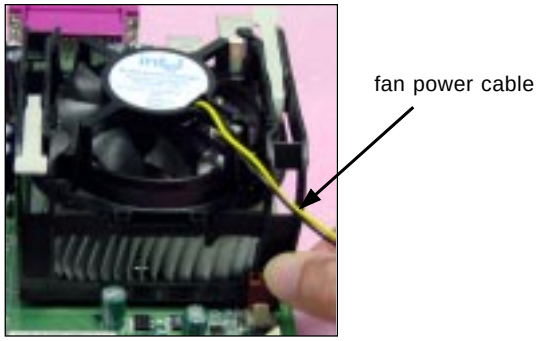
3. Mount the fan on top of the heatsink. Press down the fan until its four clips get wedged in the holes of the retention mechanism.



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.



CPU Core Speed Derivation Procedure

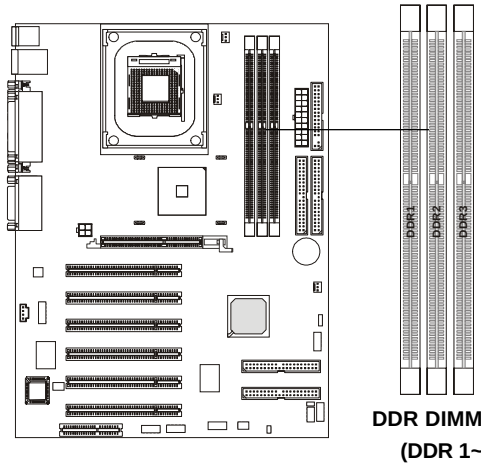
If	CPU Clock	=	100MHz
	Core/Bus ratio	=	14
then	CPU core speed	=	Host Clock x Core/Bus ratio
		=	100MHz x 14
		=	1.4GHz

STOP
WARNING!

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.***

Memory

The mainboard provides 3 slots for 184-pin, 2.5V DDR DIMM with 4 memory banks. You can install PC1600/PC2100 DDR SDRAM modules on the DDR DIMM slots (DDR 1~3). To operate properly, at least one DIMM module must be installed.



DDR DIMM Slots (DDR 1~3)

Introduction to DDR SDRAM

DDR (Double Data Rate) SDRAM is similar to conventional SDRAM, but doubles the rate by transferring data twice per cycle. It uses 2.5 volts as opposed to 3.3 volts used in SDR SDRAM, and requires 184-pin DIMM modules rather than 168-pin DIMM modules used by SDR SDRAM. Two types of DDR are available at the time of writing: PC1600 & PC2100. PC1600 DDR SDRAM running at 100MHz will produce about 1.6GB/s memory bandwidth. PC2100 running at 133MHz will produce 2.1GB/s memory bandwidth. High memory bandwidth makes DDR an ideal solution for high performance PC, workstations and servers.

Note: DIMM 1~3 is separately 2-memory-bank capable. But as Intel® 845E chipset supports only 4 DDR memory banks, the total memory banks installed cannot exceed the maximum quantity of 4. Improper memory installation may possibly cause malfunction.

DDR Module Combination

To enable normal operation, at least one DIMM module should be installed on the motherboard. As Intel® 845E chipset supports 4 DDR memory banks at its maximum, the system memory installed can be up to 2GB.

All three slots can be single-sidedly or double-sidedly installed with 184-pin DDR DIMM modules. Please especially note that DDR 1 alone occupies two memory banks; the rest two banks are shared by DDR 2 & DDR 3. You may install memory modules in the following combination:

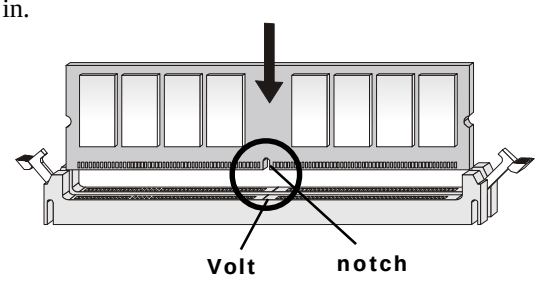
Slot	Combination		
	1	**2**	**3**
DDR 1	S/D	S/D	S/D
DDR 2	D	S	
DDR 3		S	D
Total Memory	64MB~2GB	64MB~2GB	64MB~2GB

S (Single Side): 64MB ~ 512MB **D** (Double Side): 128MB ~ 1GB

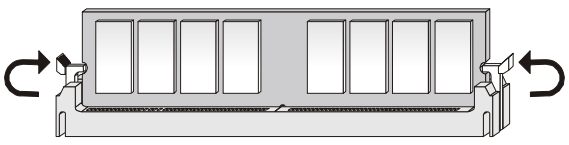
Installing DDR Modules

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.



3. The plastic clip at each side of the DIMM slot will automatically close.



Power Supply

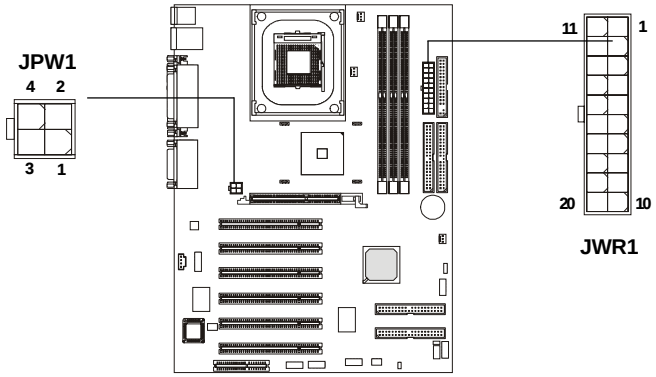
The mainboard supports ATX power supply for the power system. Before inserting the power supply connector, always make sure that all components are installed properly to ensure that no damage will be caused.

ATX 20-Pin Power Connector: JWR1

This connector allows you to connect to an ATX power supply. To connect to the ATX power supply, make sure the plugs 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. The power connector supports **instant power on** function which means that system will boot up immediately when the power supply connector is inserted on the board.

ATX 12V Power Connector: JPW1

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



JPW1 Pin Definition

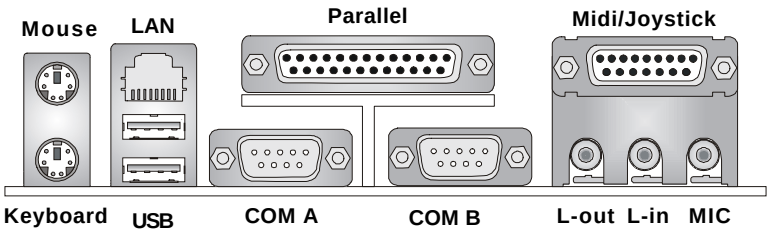
PIN	SIGNAL
1	GND
2	GND
3	12V
4	12V

JWR1 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

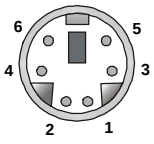
Back Panel

The Back Panel provides the following connectors:



Mouse Connector: JKBMS1

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:



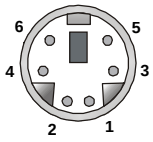
PS/2 Mouse (6-pin Female)

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: JKBMS1

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.



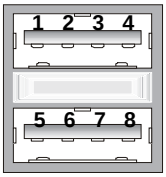
PS/2 Keyboard (6-pin Female)

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 UHCI (Universal 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 ths connector.



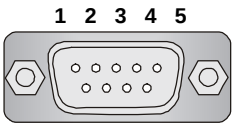
USB Ports

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 Connector: COM A & COM B

The mainboard offers two 9-pin male DIN connectors for serial port COM A and 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 them.



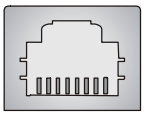
9-Pin Male DIN Connectors

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.



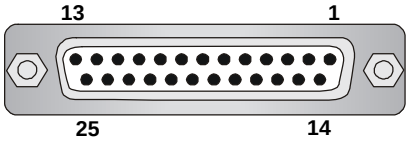
RJ-45 LAN Jack

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 for LPT. A parallel port is a standard printer port that supports Enhanced Parallel Port (EPP) and Extended Capabilities Parallel Port (ECP) mode.

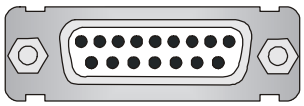


Pin Definition

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 Connectors

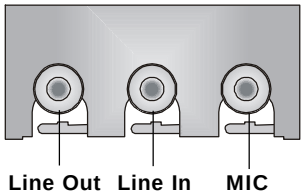
You can connect a joystick or game pad to this connector.



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



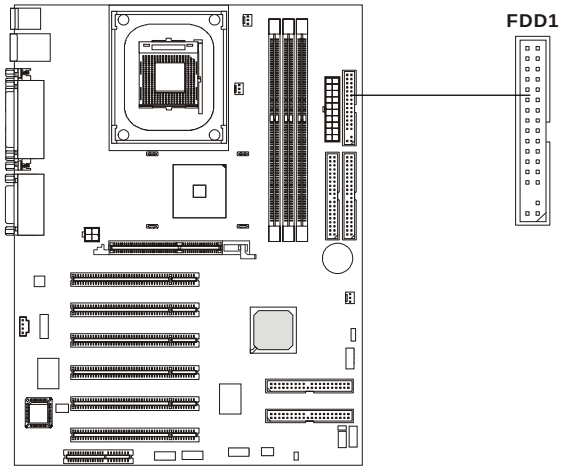
TIP:
The mainboard offers ***support for 6-channel audio operation*** *and can turn rear audio connectors from 2-channel to 4-/6-channel audio. For more information on the issue, refer to Appendix. Using 4- or 6-Channel Audio Function.*

Connectors

The mainboard provides connectors to connect to FDD, IDE HDD, case, modem, LAN, USB Ports, IR module and CPU/System FAN.

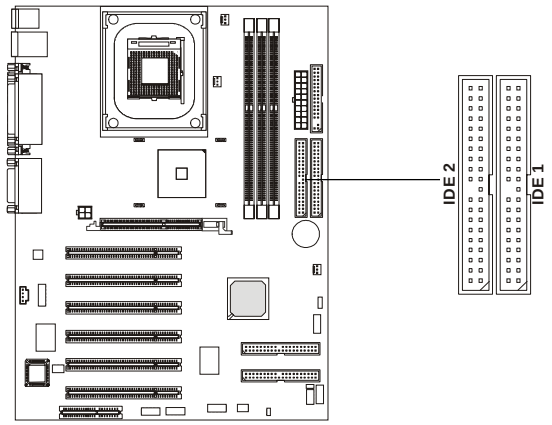
Floppy Disk Drive Connector: FDD1

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



Hard Disk Connectors: IDE1 & IDE2

The mainboard has a 32-bit Enhanced PCI IDE and Ultra DMA 33/66/100 controller that provides PIO mode 0~4, Bus Master, and Ultra DMA/33/66/100 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.

TIP:

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.

ATA133 RAID Connectors: IDE3 & IDE4 (Optional)

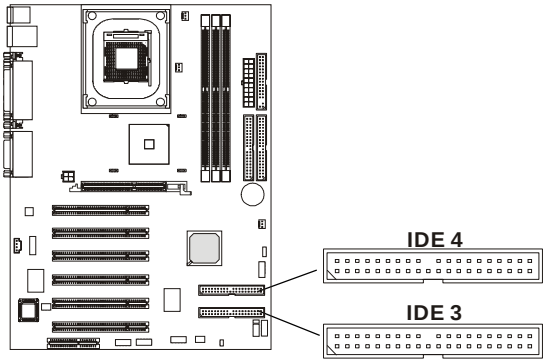
The mainboard offers high-end Ultra ATA/133 RAID (0 or 1) hard drive interface specifications supported through Promise® PDC20276 controller .

The Ultra ATA/133 interface boosts data transfer rates between the computer and the hard drive up to 133 megabytes (MB) per second. The new interface is one-third faster than earlier record-breaking Ultra ATA/100 technology and is backwards-compatible with the existing Ultra ATA interface.

The low-cost RAID (Redundant Array of Independent Disks) solution integrates two IDE RAID connectors that support PIO mode 0-4, Bus Master, and Ultra DMA 33/66/100/133 modes. The IDE RAID connectors allow you to connect Ultra ATA/DMA hard disks and use RAID technology (RAID 0 striping or RAID 1 mirroring) for high performance, data security and fault tolerance.

ATA133 RAID Connectors

- You can connect a Master drive to each IDE RAID connector.
- The two connectors support **hard disk drives** only.
- For more information on ATA133 RAID, please refer to ***ATA133 RAID 0 or 1 Quick User's Guide.***

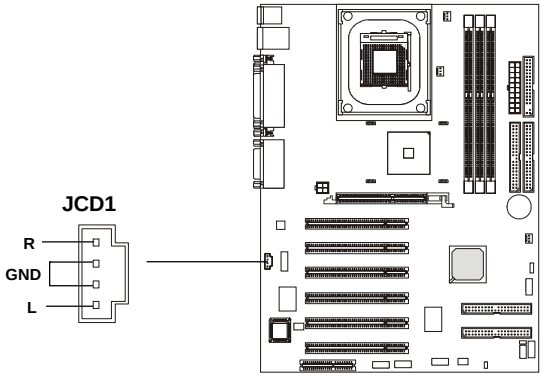


TIP:

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.

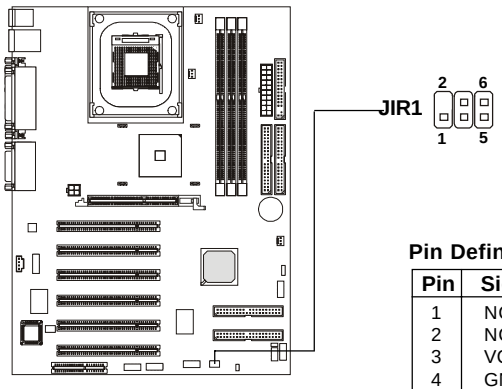
CD-In Connector: JCD1

The connector is for CD-ROM audio connector.



IrDA Infrared Module Header: JIR1

This connector allows you to connect to IrDA Infrared modules. You must configure the setting through the BIOS setup to use the IR function. The IR2 is compliant to Intel Front Panel I/O Connectivity Design Guide.

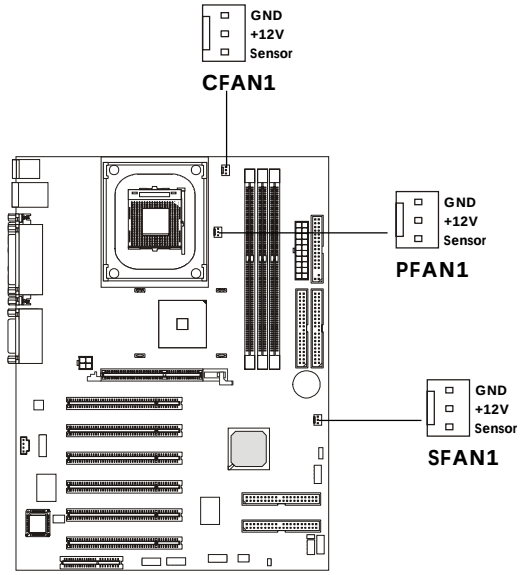


Pin Definition

Pin	Signal
1	NC
2	NC
3	VCC
4	GND
5	IRTX
6	IRRX

Fan Power Connectors: CFAN1/SFAN1/PFAN1

The CFAN1 (processor fan), PFAN1 (power supply fan) & SFAN1 (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.



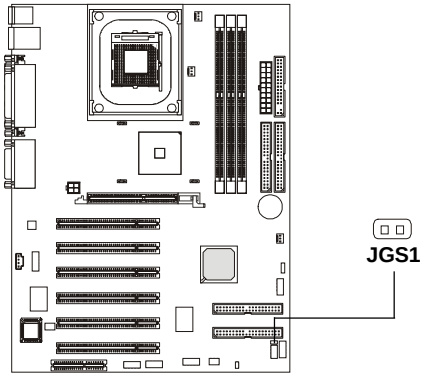
Note:

1. Always consult the vendor for proper CPU cooling fan.

2. CPU Fan supports the fan control. You can install the PC Alert utility that will automatically control the CPU Fan speed according to the actual CPU temperature.

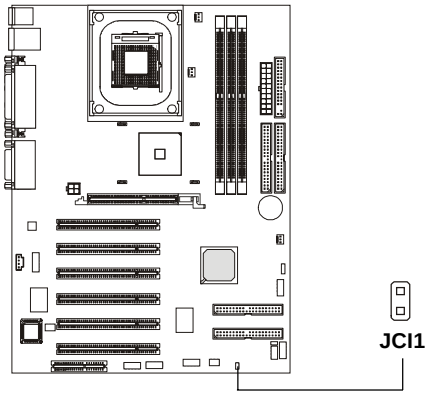
Power Saving Switch Connector: JGS1

Attach a power saving switch to this connector. Pressing the switch once will have the system enter the sleep/suspend state. Press any key to wake up the system.



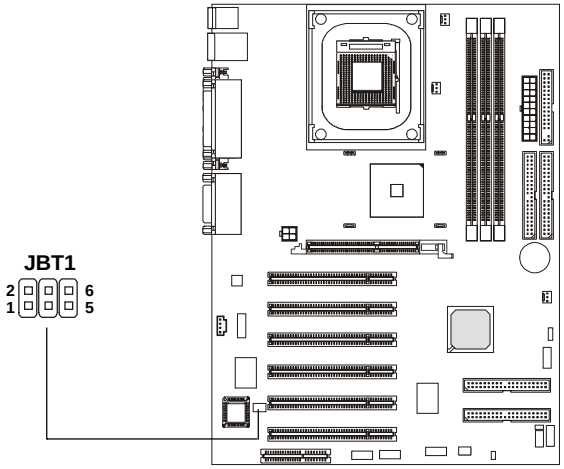
Chassis Intrusion Switch Connector: JCI1

This connector is connected to a 2-pin chassis switch. If the chassis is opened, the switch will be short. The system will record this status and show a warning message on the screen. To clear the warning, you must enter the BIOS utility and clear the record.



Bluetooth Connector: JBT1 (Optional)

This connector is used to connect a bluetooth module for wireless application.



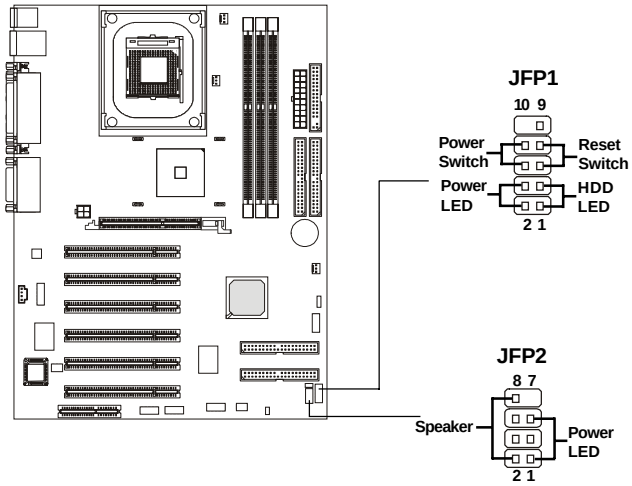
JBT1 Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	VCC5	2	3VDUAL
3	D+ (USB signal)	4	GND
5	D- (USB signal)	6	GND

Note:
Because the bluetooth connector shares the USB interface with blue-colored USB2.0 connector, the bottommost USB2.0 port will not function when you attach a bluetooth module to this connector.

Front Panel Connectors: JFP1 & JFP2

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



JFP1 Pin Definition

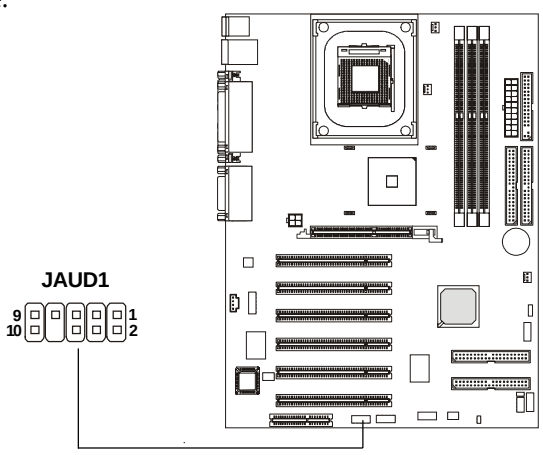
PIN	SIGNAL	DESCRIPTION
1	HD_LED_P	Hard disk LED pull-up
2	FP PWR/SLP	MSG LED pull-up
3	HD_LED_N	Hard disk active LED
4	FP PWR/SLP	MSG LED pull-up
5	RST_SW_N	Reset Switch low reference pull-down to GND
6	PWR_SW_P	Power Switch high reference pull-up
7	RST_SW_P	Reset Switch high reference pull-up
8	PWR_SW_N	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.

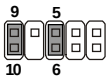


Pin Definition

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

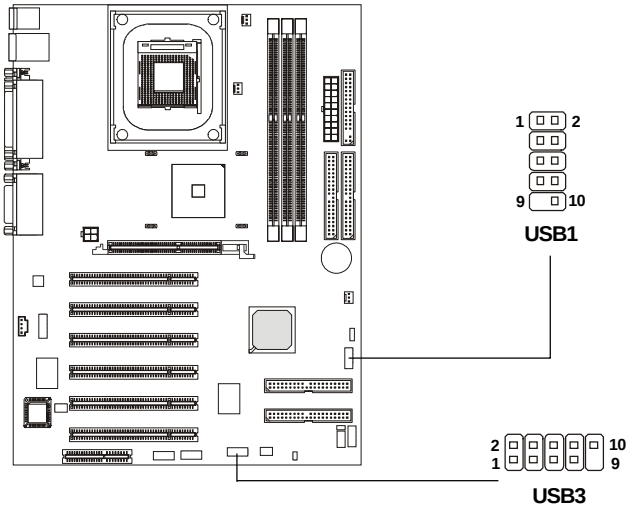
Note:

If you don't want to connect to the front audio header, pins 5 & 6, 9 & 10 have to be shorted by jumper caps 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 Connector: USB1/USB3

The mainboard provides two USB 2.0 pin headers USB1 & USB3 (optional USB 2.0 Bracket available). 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**. Both USB1 & USB3 are compliant with Intel® Front Panel I/O Connectivity Design Guide.

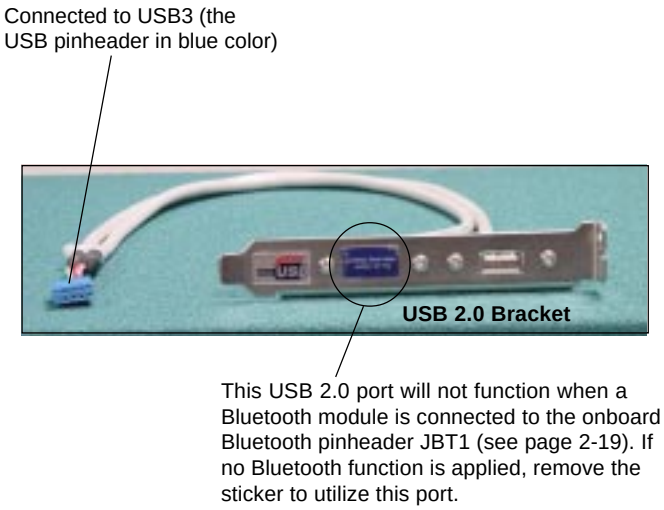


Pin Definition

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

To Attach the Optional USB 2.0 Ports:

1. Take out the USB 2.0 bracket
2. Locate the blue USB pinheader (USB3) on the motherboard.
3. Connect the USB cable from USB 2.0 bracket to the USB3 pinheader.

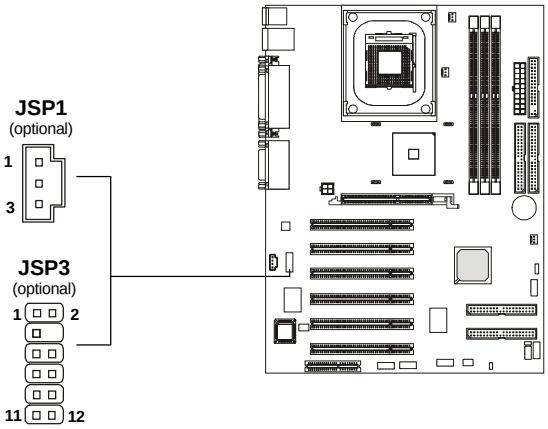


4. Place the USB 2.0 bracket into the appropriate slot of the system case.

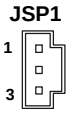
Note: *The USB 2.0 controller is backwards compatible with USB 1.1 spec. To use the USB 2.0 ports, you still need to install USB 2.0 driver, which is supplied by Microsoft for Windows® 2000 and XP. If you have any problems regarding USB 2.0 driver, please visit Microsoft website for more information.*

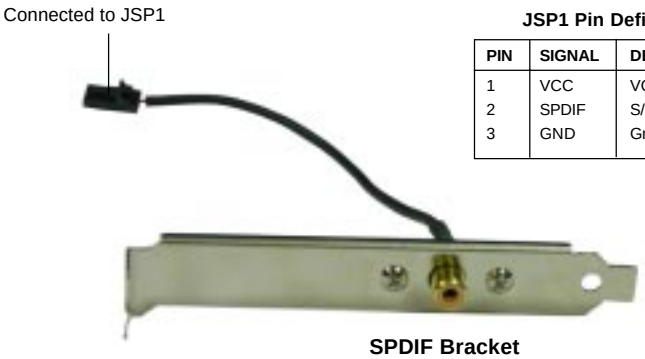
SPDIF Connector: JSP1 or JSP3

The mainboard comes with two optional SPDIF (Sony & Philips Digital Interface) connectors for digital audio transmission. Users can choose either the JSP1 or the JSP3 depending on their needs.



The JSP1 supports SPDIF output only and can be connected to an external SPDIF Bracket for digital audio transmission.





JSP1 Pin Definition

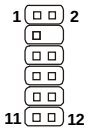
PIN	SIGNAL	DESCRIPTION
1	VCC	VCC5V
2	SPDIF	S/PDIF Output
3	GND	Ground

SPDIF Bracket

The JSP3 supports SPDIF input/output and 4-channel audio output. It allows users to connect an external S-Bracket. The S-Bracket offers 2 SPDIF jacks for digital audio transmission (one for optical fiber connection and the other for coaxial connection), and 2 analog Line-Out jacks for 4-channel audio output.

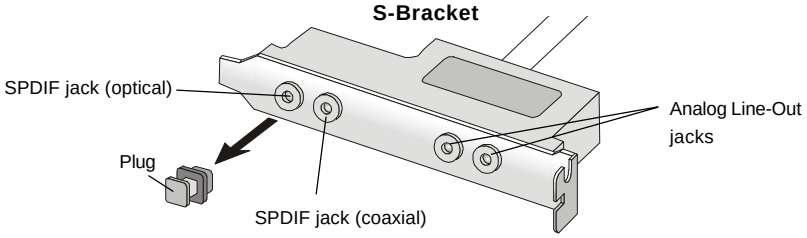
To attach the fiber-optic cable to optical SPDIF jack, you need to remove the plug from the jack first. The two SPDIF jacks support *SPDIF output* only. For more information on the S-Bracket, refer to *Appendix. Using 4- or 6-Channel Audio Function*.

JSP3



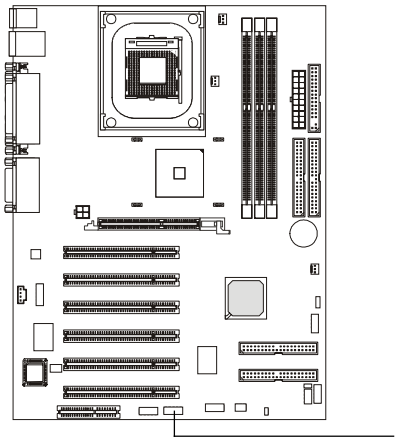
JSP3 Pin Definition

PIN	SIGNAL	DESCRIPTION	PIN	SIGNAL	DESCRIPTION
1	VCC5	VCC 5V	2	VDD3	VDD 3.3V
3	SPDFO	S/PDIF output	4	(No Pin)	Key
5	GND	Ground	6	SPDFI	S/PDIF input
7	LFE-OUT	Audio bass output	8	SOUT-R	Audio right surrounding output
9	GET-OUT	Audio center output	10	SOUT-L	Audio left surrounding output
11	GND	Ground	12	GND	Ground



D-Bracket™ 2 Connector: JDB1

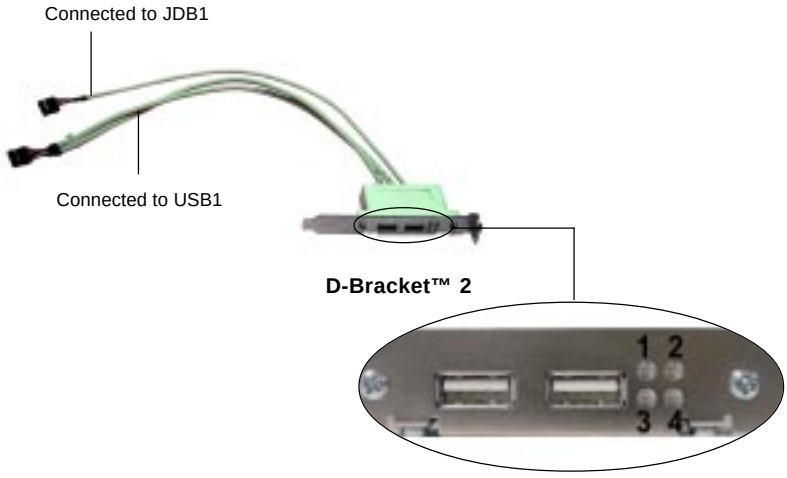
The D-Bracket™ 2 is a USB Bracket that supports both USB 1.1 & 2.0 spec. It integrates four LEDs and allows users to identify system problems through 16 various combinations of LED signals. For definitions of 16 signal combinations, please refer to *D-Bracket™ 2* in *Chapter 1*.



JDB1 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

JDB1



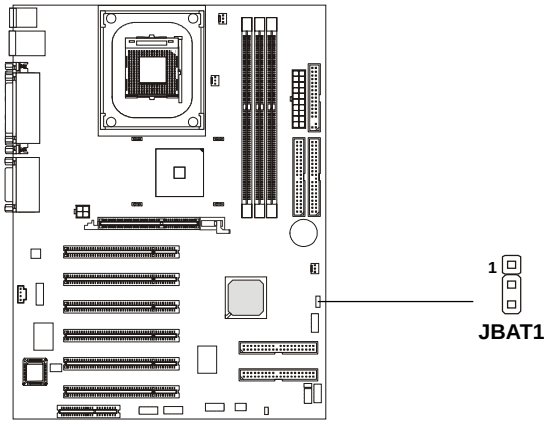
D-Bracket™ 2

Jumpers

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

Clear CMOS Jumper: JBAT1

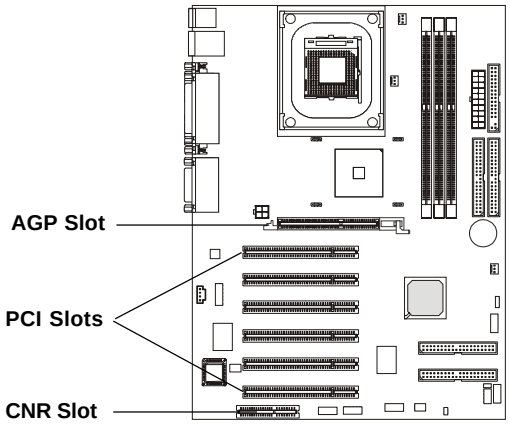
There is a CMOS RAM on board that has a power supply from external battery to keep the data of system configuration. With the CMOS RAM, the system can automatically boot OS every time it is turned on. That battery has long life time for at least 5 years. If you want to clear the system configuration, use the JBAT1 (Clear CMOS Jumper) to clear data. Follow the instructions below to clear the data:



WARNING! *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 six 32-bit Master PCI bus slots, one AGP slot and one CNR slot.



AGP (Accelerated Graphics Port) Slot

The AGP 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 and provides three levels of throughputs: 1x (266Mbps), 2x (533Mbps) and 4x (1.07Gbps).

STOP
WARNING!

*The AGP slot **DOES NOT support 3.3V AGP card**. Use of 3.3V AGP card may cause damages to the mainboard. To identify the spec of your AGP card, refer to the documentation supplied with the AGP card or check the view of its contact pins (golden fingers) before you install it.*

PCI 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 expansioncard

to make any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.

CNR (Communication Network Riser)

The CNR slot allows you to insert the CNR expansion cards. CNR is a specially designed network, audio, or modem riser card for ATX family motherboards. Its main processing is done through software and controlled by the motherboard's chipset.

PCI Interrupt Request Routing

The IRQ, abbreviation 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 A#	INT B#	INT C#	INT D#
PCI Slot 2	INT B#	INT C#	INT D#	INT A#
PCI Slot 3	INT C#	INT D#	INT A#	INT B#
PCI Slot 4	INT D#	INT A#	INT B#	INT C#
PCI Slot 5	INT B#	INT C#	INT D#	INT A#
PCI Slot 6	INT A#	INT B#	INT C#	INT D#

3 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.

TOPICS

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Set Supervisor/User Password	3-27
Load High Performance/BIOS Setup Defaults	3-28

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
<F5>	Restore the previous CMOS value from CMOS, only for Option Page Setup Menu
<F6>	Load High Performance Defaults
<F7>	Load BIOS Setup 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

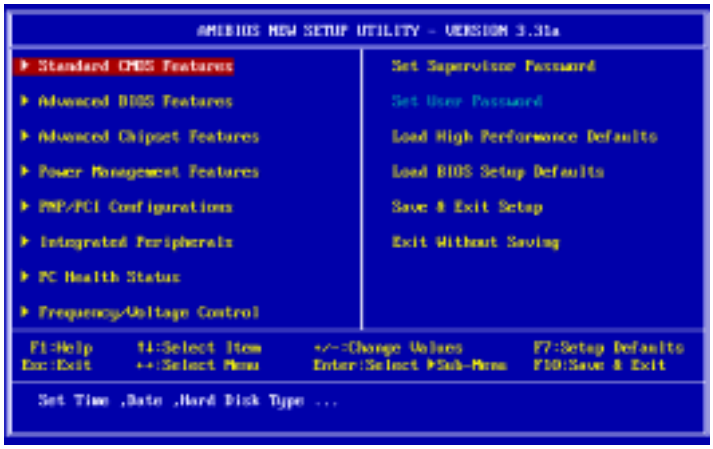
The main menu displays the setup categories the BIOS supplies. You can use the arrow keys (↑↓) to select the item. The on-line description for the selected setup category is displayed at the bottom of the screen.

Default Settings

The BIOS setup program contains two kinds of default settings: the BIOS Setup and High Performance Defaults. BIOS Setup Defaults provide stable but minimal performance settings for all devices and the system, while High Performance Defaults provide the best system performance but may affect the system stability.

The Main Menu

Once you enter AMIBIOS NEW SETUP UTILITY, the Main Menu will appear on the screen. The Main Menu displays twelve 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 your PC health status.

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

Set Supervisor/User Password
Use this menu to set User and Supervisor Passwords.

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

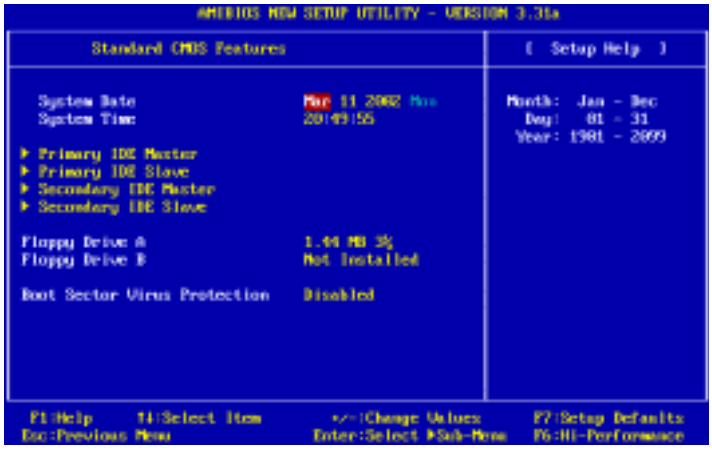
Load BIOS Setup Defaults
Use this menu to load factory default settings into the BIOS for stable system performance operations.

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 Date

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

day	Day of the week, from Sun to Sat, determined by BIOS. Read-only.
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.

System Time

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

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.

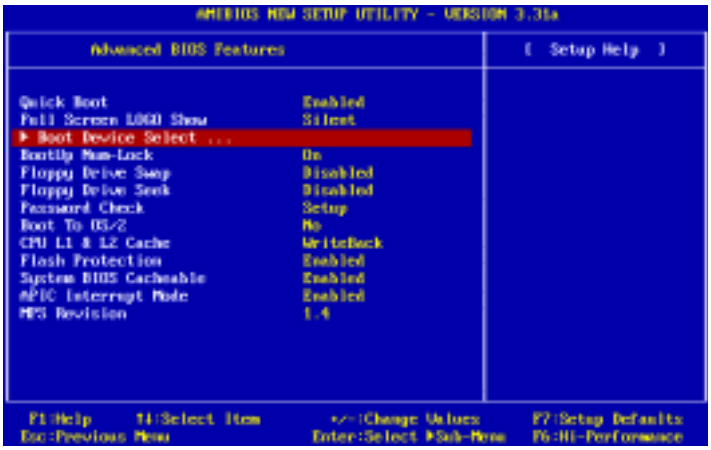
TYPE	Type of the device.
SIZE	Capacity of the device.
CYLS	Number of cylinders.
HEAD	Number of heads.
PRECOMP	Write precompensation.
LANDZ	Cylinder location of Landing zone.
SECTOR	Number of sectors.
MODE	Access mode.

Floppy Drive A:/B:
This item allows you to set the type of floppy drives installed. Available options: *Not Installed, 360 KB 5¼, 1.2 MB 5¼, 720 KB 3½, 1.44 MB 3½* and *2.88 MB 3½*.

Boot Sector 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*.

Note: *This feature only protects the boot sector, not the whole hard disk.*

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* and *Disabled*.

Full Screen Logo Show
This item enables you to show the company logo on the bootup screen. Settings are:

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

Boot Device Select
Press <Enter> to enter the sub-menu and the following screen 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.
SCSI	The system will boot from the SCSI.
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.
Disabled	Disable this sequence.

***Note**: Available settings for "1st/2nd/3rd" 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.*

Try Other Boot Devices

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.

BootUp Num-Lock

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* and *Off*.

Floppy Drive Swap
This setting switches the floppy disk drives between being designated as A and B. Setting options: *Disabled, Enabled.*

Floppy Drive Seek
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*.

Password Check
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 To OS/2
This setting allows you to run the OS/2® operating system with DRAM greater than 64MB. Setting options: *Yes, No.*

CPU L1 & L2 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) and external cache (also known as L2 or level 2 cache). Setting options: *Disabled, WriteBack, WriteThru. 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.

Flash Protection
This function protects the BIOS from accidental corruption by unauthorized

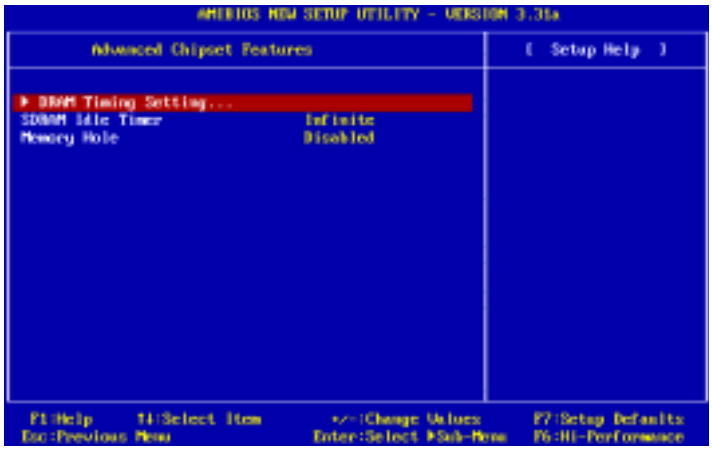
users or computer viruses. When enabled, the BIOS' data cannot be changed when attempting to update the BIOS with a Flash utility. To successfully update the BIOS, you'll need to disable this Flash Protection function. Setting options: *Disabled, Enabled*.

System BIOS Cacheable
Selecting *Enabled* allows caching of the system BIOS ROM at F0000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result. Setting options: *Enabled, Disabled*.

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

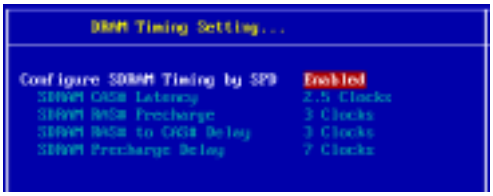
MPS Revision
This field allows you to select which MPS (Multi-Processor Specification) version to be used for the operating system. You need to select the MPS version supported by your operating system. To find out which version to use, consult the vendor of your operating system. Settings: *1.4* and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

Advanced Chipset Features



Note: *Change these settings only if you are familiar with the chipset.*

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



Configure SDRAM Timing by SPD
This setting determines whether SDRAM timing is controlled by the SPD (Serial Presence Detect) EEPROM on the DRAM module. Setting to *Enabled* enables the following fields automatically to be determined by BIOS based on the configurations on the SPD. Selecting *Disabled* allows users to configure these fields manually.

SDRAM CAS# Latency
The field controls the CAS latency, which determines the timing delay before SDRAM starts a read command after receiving it. Setting options: *2.5 Clocks, 2 Clocks*. *2 Clocks* increases system performance while *2.5 Clocks* provides more stable system performance.

SDRAM RAS# Precharge
This setting controls the number of cycles for Row Address Strobe (RAS) to be allowed to precharge. If insufficient time is allowed for the RAS to accumulate its charge before DRAM refresh, refresh may be incomplete and DRAM may fail to retain data. This item applies only when synchronous DRAM is installed in the system. Setting options: *2 Clocks, 3 Clocks*.

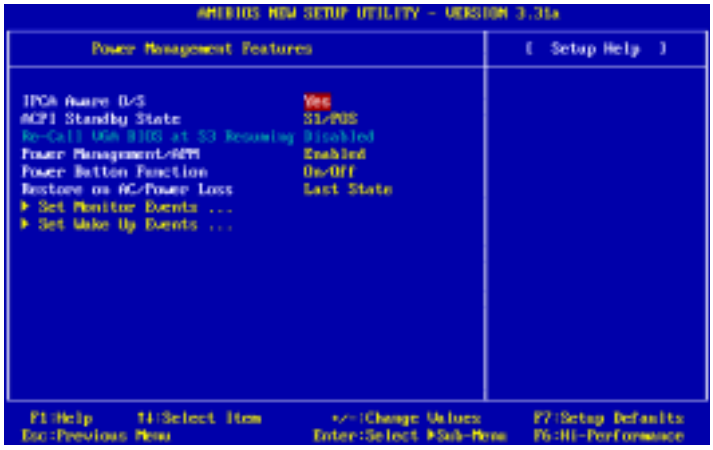
SDRAM RAS# to CAS# Delay
When DRAM is refreshed, both rows and columns are addressed separately. This setup item allows you to determine the timing of the transition from RAS (row address strobe) to CAS (column address strobe). The less the clock cycles, the faster the DRAM performance. Setting options: *3 Clocks, 2 Clocks*.

SDRAM Precharge Delay
This setting controls the precharge delay, which determines the timing delay for DRAM precharge. Setting options: *5 Clocks, 6 Clocks, 7 Clocks*.

SDRAM Idle Timer
This setting selects the amount of time in HCLKs that the DRAM controller waits to close a DRAM page after the CPU becomes idle.

Memory Hole
In order to improve performance, certain space in memory can be reserved for ISA cards. This memory must be mapped into the memory space below 16MB. When this area is reserved, it cannot be cached. Setting options: *Disabled, 15MB-16MB*.

Power Management Features



IPCA Aware O/S
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, select *Yes*. Available options: *Yes* and *No*.

ACPI Standby State
This item specifies the power saving modes for ACPI function. 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 information of system cofiguration 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 an “wake up” event occurs.

Re-Call VGA BIOS at S3 Resuming
This setting allows the system to initialize the VGA BIOS from S3 (Suspend to RAM) sleep state. Setting options: *Enabled* and *Disabled*.

Power Management/APM
Setting to *Enabled* will activate an Advanced Power Management (APM) device to enhance Max Saving mode and stop CPU internal clock. Settings are *Disabled* and *Enabled*.

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

On/Off	The power button functions as normal on/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.

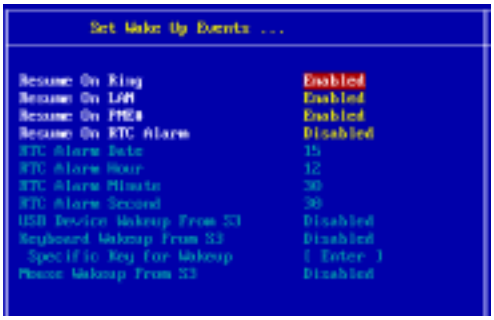
Restore on AC/Power Loss
This setting specifies whether your system will reboot after a power failure or interrupts occurs. Available settings are:

Power Off	Leaves the computer in the power off state.
Power On	Reboots the computer.
Last State	Restores the system to the status before power failure or interrupt occurs.

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

MIDI Ports, Primary/Secondary Master/Slave IDE
These items specify if the BIOS will monitor the activity of the specified hardware peripherals or components. If set to *Monitor*, any activity detected on the specified hardware peripherals or components will wake up the system or prevent the system from entering the power saving modes. Settings: *Monitor* and *Ignore*.

Set Wake Up Events
Press <Enter> to enter the sub-menu and the following screen appears:



Resume On Ring/LAN
When setting to *Enabled*, the features allow your system to be awakened from the power saving modes through an incoming call from the modem or any incoming signal received via the LAN. Settings: *Enabled* and *Disabled.*

Note: You need to install a modem/LAN card supporting power on function for Resume On Ring/LAN function.

Resume On PME#
When setting to *Enabled*, the feature allows your system to be awakened from the power saving modes through any event on PME (Power Management Event). Settings: *Enabled* and *Disabled.*

Resume On RTC Alarm
This is used to enable or disable the feature of booting up the system on a scheduled time/date from the soft off (S5) state. Settings: *Enabled* and *Disabled*.

RTC Alarm Date/Hour/Minute/Second
If *Resume On RTC 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*

***Note**: If you change these settings, you must reboot the system until it enters the operating system and then power off the system. By doing so, the changed settings will come into effect next time when you power on the system.*

USB Device Wakeup From S3
This item allows the activity of the USB device to wake up the system from S3 (Suspend to RAM) sleep state. Settings: *Enabled* and *Disabled.*

Keyboard Wakeup From S3
This item allows the activity of the keyboard to wake up the system from S3 (Suspend to RAM) sleep state. Settings: *Enabled* and *Disabled*.

Specific Key for Wakeup
This setting allows users to set a specific key for the *Keyboard Wakeup From S3* function.

Mouse Wakeup From S3
This item allows the activity of the mouse to wake up the system from S3 (Suspend to RAM) sleep state. Settings: *Enabled* and *Disabled*.

PNP/PCI Configurations

This section describes configuring the PCI bus system and PnP (Plug & Play) feature. PCI, or Peripheral Component Interconnect, 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.

Plug and Play Aware O/S

When set to *Yes*, BIOS will only initialize the PnP cards used for booting (VGA, IDE, SCSI). The rest of the cards will be initialized by the PnP operating system like Windows® 95 or 98. When set to *No*, BIOS will initialize all the PnP cards. So, select *Yes* if the operating system is Plug & Play aware.

Clear NVRAM

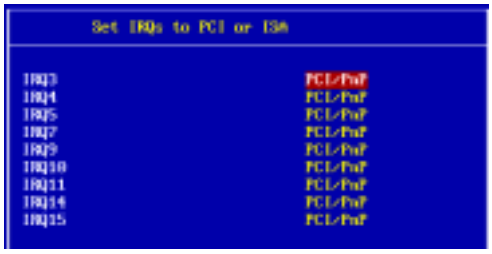
The ESCD (Extended System Configuration Data) NVRAM (Non-volatile Random Access Memory) is where the BIOS stores resource information for both PNP and non-PNP devices in a bit string format. When the item is set to *Yes*, the system will reset ESCD NVRAM right after the system is booted up and then set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

PCI Latency Timer (clock)
This feature controls how long each PCI device can hold the bus before another takes over. The larger the value, the longer the PCI device can retain control of the bus. As each access to the bus comes with an initial delay before any transaction can be made, low values for the PCI Latency Timer will reduce the effective PCI bandwidth while higher values improve it.

Primary Graphics Adapter
This item specifies which VGA card is your primary graphics adapter. Settings: *PCI* and *AGP*.

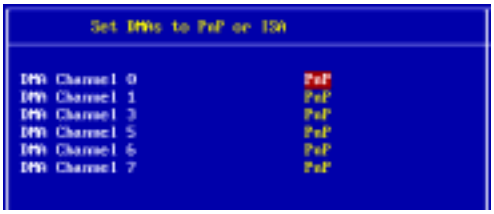
PCI Slot 1/6, 2/5, 3, 4 IRQ Priority
These items specify the IRQ line for each PCI slot. Settings: *3, 4, 5, 7, 9, 10, 11* and *Auto*. Selecting *Auto* allows BIOS to automatically determine the IR line for each PCI slot.

Set IRQs to PCI or ISA
Press <Enter> to enter the sub-menu and the following screen appears:



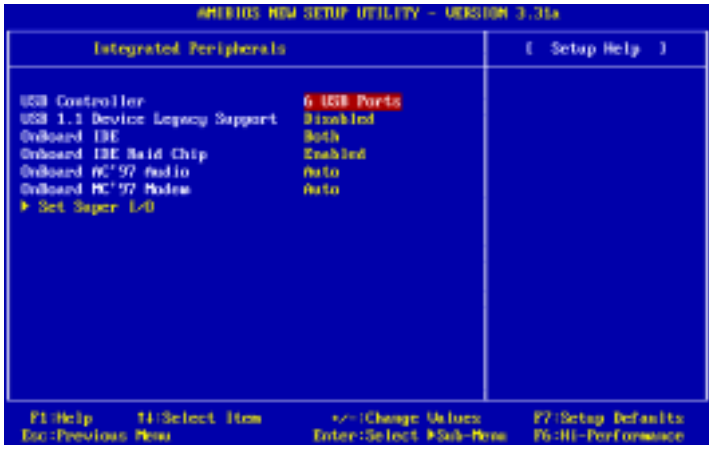
IRQ 3/4/5/7/9/10/11/14/15
These items specify the bus where the specified IRQ line is used.
The settings determine if AMIBIOS should remove an IRQ from the pool of available IRQs passed to devices that are configurable by the system BIOS. The available IRQ pool is determined by reading the ESCD NVRAM. 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 Controller
This setting is used to enable/disable the onboard USB controllers.

USB 1.1 Device Legacy Support
Set to *All Device* if your need to use any USB 1.1 device in the operating system that does not support or have any USB 1.1 driver installed, such as DOS and SCO Unix. Set to *No Mice* only if your want to use any USB device other than the USB mouse. Setting options: *Disabled, No Mice, All Device.*

OnboardIDE
This setting controls the on-chip IDE controller. Setting options: *Disabled, Primary, Secondary, Both.*

Onboard IDE RAID Chip
This allows you to enable/disable the onboard ATA133 RAID controller. Setting options: *Disabled, Enabled.*

Onboard AC'97 Audio
Auto allows the mainboard to detect whether an audio device is used. If the device is detected, the onboard AC'97 (Audio Codec'97) controller will be enabled; if not, it is disabled. Disable the controller if you want to use other controller cards to connect an audio device. Settings: *Auto, Disabled.*

OnboardMC'97Modem
Auto allows the mainboard to detect whether a modem is used. If a modem is used, the onboard MC'97 (Modem Codec'97) controller will be enabled; if not, it is disabled. Disable the controller if you want to use other controller cards to connect to a modem. Settings: *Auto, Disabled.*

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

OnboardFDC
This is used to enable or disable the onboard Floppy controller.

Option	Description
Auto	BIOS will automatically determine whether to enable the onboard Floppy controller or not.
Enabled	Enables the onboard Floppy controller.
Disabled	Disables the onboard Floppy controller.

Onboard Serial Port A/B
These items specify the base I/O port addresses of the onboard Serial Port 1 (COM A)/Serial Port 2 (COM B). Selecting *Auto* allows AMIBIOS to automatically determine the correct base I/O port address. Settings: *Auto, 3F8/COM1, 2F8/COM2, 3E8/COM3, 2E8/COM4* and *Disabled.*

Serial Port B Mode
This item sets the operation mode for Serial Port B. Settings: *Normal, 1.6uS, 3/16 Baud* and *ASKIR* (the last three operation modes are setting

options for IR function).

IR Pin Select
Set to *IRRX/IRTX* when using an internal IR module connected to the IR connector. Set to *SINB/SOUTB.* when connecting an IR adapter to COM B.

Onboard Parallel Port
This field specifies the base I/O port address of the onboard parallel port. Selecting *Auto* allows AMIBIOS to automatically determine the correct base I/O port address. Settings: *Auto, 378, 278, 3BC* and *Disabled*.

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

EPP Version
The item selects the EPP version used by the parallel port if the port is set to *EPP* mode. Settings: *1.7* and *1.9.*

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

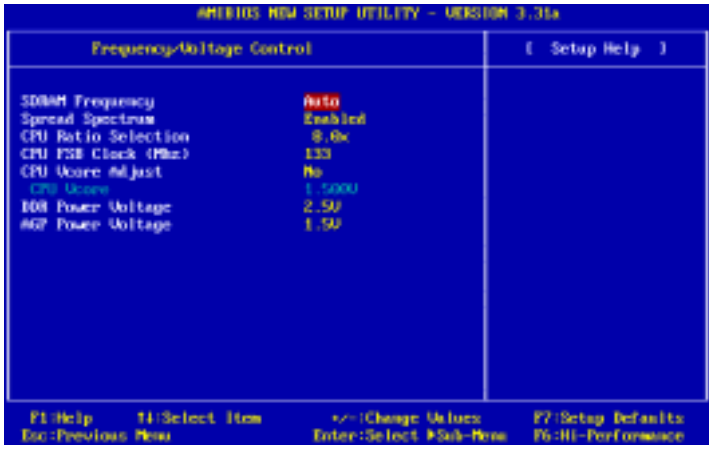
This section monitors the current hardware status including CPU/system temperature, CPU/system fan speeds, Vcore etc. Monitor function is available only if there is hardware monitoring mechanism onboard.

CPU/System/Power Fan Speed, CPU/System Temperature, Vcore, 3.3V, +5.0V, +12.0V, -12.0V, -5.0V, Battery

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

Frequency/Voltage Control

This section controls the frequency/voltage of the CPU and certain onboard hardware to enhance overall system performance.



SDRAM Frequency
Use this item to configure the clock frequency of the installed SDRAM. Settings are: *Auto, 200MHz, 266MHz*.

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.

CPU Ratio Selection
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.

CPU FSB Clock (Mhz)
This setting allows you to select the CPU Front Side Bus clock frequency. Setting options: *100MHz~200MHz* at 1MHz increment.

CPU Vcore Adjust
This setting is used to adjust the CPU core voltage (Vcore), making overclocking possible.

Note: *Changing CPU Vcore could result in unstable system; therefore, it is not recommended to change the default setting for long-term purpose.*

DDR/AGP Power Voltage
The item is to adjust the DDR/AGP voltage to increase the DDR/AGP rate. Modifying the setting may lead to unstable system, so changing the DDR/AGP Vcore for long-term use is not recommended.

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 PASSWORD CHECK option of the ADVANCED BIOS FEATURES menu. If the PASSWORD CHECK 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.

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 High Performance/BIOS Setup Defaults

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

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

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

WARNING!

The option is for experienced 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.*

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

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

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

Installing the Audio Driver *A-2*
Using 4-/6-Channel Audio Function *A-4*
Testing the Connected Speakers *A-11*
Playing KaraOK *A-12*

Installing the Audio Driver

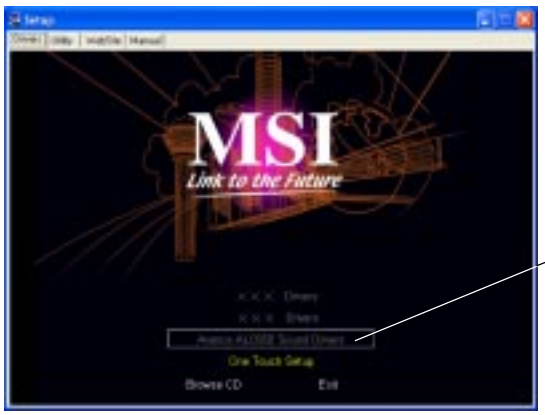
You need to install the driver for Realtek ALC650 chip to function properly before you can get access to 4-/6-channel audio operations. Follow the procedures described below to install the drivers for different operating systems.

Installation for Windows 98SE/ME/2000/XP

For Windows® 2000, you must install Windows® 2000 Service Pack2 or later before installing the driver.

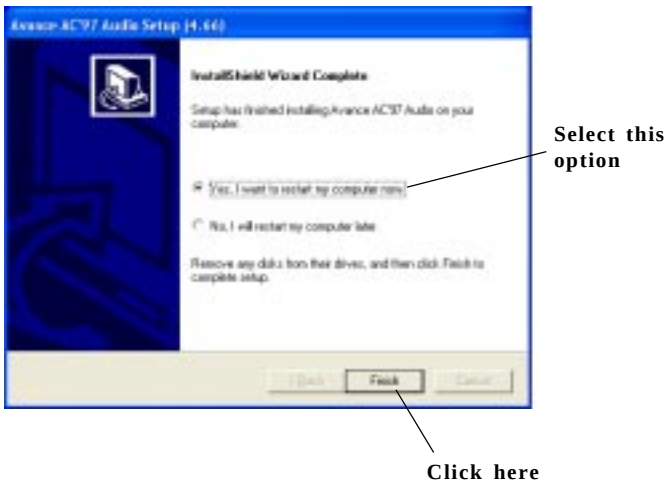
The following illustrations are based on Windows® XP environment and could look slightly different if you install the drivers in different operating systems.

1. Insert the companion CD into the CD-ROM drive. The setup screen will automatically appear.
2. Click **Avance ALC650 Sound Drivers**.



3. Click **Next** to start installing files into the system.

4. Click **Finish** to restart the system.



Using 4- or 6-Channel Audio Function

After installing the audio driver, you are able to use the 4-/6-channel audio feature now. To enable 4- or 6-channel audio operation, first connect 4 or 6 speakers to the appropriate audio connectors, and then select 4- or 6-channel audio setting in the software utility.

There are two ways to utilize the function and connect the speakers to your computer:

- *Use the optional S-Bracket*. If your motherboard supports S-Bracket and you have installed S-Bracket in the computer, you can connect two speakers to back panel's Line-Out connector, and the rest of speakers to S-Bracket.
- *Use the back panel only*. If you do not have a S-Bracket, you can connect all speakers to the audio connectors on the back panel.

Attaching Speakers

To perform multichannel audio operation, connect multiple speakers to the system. You should connect the same number of speakers as the audio channels you will select in the software utility.

Note:
If the Center and Subwoofer speaker exchange their audio channels when you play video or music on the computer, a converter may be required to exchange center and subwoofer audio signals. You can purchase the converter from a speaker store .

Using S-BRACKET connectors:

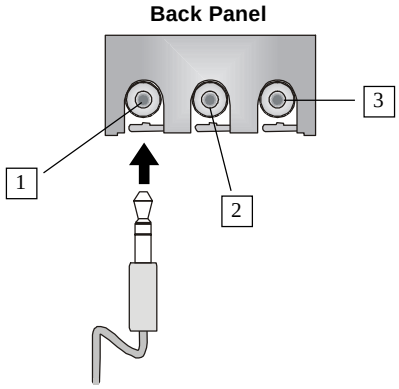
S-Bracket is an optional accessory. It gives access to analog and digital audio output by integrating both SPDIF (Sony & Philips Digital Interface) and analog LINE OUT connectors. To use the S-Bracket, you should select correct setting in the software utility. For information about the setting, refer to *Selecting 4- or 6-Channel Setting* later in the section.

Connector configurations for 2-, 4- and 6-channel using S-Bracket are described below:

2-Channel Analog Audio Output

We recommend that you should still attach the speakers to BACK PANEL's Line Out connector during 2-channel audio mode even though S-Bracket's Line Out connectors function properly.

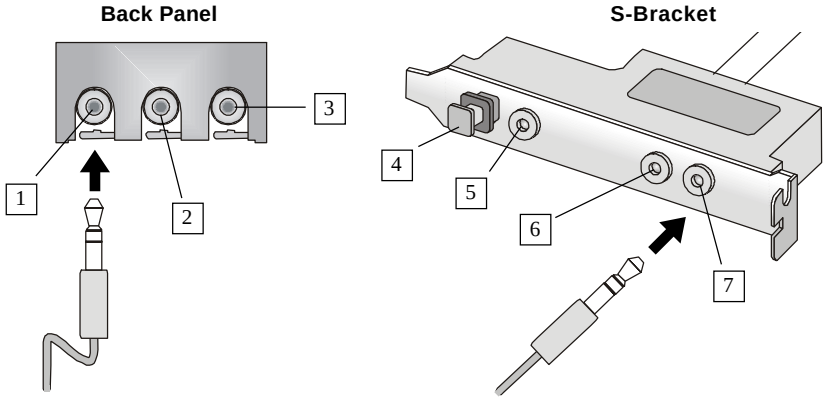
1 Line Out *(Front channels)*
2 Line In
3 MIC



4-Channel Analog Audio Output

1 Line Out *(Front channels)*
2 Line In
3 MIC
4 Optical SPDIF jack
5 Coaxial SPDIF jack
6 Line Out *(Center and Subwoofer channel)*
7 Line Out *(Rear channels)*

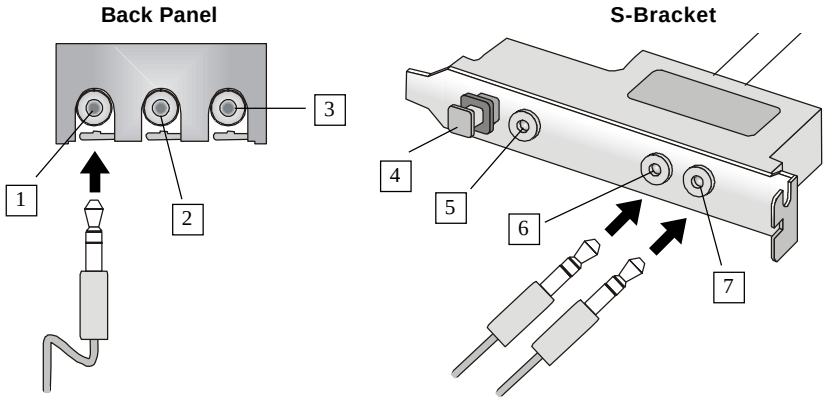
Description:
Connect two speakers to back panel's Line Out connector and two speakers to one Line Out connector of S-Bracket.



6-Channel Analog Audio Output

1. Line Out *(Front channels)*
2. Line In
3. MIC
4. Optical SPDIF jack
5. Coaxial SPDIF jack
6. Line Out *(Center and Subwoofer channel)*
7. Line Out *(Rear channels)*

Description:
Connect two speakers to back panel's Line Out connector and four speakers to both Line Out connectors of S-Bracket.



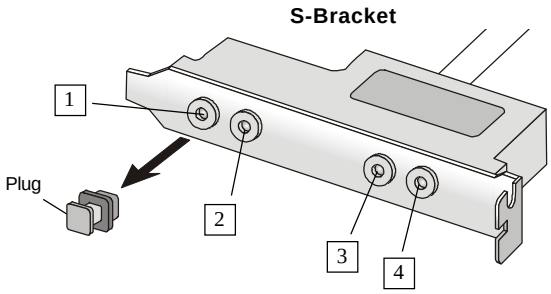
Digital Audio Output (2-Channel only)

For digital audio output, use the SPDIF (Sony & Philips Digital Interface) connectors supplied by *S-Bracket*. First, connect the SPDIF speakers to the appropriate SPDIF jack, and then select the audio channel you desire through the control panel of speakers. The SPDIF connectors support 2-channel audio operation only.

S-Bracket offers two types of SPDIF jacks: one for fiber-optic cable and the other for coaxial cable. Select the connector according to the type of your SPDIF speakers.

1 Optical SPDIF jack
2 Coaxial SPDIF jack
3 Line Out
4 Line Out

Description:
Select the correct type of SPDIF jack to connect SPDIF speakers. For optical connection, remove the plug from the S-Bracket before inserting the fiber-optic cable to it.



Using BACK PANEL connectors only:

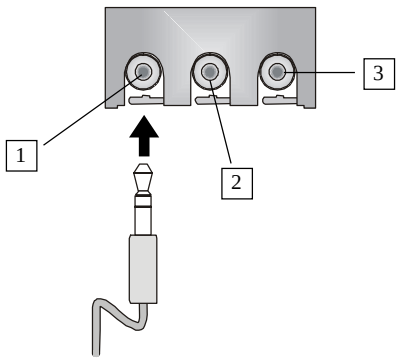
The audio connectors on the back panel already provide 2-channel analog audio output function. The back panel's audio connectors can be transformed to 4-/6-channel analog audio connectors automatically when you select correct setting in the software utility. For information about the setting, refer to *Selecting 4- or 6-Channel Setting* later in the section.

Make sure all speakers are connected to *Line Out* connectors. Diverse connector configurations for 2-, 4- and 6-channel using back panel connectors are described below:

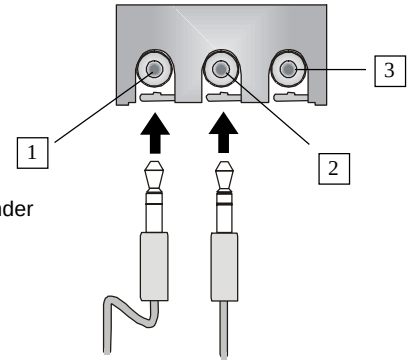
2-Channel Analog Audio Output

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

Description:
Line Out, Line In and MIC functions all exist under 2-channel configuration.



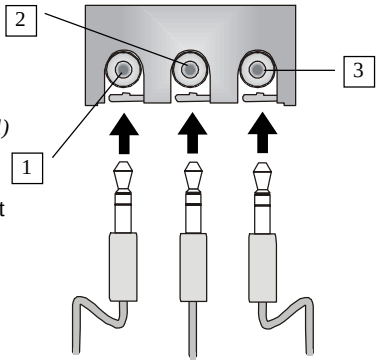
4-Channel Analog Audio Output



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

Description:
Line In is converted to Line Out function under 4-channel configuration.

6-Channel Analog Audio Output

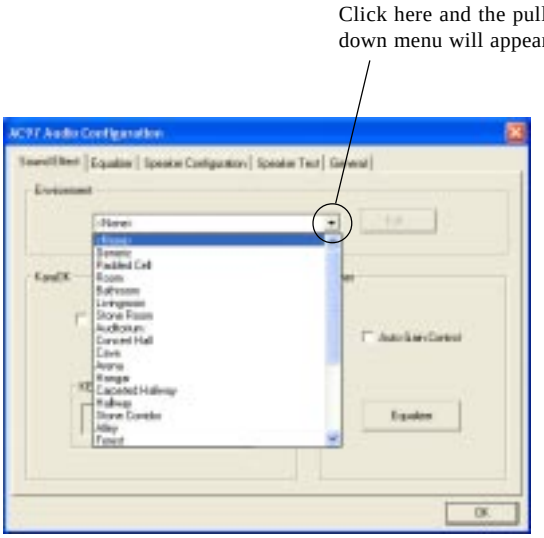


1. Line Out *(Front channels)*
2. Line Out *(Rear channels)*
3. Line Out *(Center and Subwoofer channel)*

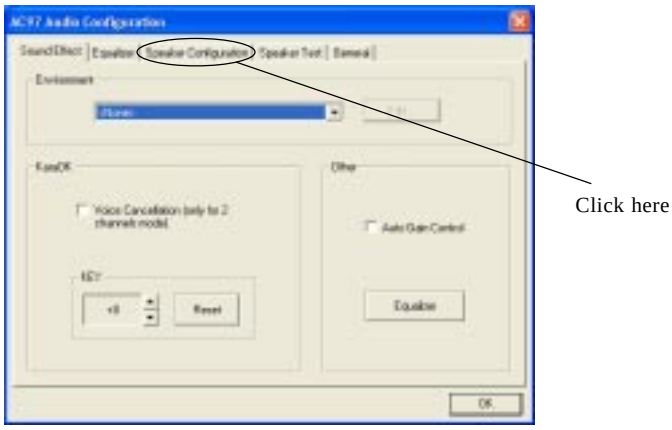
Description:
Both Line In and MIC are converted to Line Out function under 6-channel configuration.

Selecting 4- or 6-Channel Setting

1. Click the audio icon from the window tray at the bottom of the screen.
2. Select any surround sound effect you prefer from the “Environment” pull-down menu under the **Sound Effect** tab.



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



4. The following window appears.

5. Select the multi-channel operation you prefer from **No. of Speakers**.

6. Select the audio device that you wish to use as audio output connectors. There are two options for this:

- ☐ Use S-Bracket — Make sure **Use S-Bracket** is NOT selected if you want to use audio connectors on the back panel only.

  ☞ *Refer to "Using BACK PANEL connectors only" earlier in the section for how to attach speakers.*

- ☐ Use S-Bracket — Select **Use S-Bracket** if you want to use audio connectors supplied by the connected S-Bracket.

  ☞ *Refer to "Using S-BRACKET connectors" earlier in the section for how to attach speakers.*

7. Click **OK**.

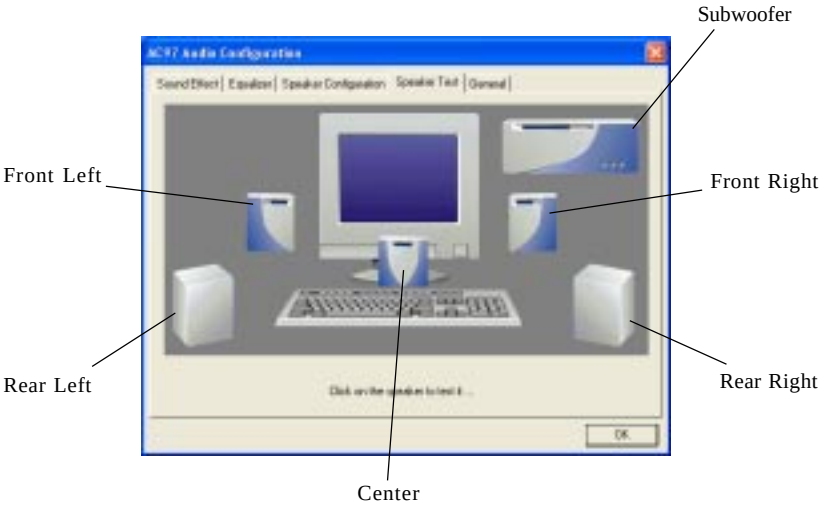
> ***Note:***
> *It is useless to select "Use S-Bracket" if your motherboard does not support or have the S-Bracket installed in the system.*

Testing the Connected Speakers

To ensure 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 bottom of the screen.
2. Click the **Speaker Test** tab.
3. The following window appears.



4. Select the speaker which you want to test by clicking on it.

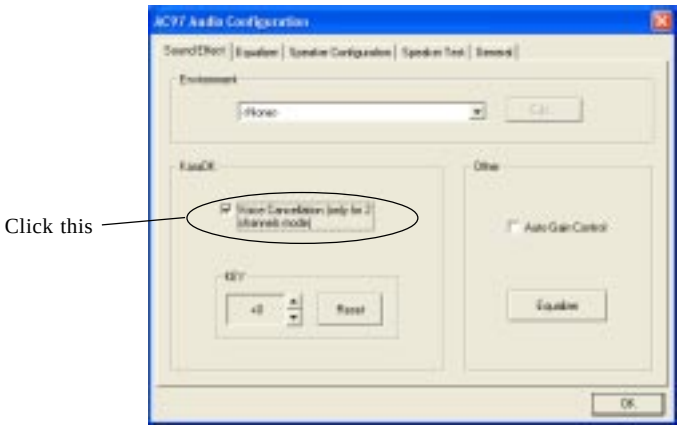
Note:
6 speakers appear on the "Speaker Test" window only when you select "6 channels mode" in the "No. of Speakers" column. If you select "4 channels mode", only 4 speakers appear on the window.

Playing KaraOK

The KaraOK function will automatically remove human voice (lyrics) and leave melody for you to sing the song. **The function is applied only for 2-channel audio operation,** so make sure "2 channels 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 bottom of the screen.
2. Make sure the **Sound Effect** tab is selected.
3. Select **Voice Cancellation** in the "KaraOK" column.



4. Click **OK**.

Glossary

ACPI (***A**dvanced **C**onfiguration & **P**ower **I**nterface*)
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 (***A**ccelerated **G**raphics **P**ort*)
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.

ATX
A modern shape and layout of mainboard that supersedes the widely-used Baby AT form factor. It improves many placement of components and makes a more efficient design.

BIOS (***b**asic **i**nput/**o**utput **s**ystem*)
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.

CMOS (***c****omplementary* ***m****etal-****o****xide* ***s****emiconductor*)
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.

COM
In MS-DOS system, the name of a serial communications port. DOS supports four serial ports. For example, if a modem is connected to one serial port and a serial mouse to another, they are identified as COM1 and COM2.

DIMM (***d****ual* ***i****n-line* ***m****emory* ***m****odule*)
A small circuit board that holds memory chips. A ***SIMM*** *(****s****ingle* ***i****n-line* ***m****emory* ***m****odule)* has a 32-bit path to the memory chips whereas a DIMM has 64-bit path.

DRAM (***D****ynamic* ***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 (***e**rror **c**orrecting **c**ode memory*)
A type of memory that contains special circuitry for testing the accuracy of data and correcting the errors on the fly.

IDE (***I**ntegrated **D**rive **E**lectronics*)
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.

IrDA (***I**nfrar**e**d **D**ata **A**ssociation*)
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.

LAN (***l**ocal **a**rea **n**etwork*)
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.

LED (***l**ight **e**mitting **d**iode*)
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 (***l**ine **p**rinter **t**erminal*)
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.

PCI (***P****eripheral* ***C****omponent* ***I****nterconnect*)
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 (***P****lug a****n****d* ***P****lay*)
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 (***P****ower* ***O****n* ***S****elf* ***T****est*)
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.

USB (***u****niversal* ***s****erial* ***b****us*)
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.