

MSI

K7D Master
MS-6501 (v1.X) ATX Mainboard



Version 1.0
G52-MA00415

Manual Rev: 1.0
Release Date: Jan.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.



Edition

Jan.2002

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Revision History

Revision	Revision History	Date
V1.0	First release	Jan. 2002

Safety Instructions

1. Read the safety instructions carefully.
2. Save this User' s Guide for possible use later.
3. Keep this equipment away from humidity.
4. Lay this equipment on a stable and flat surface before setting it up.
5. The openings on the enclosure are used for air convection and to prevent the equipment from overheating. Note: Do not cover the openings.
6. Make sure that the power voltage is within its safety range and has been adjusted properly to the value of 110/220V before connecting the equipment to the power inlet.
7. Place the powercord in a way that people are unlikely to step on it. Do not place anything on 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 the equipment or cause an electrical shock.
11. If any of the following situations arises, get the equipment checked by a service personnel:
 - the powercord 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 Guide
 - the equipment was dropped and damaged
 - the equipment has obvious signs of breakage
12. Do not leave the equipment in an unconditioned environment with a storage temperature of 60⁰ C (140⁰F) or above, which may damage the equipment.



CAUTION: To prevent explosion caused by improper battery replacement, use the same or equivalent type of battery recommended by the manufacturer only.

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Getting Started **1**

Thank you for your purchase of the MSI mainboard. The MS-6501 V1.X ATX mainboard is an excellent computer mainboard based on the innovative **AMD-762™ & 768™** chipsets, which supports the dual AMD Athlon™ MP processors series and provides you a cost-effective solution to meet your needs.

TOPICS

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Chapter 1

Mainboard Specification

CPU

- Supports dual Socket A (Socket-462) for AMD Athlon™MP processors
- Supports up to Athlon MP 1900+ or higher

Chipset

- AMD-762™chipset (949 BGA)
 - Supports 200MHz High speed, split transaction system bus
 - A 66/33MHz 64/32bit PCI 2.2 compliant bus interface supports up to seven bus masters
 - The 66MHz AGP 2.0 compliant interface supports 1x, 2x, and 4x data transfer mode
- AMD-768™chipset (492 BGA)
 - Host (primary) PCI bus utilizes a 66 MHz, 32-bit interface.
 - Enhanced IDE controller (through ATA100)
 - LPC bus to connect peripherals such as super IO and BIOS
 - Extensive ACPI-compliant power management logic
 - IO APIC controller
 - AC97 soft audio controller

Clock Generator

- 100/133MHz clocks are supported (266 MHz Internal System Bus)

Main Memory

- Supports eight memory banks using four 184-pin unbuffered DDR DIMMs
- Supports DDR SDRAM DIMM
- Supports a maximum memory size of 4GB (registered DDR only).

Slots

- One AGP (Accelerated Graphics Port) ProSlot (4X mode)
- Two 64-bit/66MHz and three 32-bit/33MHz PCI Slots
- Supports 3.3v/5v PCI bus interface

On-Board IDE

- An IDE controller on the AMD-768™chipset provides IDE HDD/CD-ROM with PIO, BusMaster and Ultra DMA 100 operation modes
- Can connect up to four IDE devices

Getting Started

Audio

- 🔍 Chip Integrated
 - Direct Sound AC97 Audio

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/HP connector for SIR/CIR/FIR/ASKIRHPSIR
 - 1 audio/game port

Network (optional)

- 🔍 Intel®82559ER LAN Controller
 - Integrated IEEE802.3 10-BaseT & 100-BaseTXPHY

BIOS

- 🔍 The mainboard BIOS provides “Plug & Play” function 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 25.2cm

Mounting

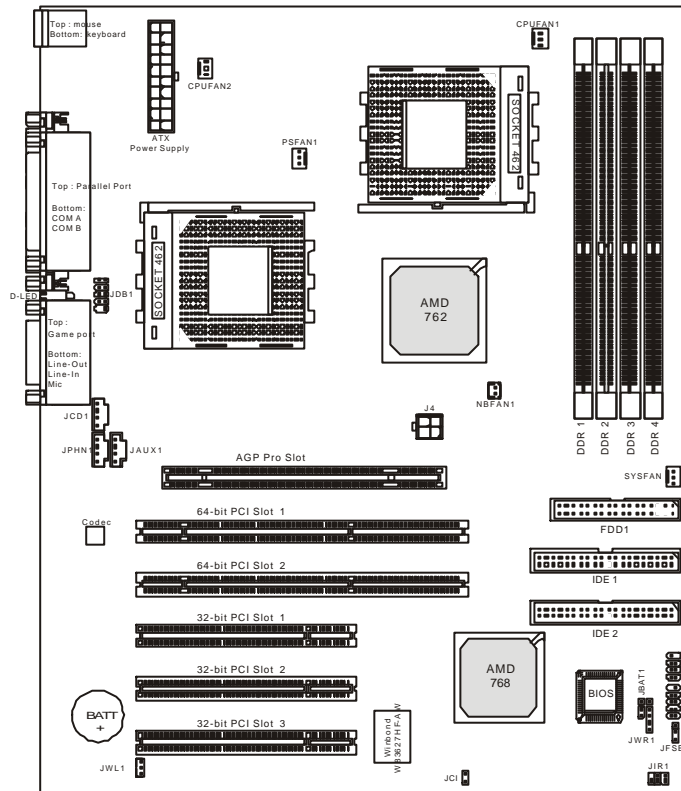
- 🔍 9 mounting holes

Others

- 🔍 PC Alert System Hardware Monitor
- 🔍 Suspends to RAM/Disk
- 🔍 Supports LAN (optional)

Chapter 1

Mainboard Layout



**K7D Master ATX Mainboard
(MS-6501 v1.X)**

Quick Components Guide

Component	Function	Reference
JFSB1	For CPU Clock Frequency	See p. 2-5
JPWR1	ATX 20-pin power connector	See p. 2-10
J4	ATX 12V power connector	See p. 2-11
JKBMS1	Mouse connector	See p. 2-12
JKBMS1	Keyboard connector	See p. 2-13
COM A & COM B	Serial port connector	See p. 2-13
LPT 1	Parallel port connector	See p. 2-14
FDD1	Floppy disk drive connector	See p. 2-16
IDE1 ~ IDE2	Hard disk connectors	See p. 2-17
JFP1/JFP2	Case connectors	See p. 2-18
JCD1	CD-in connector	See p. 2-19
JAUX1	Aux line-in connector	See p. 2-19
JPHN1	Modem-in connector	See p. 2-19
JWR1	Wake on ring connector	See p. 2-20
JWL1	Wake on LAN connector	See p. 2-20
CPUFAN1/CPUFAN2/ SYSFAN/PSEFAN1/NBEFAN1	Fan power connectors	See p. 2-21
JDB1	D-Bracket connector	See p. 2-22
JIR1	IrDA infrared module connector	See p. 2-23
JCI1	For Chassis intrusion switch	See p. 2-24
JBAT1	Clear CMOS jumper	See p. 2-25
AGP Pro Slot	Connecting to AGP Pro card	See p. 2-26
PCI Slots	Connecting to expansion cards	See p. 2-27

Chapter 1

MSI Special Features

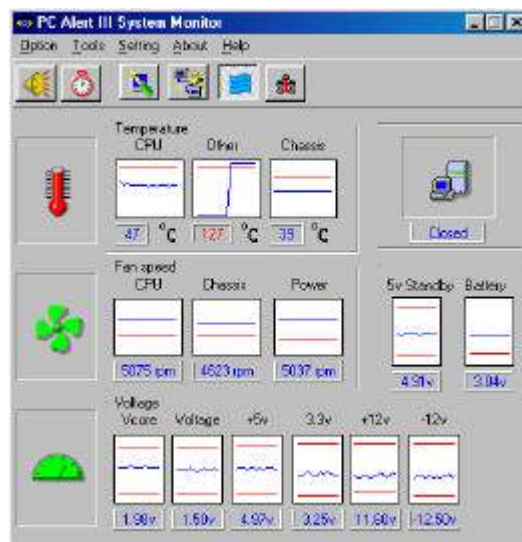
The MSI special features are designed by MSIR & D which are only available in MSI mainboards.

PC Alert™ III

The PC Alert™ III is an 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 user disables the warning.



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

Fuzzy Logic™II

The Fuzzy Logic™II utility allows users to overclock the CPU FSB (Front Side Bus) frequency in the Windows environment. Select the CPU frequency you prefer and click *Go* to apply the frequency or click *Save* allowing the system to run at the specified frequency each time when the system is powered on.



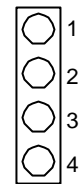
Features:

- Display Current System Status
 - CPU Fan
 - CPU Temp.
 - Vcore
 - Vio
 - Memory Clock
 - CPU Clock
 - AGP Clock
 - PCI Clock
- Adjust CPUFSB Frequency

Chapter 1

D-LED™ & D-Bracket™ (Optional)

The D-LED™ uses graphic signal display to help users understand their system. Four LEDs embedded in the mainboard 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.



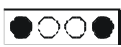















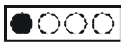



Diagnostic LED

The D-Bracket™, which is an external USB bracket integrating four Diagnostic LEDs, is optional. Definitions of the D-Bracket™ LED signals are the same as D-LED™ as shown below.



D-LED	D-Bracket	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.

Getting Started

D-LED	D-Bracket	Description
		Processor Initialization - It will show information of the processor (brand name, systembus and so on)
		Testing RTC (Real Time Clock)
		Initializing Video Interface - It will detect CPU clock and check the onboard video type, and then detect and initialize the video adapter.
		BIOS Sign-On - It will show information of the logo, brand name of the processor and so on.
		Testing Base and Extended Memory - It will test base memory from 240K to 640K and extended memory above 1MB using various patterns.
		Assigning Resources to all ISA
		Initializing Hard Drive Controller - It will initialize IDE drive and controller.
		Initializing Floppy Drive Controller - It will initialize floppy drive and controller.
		Boot Attempt - It will set low stack and boot via INT 19h.
		Booting Operating System

Hardware Setup

2

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.

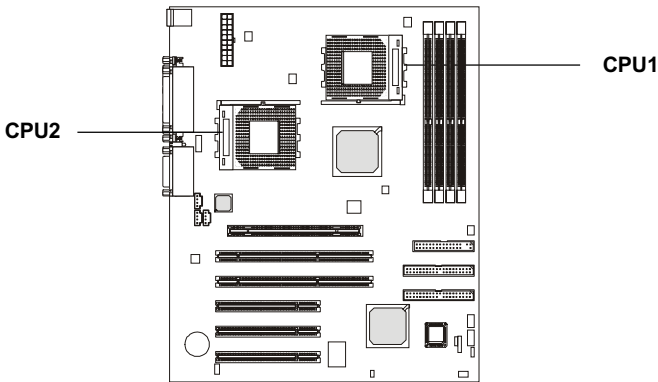
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Central Processing Unit: CPU

The MSI mainboard supports **Single/Dual** AMD® Athlon™ MP processor(s). The mainboard uses two CPU sockets called Socket A for easy CPU installation. You can install **SINGLE** or **DUAL** CPUs on the board to meet your own needs. Keep the following points in mind before installing CPU(s):

1. If **SINGLE** CPU is intended, always install the CPU on the **CPU1** socket.

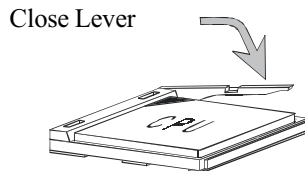
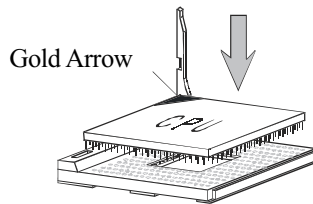
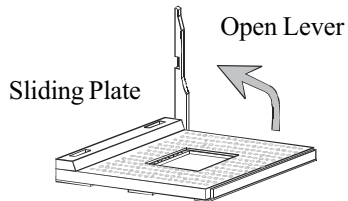


2. To install **DUAL** CPUs on the board, you must use **the same types of CPUs running at the same FSB frequency.**

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 gold arrow.
The gold arrow 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.



WARNING!

Thermal Issue for CPU

As processor technology pushes to faster speeds and higher performance, thermal management becomes increasingly crucial when building computer systems. Maintaining the proper thermal environment is key to reliable operation. As such, the processor must be maintained in the specified thermal requirements. AMD recommends the use of high performance thermal interface material.

AMD Athlon™ processor with a speed of **600MHz and above** requires LARGER heatsink and fan. You also need to add thermal grease between the CPU and heatsink to improve heat dissipation. Then, make sure that the CPU and heatsink are securely fastened and in good contact with each other. These are needed to prevent damaging the processor and ensuring reliable operation.

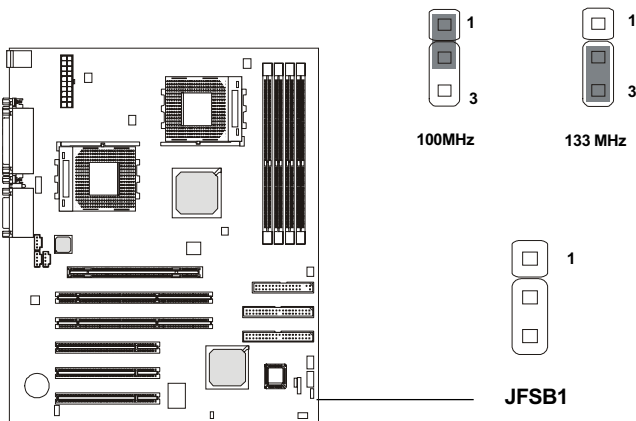
You can check AMD's web site for more information.

CPU Core Speed Derivation Procedure

If	<u>CPU Clock</u>	=	100MHz
	<u>Core/Bus ratio</u>	=	7
then	<u>CPU core speed</u>	=	<u>Host Clock x Core/Bus ratio</u>
		=	100MHz x 7
		=	700MHz

CPU Clock Frequency Selection: JFSB1

The default hardware configuration for CPU Clock Frequency is set at 100 MHz. To use a 133 MHz CPU, you need to adjust the CPU clock up to 133 MHz by setting the JFSB1 jumper.



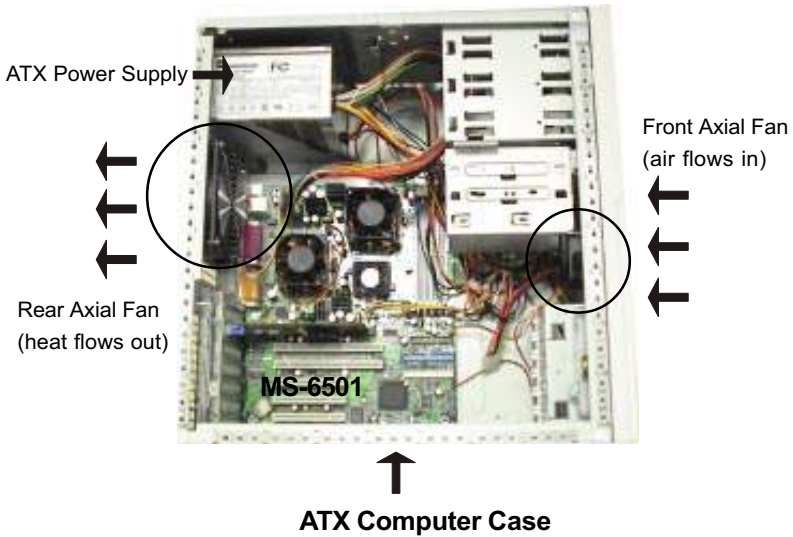
While replacing the CPU, always turn off the ATX power supply or unplug the power cable of the ATX power supply from grounded outlet first to ensure the safety of CPU.

Recommended Computer Case and Axial Fans

To accommodate the MS-6501 mainboard, Axial Fans and other required components, we recommend that you use the ATX computer case.

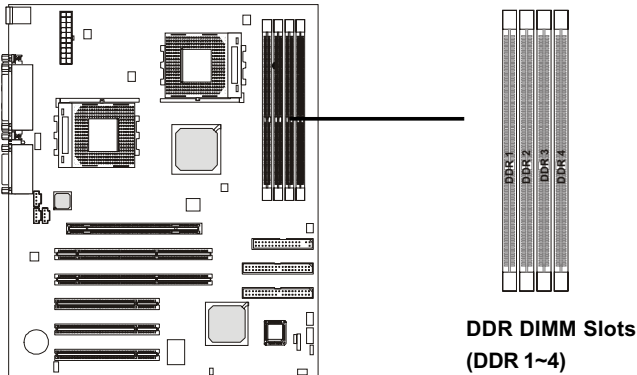
To maintain a well-ventilated operating environment and prevent CPU overheating problems, we strongly suggest that you add two axial fans to the system. The specification of the Front/Rear Axial Fans are as follows:

Axial Fan	Length x Width	Running Speed
Front	80mm x 25mm	12V at 2500 rpm
Rear	120mm x 25mm	12V at 2200 rpm



Memory Installation

The mainboard provides 4 sockets for 184-pin, 2.5V DDR DIMM with 8 memory banks. To operate properly, at least one DIMM module must be installed.




You can install PC1600/PC2100 DDR SDRAM modules on the DDR DIMM slots (DDR 1~4).

DDR (Double Data Rate) SDRAM is similar to conventional SDRAM, but doubles the rate by transferring data twice per cycle. It transfers data on both the rising and falling edges of the clock. Conventional SDRAM only uses the rising edge of the clock to transfer data. Therefore, conventional SDRAM is called SDR (Single Data Rate) SDRAM.

DDR SDRAM 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. DDR SDRAM is also known as SDRAM-II, DDR DRAM and DSDRAM (Double-Speed DRAM).

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: Registered DIMMs can be placed into DDR1~4 but unbuffered DIMMs can be placed into DDR1~2 only.**

DDR Module Combination

To enable normal operation, at least one DIMM module must be installed on the mainboard. As the AMD-762™ chipset supports 4 DDR memory banks at its maximum, the system memory installed can be up to 4 GB.

You can install memory modules in the following combination:

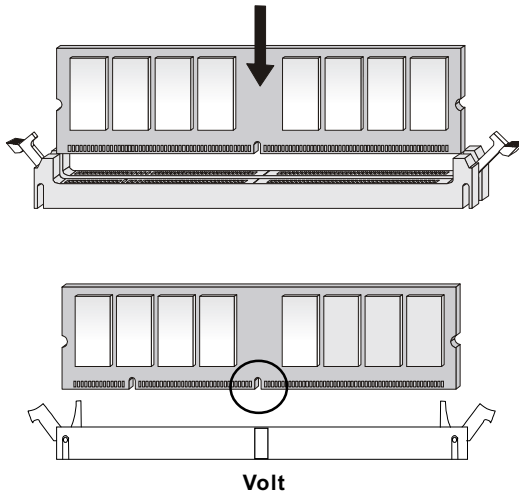
Devices used on DIMM	1 DIMM (2 Rows) x64/x72	2 DIMMs (2 Rows each) x64/x72	3 DIMMs (2 Rows each) x64/x72	4 DIMMs (2 Rows each) x64/x72
64 MB (4Mx4x4 banks)	256 MB	512 MB	768 MB	1 GB
64 MB (2Mx8x4 banks)	128 MB	256 MB	384 MB	512 MB
64 MB (1Mx16x4 banks)	64 MB	128 MB	192 MB	256 MB
128 MB (8Mx4x4 banks)	512 MB	1 GB	1.5 GB	2 GB
128 MB (4Mx8x4 banks)	256 MB	512 MB	768 MB	1 GB
128 MB (2Mx16x4 banks)	128 MB	256 MB	384 MB	512 MB
256 MB (16Mx4x4 banks)	1 GB	2 GB	3 GB	4 GB
256 MB (8Mx8x4 banks)	512 MB	1 GB	1.5 GB	2 GB
256 MB (4Mx16x4 banks)	256 MB	512 MB	768 MB	1 GB
512 MB (32Mx4x4 banks)	2 GB	4 GB	4 GB	4 GB
512 MB (16Mx8x4 banks)	1 GB	2 GB	3 GB	4 GB
512 MB (8Mx16x4 banks)	512 MB	1 GB	1.5 GB	2 GB

Note: The maximum address space supported by the AMD-762 system controller is four Gbytes.

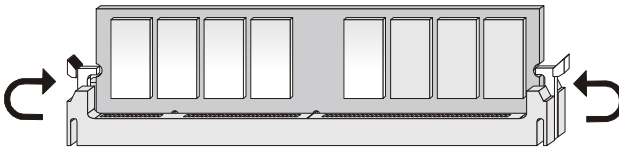
DDR Module Installation Procedures

You can install either single-sided or double-sided 184-pin DDR DIMM modules into DDR DIMM slots to meet your needs. Different from the SDR DIMM, the DDR DIMM has only one notch on the center of module. The number of pins on either side of the breaks are different. The module will only fit in the right orientation.

1. Insert the DIMM module vertically into the DDR DIMM slot. Make sure the notch is on the right orientation.



2. The plastic clips at sides of the DIMM slot will automatically close.

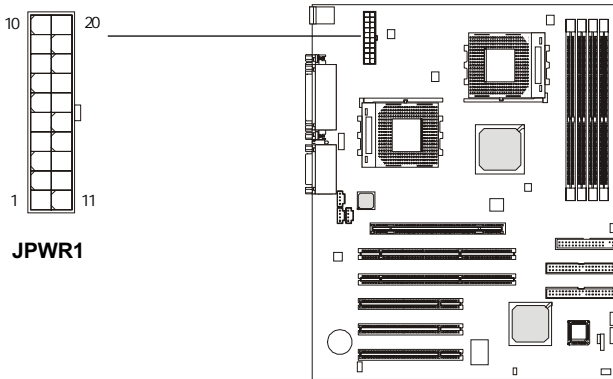


Power Supply

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: JPWR1

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.



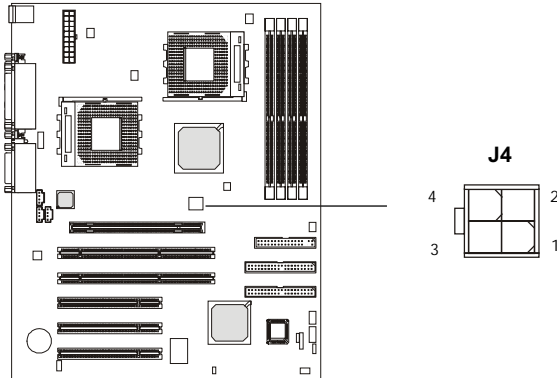
Recommended Power Supply Requirement

DC Output	+12V	+5V	+3.3V	5VSB	-5V	-12V
MIN (A)	12A	35A	16A	2A	0	0.5A
Minimum Power 300W						

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

ATX 12V Power Connector: J4

This 12V power connector is used to provide power for the CPU & the AGP Pro card.



Pin Definition

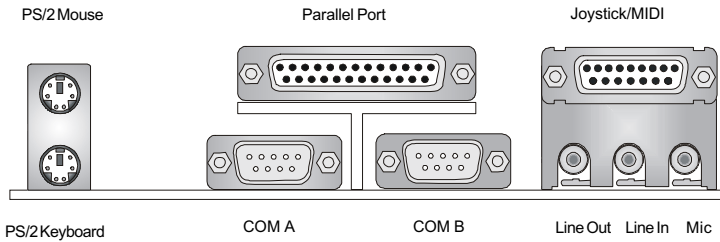
PIN	SIGNAL
1	GND
2	GND
3	12V
4	12V



Note: Always make sure to connect a power cable to the J4 to provide power for the CPU & the AGP Pro card. Even if you do not intend to use AGP Pro card, you still have to connect the J4 in order to ensure that CPU will work properly with sufficient power input.

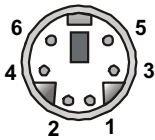
Back Panel

The Back Panel provides the following connectors:



Mouse Connector: KBMS1

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:



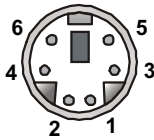
PS/2 Mouse (6-pin Female)

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: KBMS1

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.



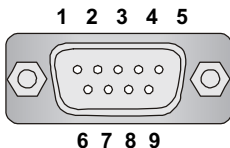
PS/2 Keyboard (6-pin Female)

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

Serial Port Connectors: COM A & COM B

The mainboard offers two 9-pin male DIN connectors as serial ports 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.



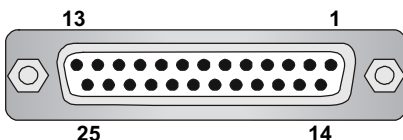
9-Pin Male DIN Connector

Pin Definition

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

Parallel Port Connector: LPT1

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



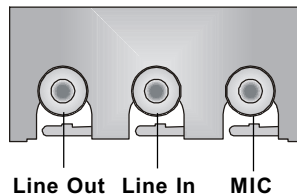
Pin Definition

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

Audio Port Connectors

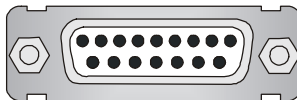
Line Out is a connector for Speakers or Headphones. **Line In** is used for external CD player, Tape player, or other audio devices. **Mic** is a connector for microphones.

1/8" Stereo Audio Connectors



Joystick/Midi Connectors

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



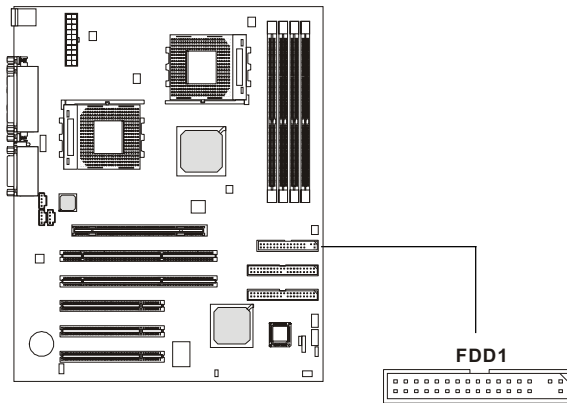
*Note: If you choose to enable the Audio Multi-Channel, this will change the **Line In** to 3, 4 channel output and **MIC** to 5, 6 channel output (optional). To use this function, set the Audio Multi-Channel to enable located at the BIOS Integrated Peripherals or install the driver provided with this mainboard.*

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

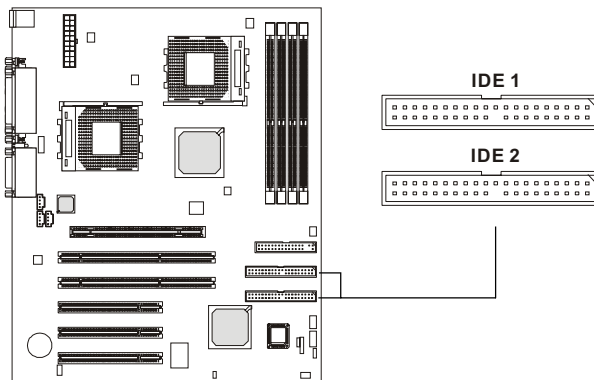
The mainboard has a 32-bit Enhanced PCI IDE and Ultra DMA 33/66/100 controller that provides PIO mode 0-4, Bus Master, and Ultra DMA 33/66/100 functions. It has two HDD connectors IDE1 (Primary) and IDE2 (Secondary). You can connect up to four hard disk drives, CD-ROM or 120MB Floppy to IDE1 and IDE2.

IDE1 (Primary IDE Connector)

- The first hard disk drive should always be connected to IDE1. You can connect a Master and a Slave drive to IDE1.

IDE2 (Secondary IDE Connector)

- You can connect a Master and a Slave drive to IDE2.

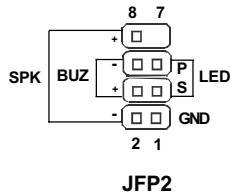
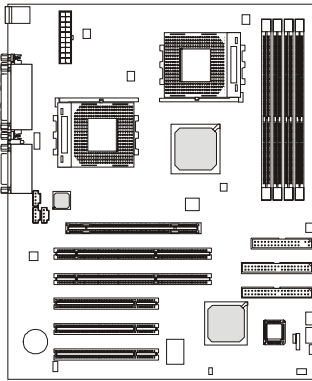


TIP:

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.

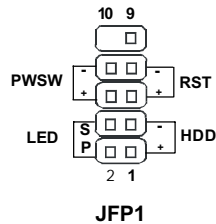
Case Connector: JFP1/JFP2

The case connectors JFP1 and JFP2 allow you to connect to the Power Switch, Reset Switch, Speaker, Power LED, and HDD LED on the case.



JFP2 Pin Definition

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



JFP1 Pin Definition

Pin	Signal	Description
1	HD_LED_P	Hard disk LED pullup (330 ohm) to +5V
2	FP_PWR/SLP	MSG LED pull-up (330 ohm) to +5V
3	HD_LED_N	Hard disk active LED
4	FP_PWR/SLP	MSG LED pull-up (330 ohm) to +5V
5	RST_SW_N	Reset Switch low reference pull-down (100 ohm) to GND
6	PWR_SW_P	Power Switch high reference pull-up (10000 ohm) to +5V
7	RST_SW_P	Reset Switch high reference pull-up (10000 ohm) to +5V
8	PWR_SW_N	Power Switch high reference pull-down (100 ohm) to GND
9	RSVD_DNU	Reserved. Do not use.

CD-In Connector: JCD1

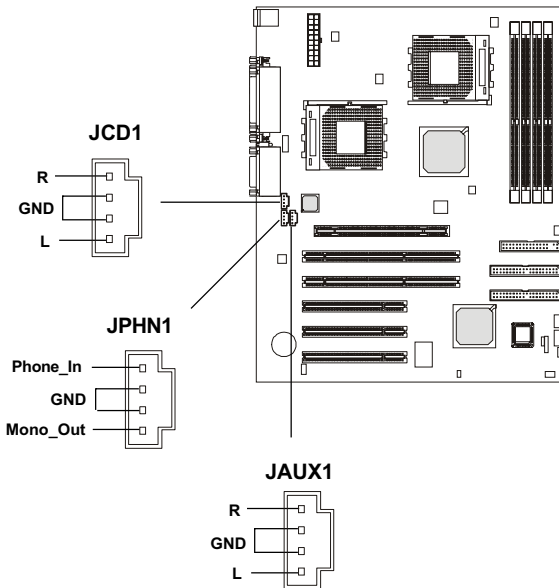
The connector is for CD-ROM audio connector.

Aux Line-In Connector: JAUX1

The connector is for DVD add-on card with Line-in connector.

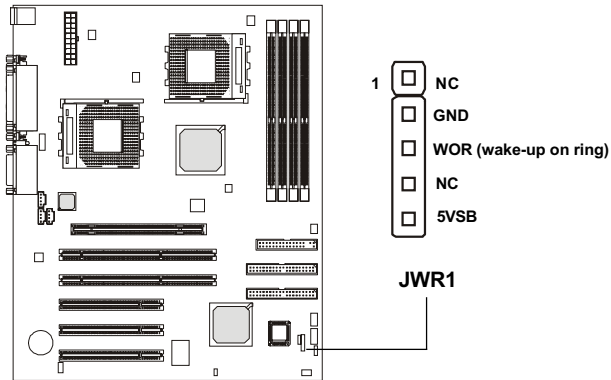
Modem-In Connector: JPHN1

The connector is for modem with internal audio connector.



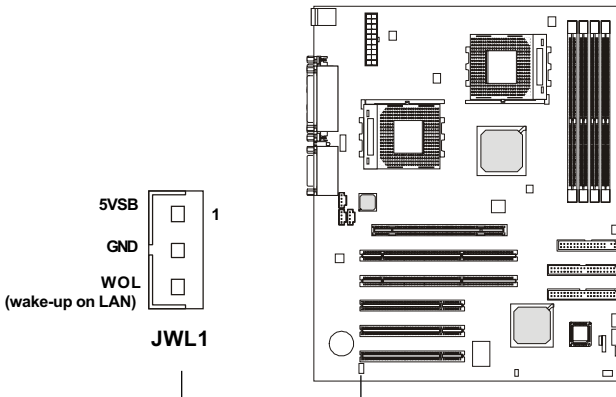
Wake On Ring Connector: JWR1

This connector allows you to connect to a modem card with Wake On Ring function. The connector will power up the system when a signal is received through the modem card.



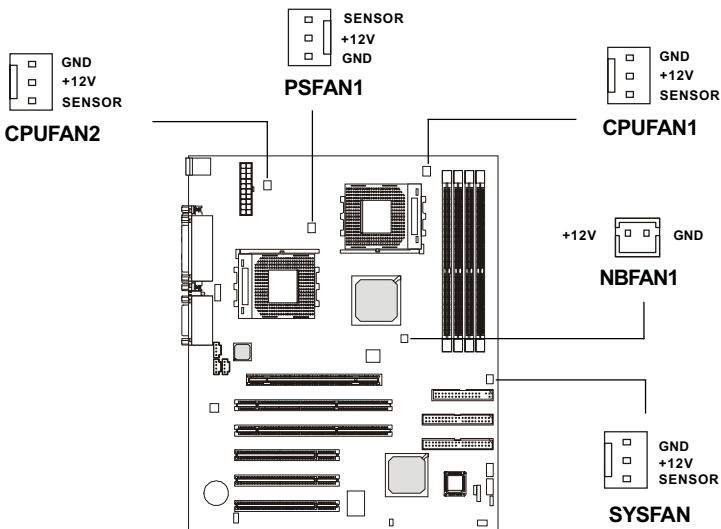
Wake On LAN Connector: JWL1

This connector allows you to connect to a LAN card with Wake On LAN function. You can wake up the computer via remote control through a local area network.



Fan Power Connectors: CPUFAN1/CPUFAN2/PSFAN1/ SYSFAN/NBFAN1

The CPUFAN1,2 (processor fans), PSFAN1 (power supply fan), SYSFAN (system fan), and NBFAN1 (NorthBridge fan) support system cooling fan with +12V. It supports two/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.

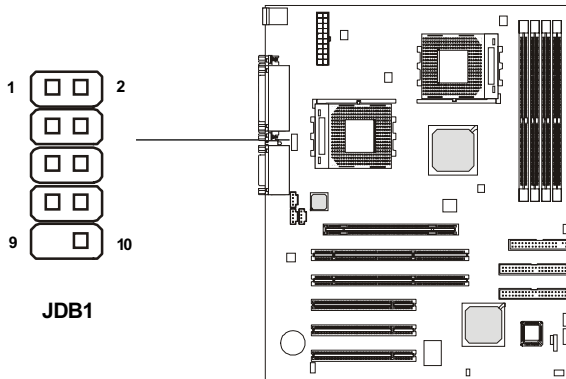


Note:

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.

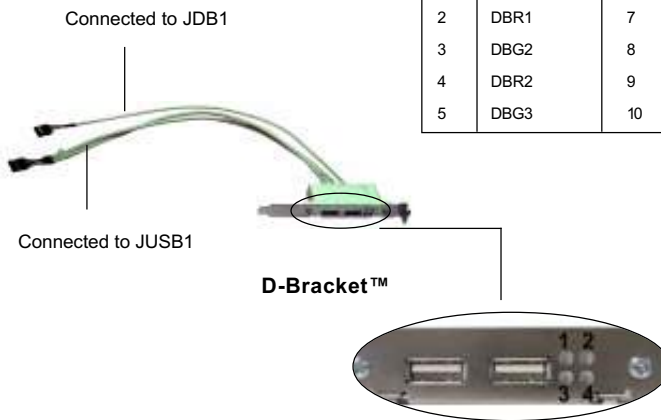
D-Bracket™ Connector: JDB1

The mainboard comes with a JDB1 connector for you to connect to D-Bracket™. D-Bracket™ is a USB Bracket integrating four LEDs whose functions are similar to D-LED™ and allows users to identify system problem through 16 various combinations of LED signals. For definitions of 16 signal combinations, please refer to Chapter 1. *D-LED™ & D-Bracket™*.



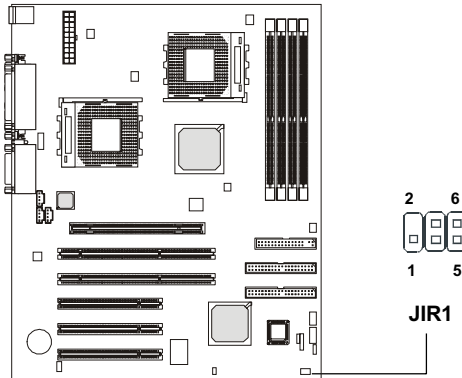
JDB1 Pin Definition

Pin	Description	Pin	Description
1	DBG1	6	DBR3
2	DBR1	7	DBG4
3	DBG2	8	DBR4
4	DBR2	9	Key
5	DBG3	10	NC



IrDA Infrared Module Connector: JIR1

This connector allows you to connect an IrDA Infrared module. You must configure the setting through the BIOS setup to use the IR function.

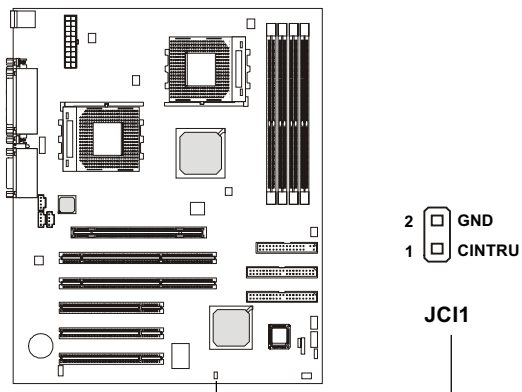


Pin Definition

Pin	Signal	Description	Pin	Signal	Description
1	NC	Not Assigned	2	(No pin)	Key
3	+5V	IR Power	4	GND	Ground
5	IRTX	IrDA serial output	6	IRRX	IrDA serial input

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.

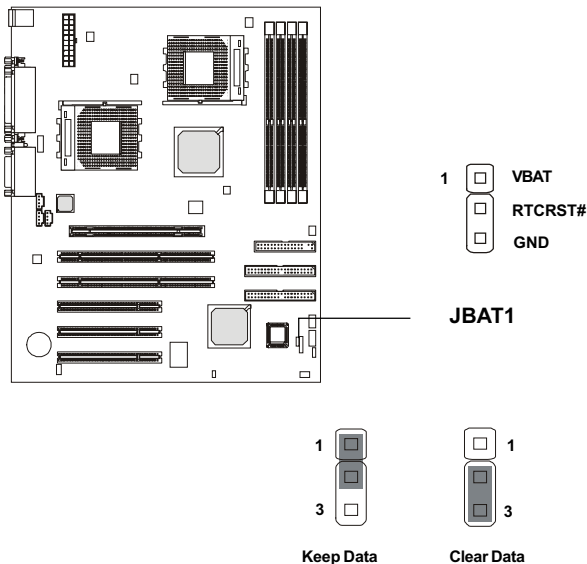


Jumpers

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, turn off the AC power first and then use the JBAT1 (Clear CMOS Jumper) to clear data. Follow the instructions below to clear the data:

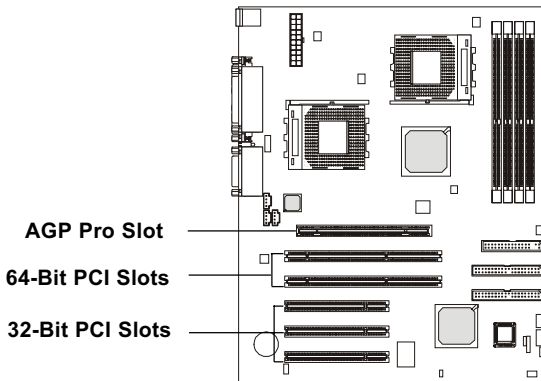


WARNING!

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 one AGP Pro slot, three 32-bit master PCI bus slots, and two 64-bit master PCI bus slots.



AGP (Accelerated Graphics Port) Pro Slot

The AGP Pro slot allows you to insert the AGP or AGP Pro graphics cards. The universal AGP Pro slot is an extension of the existing AGP slot (with two extended sections on both ends of the original AGP slot) and is backward compatible with existing AGP cards.

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).

PCI Slots

This mainboard offers two types of PCI slots for you to insert the desired expansion cards:

1. **PCI 64bit/66MHz**---supports 3V or universal cards (can be downgraded to PCI 32bit/33MHz or PCI 64bit/33MHz)
2. **PCI 32bit/33MHz**---supports 5V or universal cards

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

PCI Interrupt Request Routing

The IRQ, 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 A#	INT B#	INT C#	INT D#
PCI Slot 4	INT B#	INT C#	INT D#	INT A#
PCI Slot 5	INT C#	INT D#	INT A#	INT B#

AWARD® BIOS Setup

3

If your motherboard comes with the AWARD® BIOS ROM, read this chapter for an overview of the Award® BIOS settings. AWARD® BIOS ROM provides a Setup utility for users to modify the basic system configuration. The information is stored in a battery-backed CMOS RAM so it retains the Setup information when the power is turned off.

TOPICS

Entering Setup	3-2
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Frequency/Voltage Control	3-26
Load Fail-Safe/Optimized Defaults	3-27
Set Supervisor/User Password	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 to enter Setup.

Press to Enter SETUP

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

Control Keys

<↑>	Move to the previous item
<↓>	Move to the next item
<←>	Move to the item on the left-hand side
<→>	Move to the item on the right-hand side
<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
<F1>	General help, only for Status Page Setup Menu and Option Page Setup Menu
<F5>	Restore the previous CMOS value from CMOS, only for Option Page Setup Menu
<F6>	Load the default CMOS value from Fail-Safe default table, only for Option Page Setup Menu
<F7>	Load Optimized defaults
<F10>	Save all the CMOS changes and exit

Getting Help

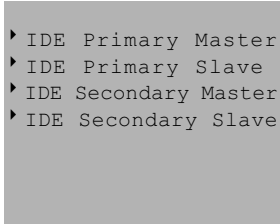
After entering the Setup menu, the first menu you will see is the Main Menu.

Main Menu

The main menu lists the setup functions you can make changes to. You can use the control keys ($\uparrow\downarrow$) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

Sub-Menu

If you find a right pointer symbol (as shown in the right view) appears to the left of certain fields that means a sub-menu can be launched from this field. A sub-menu contains additional options for a field parameter. You can use control keys ($\uparrow\downarrow$) to highlight the field and press <Enter> to call up the sub-menu. Then you can use the control keys to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the <Esc >.



```
▸ IDE Primary Master
▸ IDE Primary Slave
▸ IDE Secondary Master
▸ IDE Secondary Slave
```

General Help <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

The Main Menu

Once you enter Award® BIOS CMOS Setup Utility, the Main Menu (Figure 1) will appear on the screen. The Main Menu allows you to select from twelve setup functions and two exit choices. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.



Standard CMOS Features

Use this Menu for basic system configurations.

Advanced BIOS Features

Use this menu to set the Advanced Features available on your system.

Advanced Chipset Features

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

Integrated Peripherals

Use this menu to specify your settings for integrated peripherals.

Power Management Setup

Use this menu to specify your settings for power management.

PnP/PCI Configurations

This entry appears if your system supports PnP/PCI.

PC Health Status

This entry shows your PC health status.

Frequency/Voltage Control

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

Load Fail-Safe Defaults

Use this menu to load the BIOS default values for the minimal/stable performance for your system to operate.

Load Optimized Defaults

Use this menu to load the BIOS default values that are factory settings for optimal performance system operations.

Supervisor/User Password

Use this menu to set User and Supervisor Passwords.

Save & Exit Setup

Save CMOS value changes to CMOS and exit setup.

Exit Without Saving

Abandon all CMOS value changes and exit setup.

Standard CMOS Features

The items in Standard CMOS Features Menu are divided into 10 categories. Each category includes no, one or more than one setup items. Use the arrow keys to highlight the item and then use the <PgUp> or <PgDn> keys to select the value you want in each item.



Date

The date 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, depends on the year of the BIOS

Time

The time format is <hour> <minute> <second>.

IDE Primary/Secondary Master/Slave

Press PgUp/<+> or PgDn/<-> to select Manual, None, Auto type. Note that the specifications of your drive must match with the drive table. The hard disk will not work properly if you enter improper information for this category. If your hard disk drive type is not matched or listed, you can use Manual to define your own drive type manually.

If you select Manual, related information is asked to be entered to the following items. Enter the information directly from the keyboard. This information should be provided in the documentation from your hard disk vendor or the system manufacturer.

If the controller of HDD interface is SCSI, the selection shall be “None”.

If the controller of HDD interface is CD-ROM, the selection shall be “None”.

Access Mode	The settings are CHS, LBA, Large, Auto.
Capacity	The formatted size of the storage device.
Cylinder	Number of cylinders.
Head	Number of heads.
Precomp	Write precompensation.
Landing Zone	Cylinder location of the landing zone.
Sector	Number of sectors.

Drive A/B

This item allows you to set the type of floppy drives installed. Available options are *None*, *360K, 5.25 in.*, *1.2M, 5.25 in.*, *720K, 3.5 in.*, *1.44M, 3.5 in.*, *2.88M, 3.5 in.*

Video

The setting controls the type of video adapter used for the primary monitor of the system. Available options are *EGA/VGA*, *CGA 40*, *CGA 80* and *Mono*.

Halt On

The setting determines whether the system will stop if an error is detected at boot. Available options are:

<i>All Errors</i>	The system stops when any error is detected.
<i>No Errors</i>	The system doesn't stop for any detected error.
<i>All, But Keyboard</i>	The system doesn't stop for a keyboard error.
<i>All, But Diskette</i>	The system doesn't stop for a disk error.
<i>All, But Disk/Key</i>	The system doesn't stop for either a disk or a keyboard error.

Advanced BIOS Features



Virus Warning

Allows you to choose the VIRUS Warning feature for IDE Hard Disk boot sector protection. If this function is enabled and someone attempts to write data into this area, BIOS will show a warning message on screen and alarm beep.

Disabled No warning message to appear when anything attempts to access the boot sector or hard disk partition table.

Enabled Activates automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector of hard disk partition table.

CPU Internal/External 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. This setting enables/disables the internal cache (also known as L1 or level 1 cache) and external cache (also known as L2 or level 2 cache). Settings are: *Enabled* and *Disabled*.

Quick Power On Self Test

This option allows the system to skip certain tests while booting. This will decrease the time needed to boot the system.

<i>Enabled</i>	Enable quick POST
<i>Disabled</i>	Normal POST

First/Second/Third Boot Device

The BIOS attempts to load the operating system from the devices in the sequence selected in these items. The settings are *Floppy*, *LS120*, *HDD-0/HDD-1/HDD-2/HDD-3*, *SCSI*, *CDROM*, *LAN*, *ZIP100*, and *Disabled*.

Boot Other Device

This option allows you to enable/disable the booting of other additional device. Settings are: *Enabled* and *Disabled*.

Swap Floppy Drive

If the system has two floppy drives, choose *Enabled* to assign physical drive B to logical drive A and vice-versa.

Boot Up Floppy Seek

When this item is enabled during POST, BIOS will determine if the floppy disk drive installed is 40 or 80 tracks. 360K type is 40 tracks while 760K, 1.2M and 1.44M are all 80 tracks. Settings are: *Enabled* and *Disabled*.

Floppy Disk Access Control

You can select *R/W* to read and add data to the floppy disk or *Read Only* to read data from the floppy disk.

Boot Up NumLock Status

This option allows you to select the power on state for NumLock.

<i>On</i>	Keypad is numeric keys.
<i>Off</i>	Keypad is arrow keys.

Gate A20 Option

This item is to set the Gate A20 status. A20 refers to the first 64KB of extended memory. When the default value *Fast* is selected, the Gate A20 is controlled by Port 92 or chipset specific method resulting in faster system performance. When *Normal* is selected, A20 is controlled by a keyboard controller or chipset hardware.

Typematic Rate Setting

Key strokes repeat at a rate determined by the keyboard controller. When enabled, the typematic rate and typematic delay can be selected.

The settings are: *Enabled/Disabled*.

Typematic Rate (Chars/Sec)

Sets the number of times a second to repeat a key stroke when you hold the key down. The settings are: *6, 8, 10, 12, 15, 20, 24, 30*.

Typematic Delay (Msec)

Sets the delay time after the key is held down before it begins to repeat the keystroke. The settings are: *250, 500, 750, 1000*.

Security Option

This option allows you to select whether the password is required every time the system boots or only when you enter setup.

<i>System</i>	The system will not boot and access to Setup will be denied if the correct password is not entered at the prompt
<i>Setup</i>	The system will boot, but access to Setup will be denied if the correct password is not entered at the prompt.

MPS Version Control For OS

This option allows you to control the MPS version for OS. Settings are: *1.1* or *1.4*.

OS Select For DRAM > 64MB

This allows you to run the OS/2[®] operating system with DRAM greater than 64MB. Setting options are *Non-OS2* and *OS2*.

Video BIOS Shadow

Shadowing is a technique used to increase a computer's speed by using high-speed RAM memory in place of slower ROM memory. This setting enables/disables the video BIOS to shadow into memory area C0000-C7FFF. Setting options: *Disabled* and *Enabled*.

Small Logo(EPA) Show

This item allows you to show the company logo on the bootup screen. Settings are: *Disabled* (shows the POST messages at boot) and *Enabled* (shows a still logo on the full screen at boot).

processor is running.

(Note: The mainboard specification does not support dual Athlons running in MP mode. Therefore, we do not recommend end users select [Disabled].)

Memory Hole At 15M-16M

You can reserve this area of system memory for ISA adapter ROM. When this area is reserved, it cannot be cached. The user information of peripherals that need to use this area of system memory usually discusses their memory requirements. The settings are: *Enabled* or *Disabled*.

AGP Aperture Size (MB)

This option allows you to select the size of the Accelerated Graphics Port (AGP) aperture. Aperture is a portion of the PCI memory address range dedicated to graphics memory address space. Host cycles that hit the aperture range are forwarded to the AGP without any translation. The settings are: 32, 64, 128 and 256.

AGP ISA Aliasing

When enabled, address bits [15:10] will not be used in decoding. When disabled, [15:10] are used for decoding. The settings are: *Enabled* or *Disabled*.

AGP Fast Write

The item enables or disables the AGP Fast Write feature. The Fast Write technology allows CPU to write directly into the graphics controller without passing anything through system memory and improves 4X speed accordingly. Select *Enabled* only when your card supports the feature.

AGP Data Transfer Mode

This allows you to set the AGP Data Transfer Mode. The settings are: *1x/2x*, or *4x*.

AGP Always Compensate

When set to *Enabled*, dynamic compensation is performed by AGP on an ongoing basis at regular intervals.

AGP Secondary Lat Timer

This allows you to set the AGP Secondary Lat Timer. The settings are: *00h*, *20h*, *40h*, *60h*, *80h*, *C0h*, *FFh*.

SDRAMECC Setting

This allows you to set the SDRAM Error Correcting Code. The settings are: *Disabled, Check Only, Correct Errors, or Correct+Scrub.*

Super Bypass Mode

When enabled, the chipset internally bypasses certain memory to CPU pipe stages for optimal performance. The settings are: *Disabled or Enabled.*

Note: This item is hidden if both processors are running.

DDR SDRAM Timing Setting By

This feature allows you to set the DDR SDRAM Timing Setting. The options are: *Auto* and *Manual*. When setting to *Auto*, the system will automatically set proper values to DDR SDRAM Idle Limit, Page Hit Limit, Trc Cycle, Trp Cycle, Tras Cycle, CAS Latency Cycle and Trcd Cycle. To ensure optimal operation, it is recommended that you set this option to *Auto*.

Integrated Peripherals



IDE Read/Write Prefetch

This item is used to enable or disable the IDE Read/Write Prefetch buffer. This buffer is used to store data for faster performance. Settings are: *Enabled* and *Disabled*.

Primary/Secondary Master/Slave PIO

The four IDE PIO (Programmed Input/Output) fields let you set a PIO mode (0-4) for each of the four IDE devices that the onboard IDE interface supports. Modes 0 through 4 provide successively increased performance. In *Auto* mode, the system automatically determines the best mode for each device. The settings are: *Auto*, *Mode 0*, *Mode 1*, *Mode 2*, *Mode 3*, *Mode 4*.

Primary/Secondary Master/Slave UDMA

Ultra DMA/33 implementation is possible only if your IDE hard drive supports it and the operating environment includes a DMA driver (Windows 95 OSR2 or a third-party IDE bus master driver). If your hard drive and your system software both support Ultra DMA/33, Ultra DMA/66 and Ultra DMA/100, select *Auto* to enable BIOS support. The settings are: *Auto* and *Disabled*.

On-Chip Primary/Secondary PCI IDE

The integrated peripheral controller contains an IDE interface with support for two IDE channels. Choose *Enabled* to activate each channel separately. The settings are: *Enabled* and *Disabled*.

USB Host Controller

Select *Enabled* if your system contains a Universal Serial bus (USB) controller and you have USB peripherals. Settings are: *Enabled* and *Disabled*.

USB Keyboard /Mouse Support

Select *Enabled* if you need to use an USB keyboard/mouse in the operating system that does not support or have any USB driver installed, such as DOS and SCO Unix. The settings are: *Enabled* and *Disabled*.

Init Display First

This item specifies which VGA card is your primary graphics adapter. Settings are: *PCI Slot* and *AGP*.

On-Chip AC97

Auto allows the motherboard's BIOS to detect whether you're using any audio device. If it is, the onboard audio controller will be enabled. If not, the onboard audio controller will be disabled. If you want to use different controller cards to connect audio connectors, set these fields to *Disabled*. Setting options are: *Auto* or *Disabled*.

Onboard Lan Chip (optional)

This function is available only when LAN is integrated on the board. This is used to enable or disable the onboard LAN controller. Settings are: *Enabled* or *Disabled*.

IDE HDD Block Mode

Block mode is also called block transfer, multiple commands, or multiple sector read/write. If your IDE hard drive supports block mode (most new drives do), select *Enabled* for automatic detection of the optimal number of block read/writes per sector the drive can support. The settings are: *Enabled, Disabled*.

POWER ON Function

This controls how the PS/2 mouse or keyboard can power on the system. Settings are: *Password, Hot KEY, Mouse Left, Mouse Right, Any Key, BUTTON ONLY and Keyboard 98*.

KB Power ON Password

If **POWER ON Function** is set to *Password*, then you can set a password in the field for PS/2 keyboard to power on the system.

Hot Key Power On

If **POWER ON Function** is set to *Hot KEY*, then you can assign a hot key combination in the field for the PS/2 keyboard to power on the system. Settings are: *Ctrl-F1 through Ctrl-F12*.

Onboard FDC Controller

Select *Enabled* if your system has a floppy disk controller (FDC) installed on the system board and you wish to use it. If you install add-on FDC or the system has no floppy drive, select *Disabled*. The settings are: *Enabled, Disabled*.

Onboard Serial Port 1/Port 2

Select an address and corresponding interrupt for the first and second serial ports. The settings are: *Disabled, 3F8/IRQ4, 2F8/IRQ3, 3E8/IRQ4, 2E8/IRQ3, Auto*.

UART Mode Select

The field allows you to specify the operation mode for serial port COM B. Settings are: *IrDA* (IrDA-compliant Infrared Port), *ASKIR* (Amplitude Shift Keyed Infrared Port) and *Normal* (RS-232C Serial Port).

RxD, TxD Active

The item determines the active of RxD, TxD. Settings: *[Hi, Hi]*, *[Hi, Lo]*, *[Lo, Hi]* and *[Lo, Lo]*.

IR Transmission Delay

The field enables or disables IR transmission delay function. Settings: *Enabled* or *Disabled*.

UR2 Duplex Mode

This setting controls the operating mode of IR transmission/reception. Setting options: *Full* and *Half*. Under Full Duplex mode, synchronous, bi-directional transmission/reception is allowed. Under Half Duplex mode, only asynchronous, bi-directional transmission/reception is allowed.

Use IR Pins

Consult your IR peripheral documentation to select the correct setting of TxD and RxD signals. Settings: *[IR-Rx2Tx2]* and *[RxD2, TxD2]*.

Onboard Parallel Port

This specifies the I/O port address and IRQ of the onboard parallel port. Settings: *378/IRQ7*, *278/IRQ5*, *3BC/IRQ7* and *Disabled*.

Parallel Port Mode

This item selects the operating mode for the parallel port. Settings: *SPP*, *EPP*, *ECP*, *ECP+EPP* and *Normal*.

SPP	Standard Parallel Port
EPP	Enhanced Parallel Port
ECP	Extended Capability Port

EPP Mode Select

The item selects the EPP version used by the parallel port if it is set to EPP or ECP+EPP mode. Settings are *EPP 1.7* and *EPP 1.9*.

ECP Mode Use DMA

The item specifies the DMA channel *1* or *3* for the parallel port when it is set to ECP or ECP+EPP mode.

Game/Midi Port Address

The item disable or assign the I/O address for the Game/Midi port.

Settings are: (Game) *Disabled, 201, 209*
 (Midi) *Disabled, 330, 300, 290*

Midi Port IRQ

The item specifies an IRQ for the Midi port. Settings: *5, 10*.

Power Status LED

You may choose either *Single* or *Dual* LED to show the power status.

Power Management Setup

The Power Management Setup allows you to configure your system to most effectively save energy while operating in a manner consistent with your own style of computer use.



ACPI Function

This item allows you to enable/disable the Advanced Configuration and Power Management (ACPI) function. If your operation system is ACPI-aware, such as Windows® 98SE/2000/ME, select *Enabled*. Settings are *Enabled* and *Disabled*.

ACPI Suspend Type

This item specifies the power saving modes for ACPI function. Settings are: *S1(POS)*, *S3 (STR)*, *S1 & S3*.

S1 (POS)

The S1 sleeping state is low wake-up latency sleeping state. In this state, no system context is lost (CPU or chip set) and hardware main-

tains all system context.

S3 (STR)

The S3 state is a low wake-up latency sleeping state where all system context is lost except system memory. CPU, cache, and chipset context are lost in this state. Hardware maintains memory context and restores some CPU and L2 configuration context.

Run VGABIOS if S3 Resume

This item allows the system to initialize the VGA BIOS from S3 (Suspend to RAM) sleep state. Settings are: *Auto*, *Yes* and *No*.

Power Management

This item is used to select the degree (or type) of power saving. There are three options for power management:

User Define Allows end users to configure the suspend mode manually

Min Saving Suspend Mode=1 min

Max Saving Suspend Mode=1 hour

Video Off Method

This determines the manner in which the monitor is blanked. Settings are: *Blank Screen*, *V/H SYNC+Blank* and *DPMS Support*.

Blank Screen	This option only writes blanks to the video buffer.
V/H SYNC+Blank	This selection will cause the system to turn off the vertical and horizontal synchronization ports and write blanks to the video buffer.
DPMS Support	Initial display power management signaling.

Suspend Type

This setting allows you to select the type of Suspend mode. Settings are: *Stop Grant* (saves the state of the entire system to disk and then powers off the system) and *PwrOn Suspend* (the CPU and core system remain powered on in a very low-power mode).

Standby Mode

When enabled and after the set time of system inactivity, all devices except the CPU will be shut off. The settings are: *30 Sec*, *1/4/10/20/30 Min*, *1 Hour* and *Disabled*.

HDD Power Down

When enabled and after the set time of system inactivity, the hard disk drive will be powered down while all other devices remain active. Settings are: *1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 Min* and *Disabled*.

HDD Down In Suspend

When enabled, the hard disk drive will be powered down while other devices are in suspend mode. Settings are: *Disabled, Enabled*.

Soft-Off by PBTN

This allows you to set the time period for pressing the power button to force the system to enter the Soft-Off mode. Settings are: *Delay 4 Sec* and *Instant-Off*.

PWRON After PWR-Fail

This allows you to set whether you want your system to reboot after the power has been interrupted. *Off* leaves your system off and *On* reboots the system. *Former-Sts* leaves the system in the former status. Setting options: *Off, On* and *Former-Sts*.

Wake-Up by PCI Card

This will enable the system to wake up through PCI card peripheral. The settings are: *Enabled* or *Disabled*.

RI Resume/WOL

RI refers to Ring In. When set to *Enabled*, the system will resume from the standby or suspend power saving mode whenever Modem Ring In event occurs. To use the WOL function, you need a LAN add-on card which support power on functions. Settings are: *Enabled* or *Disabled*.

Modem Use IRQ

This determines the IRQ in which the MODEM can use. The settings are: *3, 4, 5, 7, 9, 10, 11* and *NA*.

RTC Resume

This allows you to set the date and time alarm for your computer to boot up. During *Disabled*, you cannot use this function. During *Enabled*, you can set the date and time alarm.

- Date (of Month) Alarm

You can choose which month the system will boot up. Setting [0] will allow you to boot the system every day.

- Time (hh:mm:ss) Alarm

You can choose what hour, minute and second the system will boot up.



Note: If you have change the setting, you must let the system boot up until it goes to the operating system, before this function will work.

Reload Global Time Events

IRQ3~IRQ15

Enables or disables the monitoring of the specified IRQ line. If set to *Enabled*, the activity of the specified IRQ line will prevent the system from entering power saving modes or awaken it from power saving modes.

Settings are: *Enabled* and *Disabled*.



Note: IRQ (Interrupt Request) lines are system resources allocated to I/O devices. When an I/O device needs to gain attention of the operating system, it signals this by causing an IRQ to occur. After receiving the signal, when the operating system is ready, the system will interrupt itself and perform the service required by the I/O device.

PNP/PCI Configurations

This section describes configuring the PCI bus system. 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 own 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.



PNP OS Installed

Select *Yes* if you are using a Plug and Play capable operating system. Select *No* if you need the BIOS to configure non-boot devices.

Reset Configuration Data

Normally, you leave this field *Disabled*. Select *Enabled* to reset Extended System Configuration Data (ESCD) when you exit Setup if you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the operating system can not boot. The settings are: *Enabled* and *Disabled*.

Resource Controlled By

When selecting *Auto (ESCD)*, BIOS will automatically configure all the boot and PnP (Plug & Play) compatible devices and assigns system resources like IRQ to these devices. However, this feature means absolutely nothing unless you are using a Plug and Play operating system such as Windows® 98. If you

want to configure the system by yourself, select *Manual*.

IRQ Resources

This item is enabled only when **Resources Controlled By** is set to *Manual*. Press <Enter> and you will enter the sub-menu of the items. **IRQ Resources** allows you to assign IRQ 3/4/5/7/9/10/11/12/14/15 to a type of PCI device, depending on the type of device using the IRQ.

- PCI/ISA PnP For Plug & Play compatible devices designed for PCI or ISA bus architecture.
- Legacy ISA For devices compliant with the PC AT bus specification, requiring a specific interrupt.

PCI/VGA Palette Snoop

When set to *Enabled*, multiple VGA devices operating on different buses can handle data from the CPU on each set of palette registers on every video device. Bit 5 of the command register in the PCI device configuration space is the VGA Palette Snoop bit (0 is disabled). For example, if there are two VGA devices in the computer (one PCI and one ISA) and the:

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

The setting must be set to *Enabled* if any ISA adapter card installed in the system requires VGA palette snooping. The Setup and BIOS default values are *Disabled*.

PC Health Status

This section is to monitor the current hardware status including CPU temperature, CPU Fan speed, Vcore etc. This is available only if there is hardware monitoring onboard.



Chassis Intrusion Detect

This feature records the chassis intrusion status and issues a warning message if the chassis was once opened. To clear the warning message, set the setting to *Reset* and it will automatically return to *Enabled* later.

CPU Warning Temperature

This item is used to specify a thermal limit for CPU. If CPU temperature reaches the specified limit, the system will issue a warning which allows you to prevent the CPU overheat problem. Settings: *Disabled*, *50°C/122°F*, *53°C/127°F*, *56°C/133°F*, *60°C/140°F*, *63°C/145°F*, *66°C/151°F* and *70°C/158°F*.

Current System Temp., Current CPU 1/2 Temp., Current SYSFAN Speed, Current CPUFAN 1/2 Speed, Vcore, +5/+12/-12/-5(V), VBAT/5VSB(V)

These items show the current status of all of the monitored hardware devices/components such as CPU voltages, temperatures and all fans's speed.

Shutdown Temperature

The item allows ACPI-aware OS to automatically shutdown, thus preventing the system components from being damaged due to overheat. Settings: *Disabled*, *60°C/140°F*, *65°C/149°F*, *70°C/158°F* and *75°C/167°F*.

Frequency/Voltage Control

This section is for setting CPU Frequency/Voltage Control.



Auto Detect DIMM/PCI CLK

This option allows you to enable/disable auto detect DIMM/PCI Clock. Settings are: Enabled, Disabled.

Spread Spectrum Modulated

This item is used to enable or disable the clock generator's Spread Spectrum feature. When overclocking the processor, always set it to *Disabled*. Settings are *Enabled* and *Disabled*.

CPU Host/PCI Clock

This item specifies the clock frequency of CPU host bus (FSB) and PCI bus and provides a method for end users to overclock the processor accordingly. Settings are: *Default*, *100/33 Mhz*, *103/34 Mhz*, *105/35Mhz*, *110/37 Mhz*, *113/38 Mhz*, *117/39 Mhz*, *133/33 Mhz*, *138/34 Mhz*, *140/35 Mhz*, *144/36 Mhz* and *150/38 Mhz*.

CPU Ratio

This item is used to specify the CPU ratio (clock multiplier) and provides a tool for users to overclock the processor. Settings are: *Auto*, *x5 through x12.5*.

Load Fail-Safe/Optimized Defaults

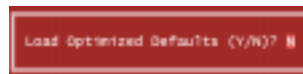
The two options on the main menu allow users to restore all of the BIOS settings to the default Fail-Safe or Optimized values. The Optimized Defaults are the default values set by the mainboard manufacturer specifically for the optimal performance of the mainboard. The Fail-Safe Defaults are the default values set by the BIOS vendor for the stable system performance.

When you select Load Fail-Safe Defaults, a message as below appears:



Pressing *Y* loads the BIOS default values for the most stable, minimal system performance.

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



Pressing *Y* loads the default factory settings for optimal system performance.

Set Supervisor/User Password

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



Type the password, up to eight 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. Re-type 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 BIOS to request a password each time the system is booted. This would prevent unauthorized use of your computer. The setting to determine when the password prompt is required is the Security Option in the Advanced BIOS Features menu. If the Security Option is set to *System*, the password is required both at boot and at entry to Setup. If set to *Setup*, password prompt only occurs when trying 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.

Installing Drivers

A

This chapter describes how to install AMD chipsets and audio drivers under Windows 2000 and XP. When you do the installation, you should always install chipset drivers prior to the audio driver.

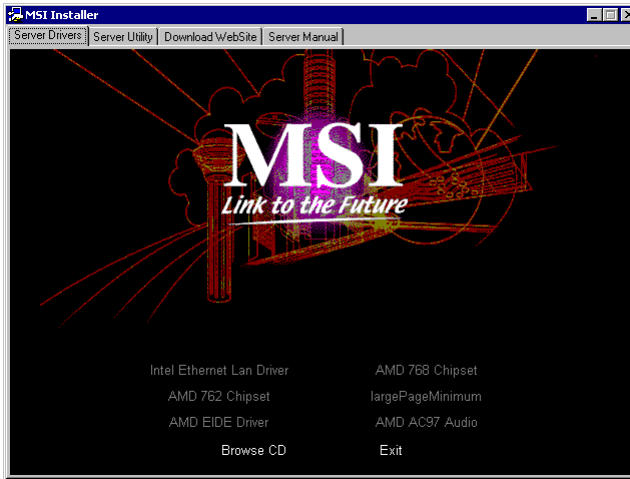
Please note that the procedures and the dialog boxes are based on Windows 2000. If you are running under Windows XP, the dialog boxes shown on the screen may be slightly different but the procedures are the same as described.

TOPICS

<i>Driver Installation for Windows 2000/XP</i>	<i>A-2</i>
<i>Installing Intel Ethernet LAN Driver</i>	<i>A-3</i>
<i>Installing AMD 762 Chipset</i>	<i>A-4</i>
<i>Installing AMD EIDE Driver</i>	<i>A-6</i>
<i>Installing AMD 768 Chipset</i>	<i>A-9</i>
<i>LargePageMinimum</i>	<i>A-10</i>
<i>AMD AC97 Audio Driver</i>	<i>A-11</i>

Driver Installation for Windows 2000/XP

1. Insert the Installation CD into the CD-ROM drive.
2. The system will automatically read the CD and the **MSI Installer** dialog box will appear on the screen as shown below.



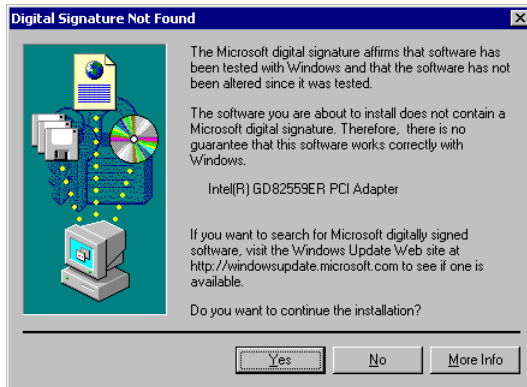
3. Refer to the instructions mentioned later in this chapter to complete the driver installation.



Note: Remember to install the chipset drivers prior to the audio driver.

Installing Intel Ethernet Driver for Windows 2000/XP

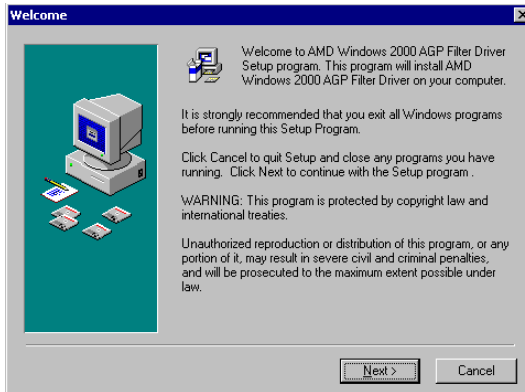
1. Click **Intel Ethernet Driver**.
2. The following dialog box will appear on the screen. Click **Yes** to continue installing the driver on your system.



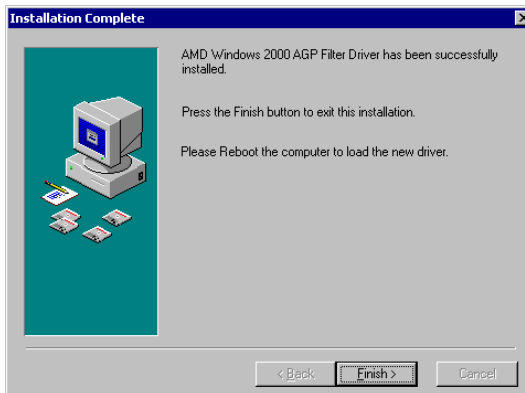
3. Click **Yes** to exit the Intel Ethernet Driver Setup. Return to the **MSI Installer** dialog box for AMD 762 Chipset Driver Installation.

Installing AMD 762 Chipset Driver for Windows 2000/XP

1. Click **AMD 762 Chipset**.
2. The following **Welcome to AMD AGP Filter Driver Setup Program** dialog box will appear on the screen. Click **Next** to continue the Setup program.

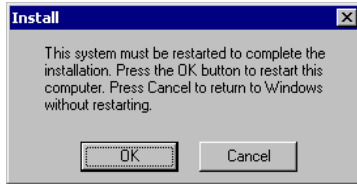


3. The **Installation Complete** dialog box informs you that AMD AGP Filter Driver has been successfully installed. Click **Finish** to continue.



4. The system will ask you to click **OK** to restart the computer or **Cancel** to return to Windows.

Click **Cancel** to proceed with the AMD EIDE Driver installation.



Installing AMD EIDE Driver for Windows 2000/XP

1. Click **AMD EIDE Driver**.
2. Select your desired language in the **Select Language** list and then click **OK** to proceed to the next step.
3. The **AMD Bus Master IDE Driver Setup** program dialog box will appear on the screen. Click **Next** to continue.



4. Read the terms and conditions in the **License Agreement** dialog box. Click **I Agree** and then **Next** to continue.



5. The **Start Installation** dialog box will appear on the screen. Click **Next** to start installing the AMD Bus Master IDE Driver.



Appendix A

6. The **Installation Complete** dialog box informs you that AMD Bus Master IDE Driver has been successfully installed. Click **Finish** to continue.



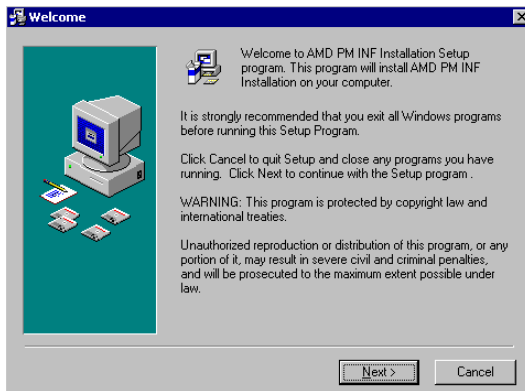
7. The system will ask you to click OK to restart the computer or Cancel to return to Windows.

Click **Cancel** to proceed with the AMD 768 Chipset Driver installation.

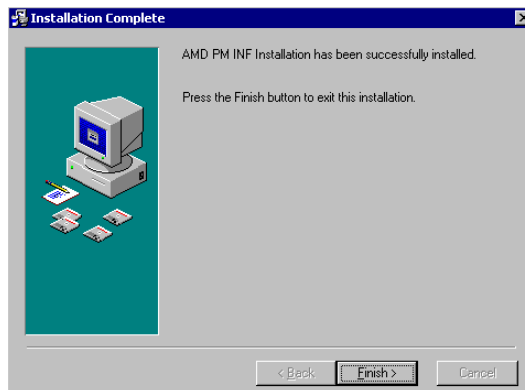


Installing AMD 768 Chipset Driver for Windows 2000/XP

1. Click **AMD 768 Chipset**.
2. The **Welcome to AMD PM INF Installation Setup** program dialog box will appear on the screen. Click **Next** to proceed to the next step.



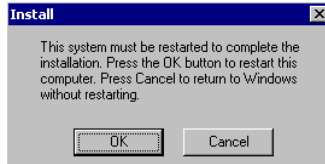
3. The **Installation Complete** dialog box will appear on the screen. Click **Finish** to continue.



Appendix A

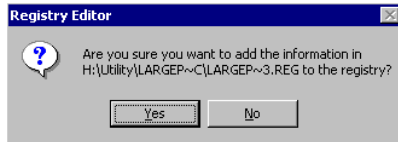
4. The system will ask you to click OK to restart the computer or Cancel to return to Windows.

Click **Cancel** to continue with the AMD 768 Chipset Driver installation.

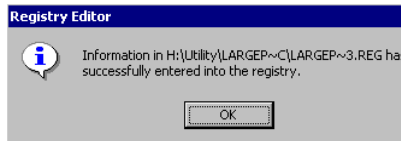


Installing LargePageMinimum (for Windows 2000 only)

1. Click **LargePageMinimum**.
2. The following dialog box will appear on the screen. Click **Yes** to add the information to the registry.



3. The information in the CD-ROM drive has been successfully entered the registry.



Installing AMD AC97 Audio Driver for Windows 2000/XP

1. Click **AMD AC97 Audio Driver**.
2. The **Welcome to AC97 Setup program** dialog box will appear on the screen. Click **Next** to continue installing the driver on your system.



3. Read the terms and conditions in the **License Agreement** dialog box. Click **I Agree** and then **Next** to proceed to the next step.



Appendix A

4. The **Read Me File** dialog box shows that installing AC97AMD.INF file enables AC'97 Audio for the AMD-768 Controller. Click **Next** to continue with the setup program.



5. Click **Next** to begin the installation.



6. The progress indicator displays the percentage of the AMD AC97 Audio Driver installation that has been completed.



7. The Installation Complete dialog box will inform you that AC'97 has been successfully installed. Click **Finish** to exit the setup.



8. The system must be restarted to complete the driver installation. Restart the computer NOW.

USB 2.0 Controller Card **B**

This chapter provides you the information about USB Controller Card. You will find detailed description of its features, system requirements, package contents, and hardware/software installation 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

<i>Acknowledgements</i>	<i>B-2</i>
<i>Introduction</i>	<i>B-4</i>
<i>Hardware Installation</i>	<i>B-6</i>
<i>Software Installation</i>	<i>B-7</i>

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Microsoft and Windows are registered trademarks of Microsoft Corporation.

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This device is in conformance with Part 15 of the FCC Rules and Regulations for Information Technology Equipment. Operation of this product is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device accept any interference received, including interference that may cause undesired operation.

FCC NOTICE

This equipment has been tested and found to comply with the limits for a Class B Computing 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 residential installation. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance to the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio and television reception, which can be determined by turning the equipment off and on, the user is encouraged trying to correct the interference by one or more of the following measures:

- * Reorient or relocate the receiving antenna.
- * Increase the separation between the equipment and the antenna.
- * Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- * Consult the dealer or an experienced radio or TV technician for help.

IMPORTANT

Any changes or modifications not expressly approved by the party responsible for the Compliance could void the user's authority to operate this equipment. This product requires the use of shielded cables in order to comply with FCC requirements.

Introduction

This 5 Port USB Card V2.0 complies with the Universal Serial Bus Specification Revision 2.0 and Open Host Controller interface Specification for full-/low-speed signaling and Intel's Enhanced Host Controller interface Specification for high-speed signaling and works up to 480Mbps.

5 Port USB Card V2.0 is integrated 3 Host controller cores with PCI interface and USB 2.0 transceivers into a single chip.

5 Port USB Card V2.0 fully meets PCI specification V2.2. It is fully supported by USB operating system; such as Windows® OS platform. It offers simple, flexible and highly scalable connectivity between PC and full range of peripherals.

Features

- * Comply with USB Specification Revision 2.0 (Date Rate 1.5/12/480 Mbps)
- * Comply with Open Host Controller Interface Specification for USB Rev. 1.0a
- * PCI multi-function device consists of two OHCI Host Controller cores for full-/low-speed signaling and one EHCI Host Controller core for high-speed signaling
- * Provide 4 external and 1 internal downstream facing ports which are shared by OHCI and EHCI Host Controller cores
- * All downstream facign port can handle high-speed (480Mbps), full-speed (12Mbps), and low-speed (1.5Mbps) transaction
- * 32-bit 33MHz host interface comply with PCI Specification Release 2.2
- * Support PCI-Bus Power Management Interface Specification Release 1.1
- * Tiered star topology support up to 5 tiers and 127 devices, no cable segment exceeding 5 meters
- * Support Windows® 98SE/ME/2000/XP

● System Requirements

- * IBM-compatible PC
- * Available PCI Slot
- * Windows 98SE/ME/2000/XP
- * 586/133 CPU and 32 MB RAM or faster

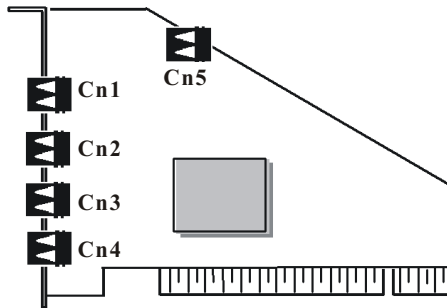
● Package Contents

The following items are included in the packaging box:

- * One High Speed 5 Port USB V2.0 Card
- * User's Manual
- * One CD Disk

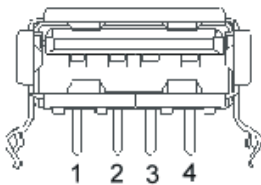
Hardware Installation

Figure 1: USB Controller Card Layout



Board Location	Port Name	Connector Type
Cn1 ~ Cn5	USB port A	4pin A-type USB connector

USB port (A Type)



USB Connector

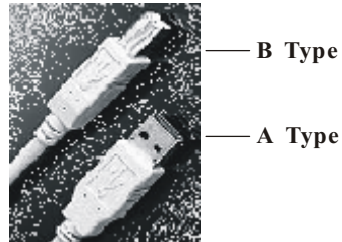


Figure2: USB port

PIN	SIGNAL
1	VCC
2	DATA-
3	DATA+
4	GND

Software Installation

This section will tell you how to setup your USB controller card. The USB Controller card is “Plug and Play”, it means there is no jumper, IRQ, or DIP switch to set.

Windows® 98SE Setup

1. Windows will auto-detect the USB Card and display a dialog “**New Hardware found**” during system boot up. Press “**Next**” on the “**Add New Hardware Wizard**” screen.



Note:

Because of 2 OHCI and 1 EHCI Cores, system will require to install respective driver three times. Don't be confused and follow subsequent procedures.

2. Select “**Search for the best driver for your device(Recommended)**” and click “**Next**”.



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3. Click “Next”.



4. Click “Next”.



5. Click “Next”.



6. Click “Finish”.



- Windows will auto-detect the USB Card and display a dialog “**New Hardware found**” during system boot up. Press “**Next**” on “**Add New hardware Wizard**” screen.



- Select “**Search for the best driver for your device(Recommended)**” and click “**Next**”.



- Click “**Next**”.



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10. Click “**Next**”.



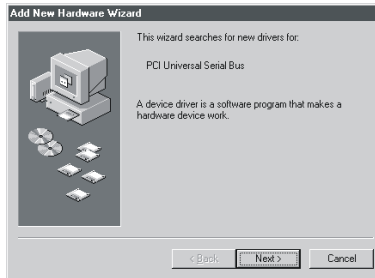
11. Click “**Next**”.



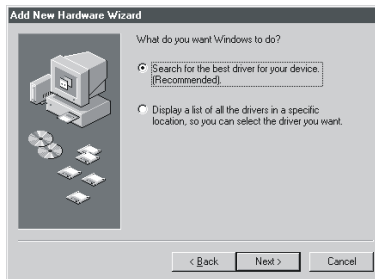
12. Click “**Finish**”.



- Windows will auto-detect the USB Card and display a dialog “**New Hardware found**” during system boot up. Press “**Next**” on the “**Add New Hardware Wizard**” screen.



- Select “**Search for the best driver for your device(Recommended)**” and click “**Next**”.



- Click “**Specify a location**” and insert the CD-disk. Click “**Browse ...**” to choose CD-ROM, and then click “**Next**”.



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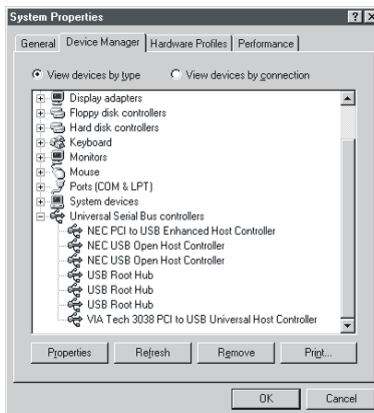
16. Click “Next”.



17. Click “Finish”.



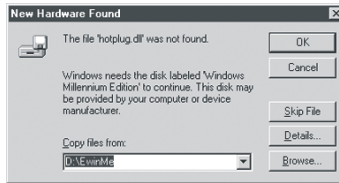
18. When “**Device Manager**” shows dual of “**NEC USB Open Host Controller**” and “**NEC PCI to USB Enhanced Host Controller**”, it means the driver is successfully installed.



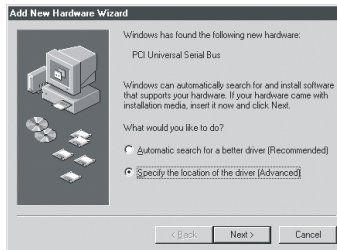
Windows® ME Setup

1. Windows ME supports **Port (Plug-n-Play)** mode and will install the USB Card driver automatically.

Please insert the WinME source CD disk, click “**Browse...**” to choose “**CD-ROM**”, and then click “**OK**”.

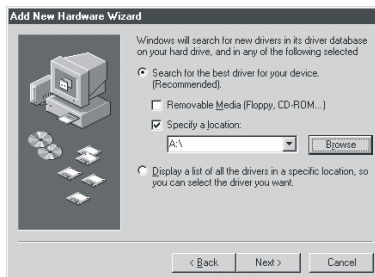


2. Windows will detect the USB Card and display a dialog, “**New Hardware found**”. Select “**Specify the location of the driver (Advanced)**” and click “**Next**”.



3. Select “**Search for the best driver for your device(Recommended)**” and click “**Specify a location**”.

Insert the CD-disk and click “**Browse ...**” to “**CD-ROM**”. Click “**Next**” to continue.



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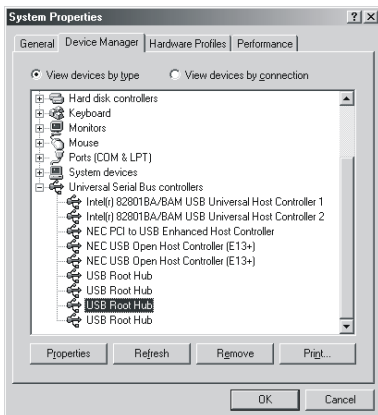
- Click “Next”.



- Click “Finish”.



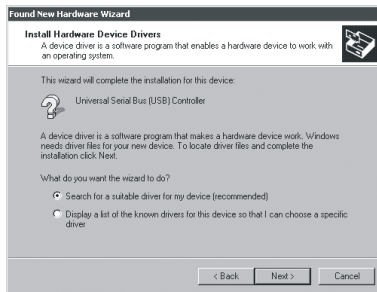
- When the “Device Manager” shows dual of “NEC USB Open Host Controller (E13+)” and “NEC PCI to USB Enhanced Host Controller”, it means the driver is successfully installed.



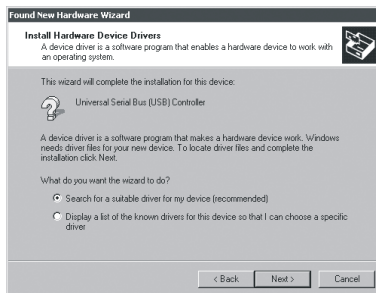
Windows® 2000 Setup

1. Windows 2000 supports **Port (Plug-n-Play)** mode and will install the USB Card driver directly.

Windows will detect the USB Card and display a dialog “**New Hardware found**” during system boot up. Press “**Next**” on the “**Found New Hardware Wizard**” screen.

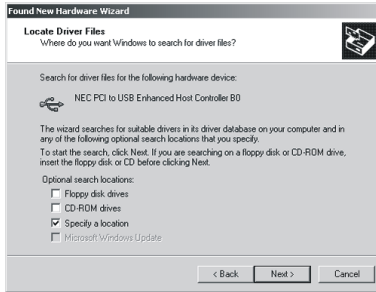


2. Select “**Search for a suitable driver for my device(Recommended)**” and click “**Next**”.

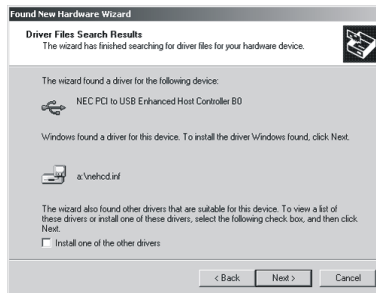


3. Select “**Specify a location**” and insert the CD-disk. Click “**Browse...**” to choose “**CD-ROM**”, and then click “**Next**”.

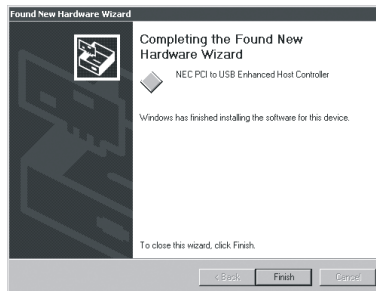
Appendix B



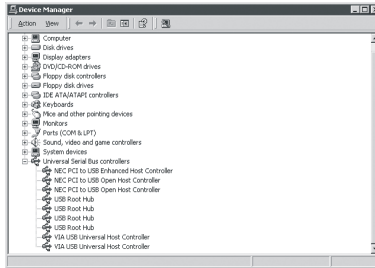
4. Click “Next”.



5. Click “Finish”.

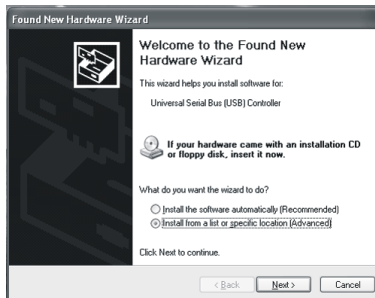


- When the “**Device Manager**” shows dual of “**NEC PCI to USB Open Host Controller**” and “**NEC PCI to USB Enhanced Host Controller**”, it means the driver is successfully installed.



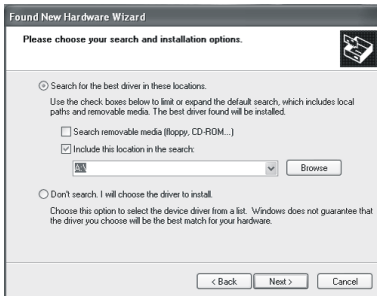
Windows® XP Setup

- Windows XP supports **Port (Plug-n-Play)** mode and will install the USB 2.0 Card driver directly.
- Windows XP will auto-detect the USB 2.0 Card and display a dialog “**New Hardware found**” during system boot up. Press “**Install from a list or specific location [Advanced]**” and click “**Next**”.

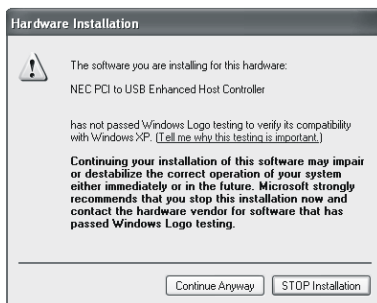


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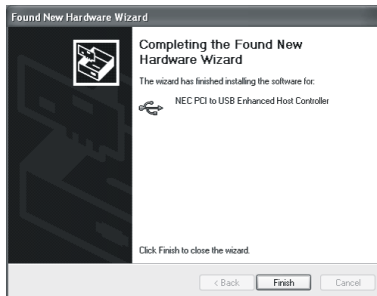
3. Select **“Include this location in the search”** and insert the CD disk. Click **“Browse...”** to choose **“CD-ROM”** and then click **“Next”**.



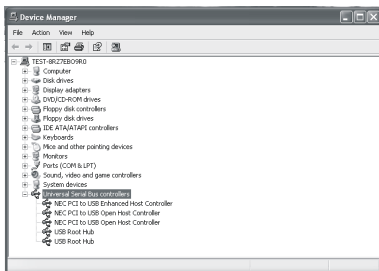
4. Click **“Continue Anyway”**.



5. Click **“Finish”**.



- When the “**Device Manager**” shows dual of “**NEC PCI to USB Open Host Controller**” and “**NEC PCI to USB Enhanced Host Controller**”, it means the driver is successfully installed.



Glossary

ACPI (*Advanced Configuration & Power Interface*)

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

AGP (*Accelerated Graphics Port*)

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

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 (*basic input/output system*)

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

Bus

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

Cache

A special memory subsystem that is used to speed up the data transfer. It stores the contents of frequently accessed RAM locations and the addresses where these data items are stored.

Chipset

A collection of integrated chips designed to perform one or more related functions. For

Glossary

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 (*complementary metal-oxide semiconductor*)

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

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 (*dual in-line memory module*)

A small circuit board that holds memory chips. A **SIMM** (*single in-line memory module*) has a 32-bit path to the memory chips whereas a DIMM has 64-bit path.

DRAM (*Dynamic RAM*)

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

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

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

Source: *Computer Desktop Encyclopedia*

Glossary

ECC Memory (*error correcting code memory*)

A type of memory that contains special circuitry for testing the accuracy of data and correcting the errors on the fly.

IDE (*Integrated Drive Electronics*)

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

IEEE 1394

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

IrDA (*Infrared Data Association*)

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

LAN (*local area network*)

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

LED (*light emitting diode*)

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

LPT (*line printer terminal*)

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

Glossary

PCI (*Peripheral Component Interconnect*)

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

PnP (*Plug and Play*)

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

POST (*Power On Self Test*)

During booting up your system, the BIOS executes a series of diagnostic tests, including 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 (*universal serial bus*)

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

Virus

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