MSI

K8N Master2-FAR

MS-9620 (v1.X) Workstation Board

Manual Rev: 1.0
Release Date: May 2005

CE

N1996

FCC-A Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a class A 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.

FC **Micro-Star International**
MS-9620

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

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Revision History

Revision	Revision History	Date
V1.0	First release	May 2005

Technical Support

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

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

iii

Safety Instructions

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

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

警告使用者:
這是甲類的資訊產品，在居住的環境中使用時，可能會造成無線電干擾，在這種情況下，使用者會被要求採取某些適當的對策。

廢電池請回收

For better environmental protection, waste batteries should be collected separately for recycling or special disposal.

To protect the global environment and as an environmentalist, MSI must remind you that...
Under the European Union ("EU") Directive on Waste Electrical and Electronic Equipment, Directive 2002/96/EC, which takes effect on August 13, 2005, products of "electrical and electronic equipment" cannot be discarded as municipal waste anymore and manufacturers of covered electronic equipment will be obligated to take back such products at the end of their useful life. MSI will comply with the product take back requirements at the end of life of MSI-branded products that are sold into the EU. You can return these products to local collection points.

iv

CONTENTS

Getting Started

Thank you for purchasing the K8N Master2-FAR (MS-9620 v1.X), an excellent ATX workstation board from MSI.

Based on the innovative *n*VIDIA® **nForce™4 Pro** chipsets for optimal system efficiency, the K8N Master2-FAR mainboard accommodates dual latest AMD Opteron™ DP processors in the 940-pin lidded ceramic micro PGA package, and supports up to six 144-bit DDR registered ECC DIMMs (at 200, 266, 333, and 400 MHz) to provide the maximum of 12GB memory capacity.

In the entry-level and mid-range market segment, this mainboard can provide a high-performance solution for today's front-end and general purpose server/workstation, as well as in the future.

Mainboard Specifications

CPU

† Supports dual Socket 940 for AMD Opteron™ processors, from 1.4 ~ 3.6 GHz
(For more information on compatible components, please visit ***http://www.msi.com.tw/program/products/server/svr/pro_svr_qvl.php***)

Chipset

† nVIDIA® nForce™4 Pro
- HyperTransport link to the AMD Opteron™ CPU
- Supports dual-channel DDR266/333/400 memory
- Supports PCI Express x16/ x8/ x4/ x1 interface
- Two independent SATA II controllers, for four drives
- Dual Ultra ATA 133/100/66 IDE controllers
- Supports high-speed USB2.0 ports

Main Memory

† 144-bit DDR at 200/266/333/400 MHz
† Supports six 184-pin DDR DIMMs up to 12GB
† Supports interleaving memory within DIMMs
† ChipKill ECC allows continuous correction of 4-bit errors in a failed x 4 memory device
(For more information on compatible components, please visit ***http://www.msi.com.tw/program/products/server/svr/pro_svr_qvl.php***)

Slots

† One 32-bit/33 MHz PCI slot (in orange, also can work as a communications slot)
† One PCI Express x4 slot
† Two PCI Express x16 slots for graphics cards (SLI mode supported)
- 2nd PCI Express x16 slot (PCI_E3) is compatible with PCI Express x 1

HDD Interface

† Dual IDE controllers on the nVIDIA® nForce™4 Pro chipset
- Provides IDE HDD/CD-ROM with PIO, Bus Master and Ultra DMA 133/100/66 operation modes
- Can connect up to 4 IDE devices

† Two independent SATA controllers on the nVIDIA® nForce™4 Pro chipset
- NV RAID supports 4 SATA II ports with up to 300MB/s transfer rate

NV RAID (Software)

† Supports up to 4 SATA and 2 PATA133 Hard drives
- RAID 0 or 1, 0+1, JBOD supported
- RAID function available for PATA133+SATA H/D or 4 SATA H/D drives

Onboard Peripherals

† 1 floppy port supports two FDDs with 360KB, 720KB, 1.2MB, 1.44MB, and 2.88MB
† 1 PS/2 keyboard port
† 1 PS/2 mouse port
† 1 serial port
† 1 parallel port supports SPP/EPP/ECP mode

† 2 RJ-45 ports (with LEDs)
† 10 USB ports (6 on the front and 4 on the rear)
† 3 IEEE 1394 ports (2 on front and 1 on rear)

Onboard LAN
† 1st LAN supports 10/100/1000 Fast Ethernet by Marvell 88E1111 PHY
† 2nd PCI LAN supports 10/100/1000 Fast Ethernet by Broadcom BCM5788

Onboard Audio
† Realtek ALC850 8-channel codec
   - 8-CH DA connector with 48 KHz rate
   - Compliant with AC97 2.3 specifications
   - Meets perfomace requirement for audio on PC 97/2001 system
   - Meets Microsoft WHQL / WLP 2.0 audio requirement

Onboard IEEE 1394
† VIA VT6306 IEEE 1394 controller

Power Management Features
† Wake up on LAN (WOL), wake up on PCI
† RTC alarm and wake up
† Wake up on keyboard/mouse/USB from S1 & S3
† Supports ACPI S1, S3, S4, S5 function

System Management
† SMBus (I2C)
† Temperature, voltage, and fan monitors

BIOS
† The mainboard BIOS provides "Plug & Play" BIOS which detects the peripheral devices and expansion cards of the board automatically
† The mainboard provides a Desktop Management Interface (DMI) function which records your mainboard specifications
† Supports boot from LAN, USB Device 1.1 & 2.0, and SATA HDD

Dimension
† ATX Form Factor (30.4 cm X 25.4 cm)

Mounting
† 9 mounting holes

MSI **MSI Reminds You...**
To create a bootable RAID volume for a Windows 2000 environment, Microsoft's Windows 2000 Service Pack 4 (SP4) is required. As the end user cannot boot without SP4, a combination installation CD must be created before attempting to install the operating system onto the bootable RAID volume.
To create the combination installation CD, please refer to the following website:
http://www.microsoft.com/windows2000/downloads/servicepacks/ sp4/HFdeploy.htm

Mainboard Layout
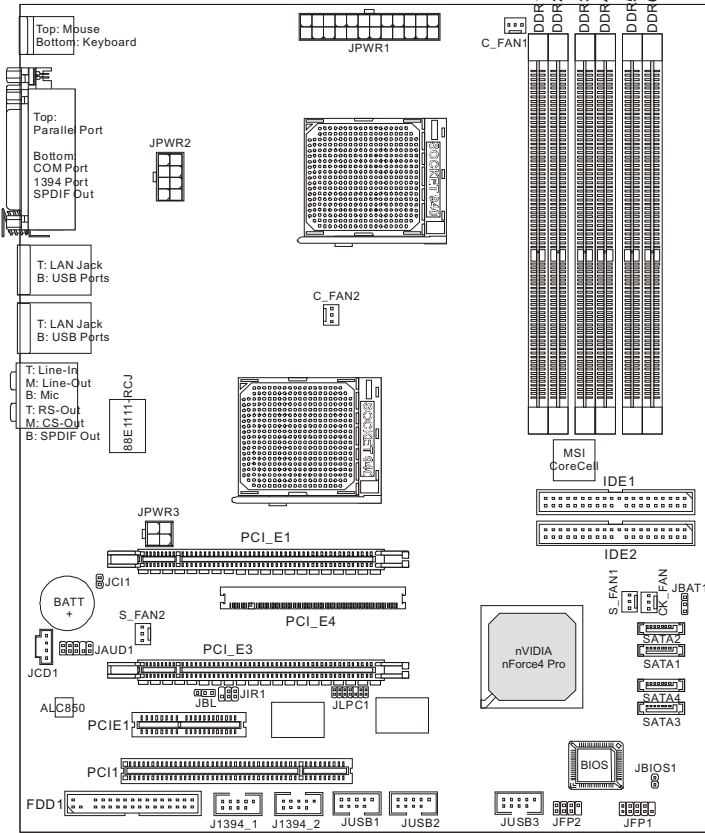
K8N Master2-FAR (MS-9620 v1.X) ATX Workstation Board

MSI Special Features

Core Center

The Core Center is a new utility you can find in the CD-ROM disk. The utility is just like your PC doctor that can detect, view and adjust the PC hardware and system status during real time operation. In the left side it shows the current system status, including the Vcore, 3.3V, +5V and 12V. In the right side it shows the current PC hardware status such as the CPU & system temperatures and all fans speeds.
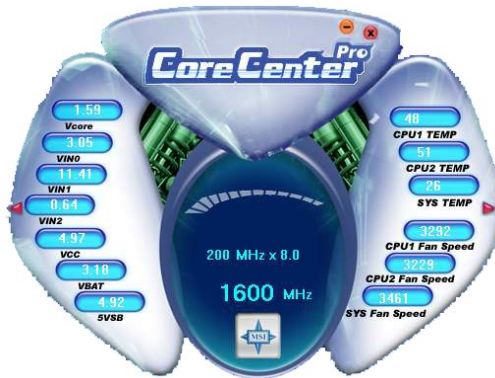
When you click the red triangles in the left and right sides, two sub-menus will open for users to overclock, overspec or to adjust the thresholds of system to send out the warning messages. If you click the *Core Center* button on the top, a screen pops up for you to choose the "*Auto mode*" or "*User mode*" of CPU fan. You may adjust the speeds of CPU fans and system fan here.

Left-side: Current system status
In the left sub-menu, you can configure the settings of FSB, Vcore, Memory Voltage and AGP Voltage by clicking the radio button in front of each item and make it available (the radio button will be lit as yellow when selected), use the "**+**" and "**-**" buttons to adjust, then click "*ok*" to apply the changes. Then you can click *Save* to save the desired FSB you just configured.

Also you may click *Auto* to start testing the maximal CPU overclocking value, The CPU FSB will automatically increase the testing value until the PC reboots. Or you may click *Default* to restore the default values.

Right-side: PC hardware status during real time operation
In the right sub-menu, here you can configure the PC hardware status such as CPU & system temperatures and fan speeds. You may use the scroll bars to adjust each item, then click "*ok*" to apply the changes. The values you set for the temperatures are the maximum thresholds for the system for warnings, and the value for fan speeds are the minimum thresholds.

Top-side: User mode/Auto mode
Here you may adjust the CPU fan speed. If you choose *User mode*, you may adjust the CPU fan speed in 8 different modes, from **Stop** to **Full speed**.

MSI Reminds You...
Items shown on Core Center may vary depending on your system status.

2

Hardware Setup

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

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

Quick Components Guide

JPWR1/2, *p.2-8*

C_FAN1, *p.2-18*   **DDR DIMMs**, *p.2-6*

I/O Ports, *p.2-10*

C_FAN2, *p.2-18*

CPU1/2, *p.2-3*

IDE1/2, *p.2-14*

JPWR3, *p.2-8*

JCI1, *p.2-17*

S_FAN1, CK_FAN, *p.2-18*

JBAT1, *p.2-20*

S_FAN2, *p.2-18*

JCD1, *p.2-17*

SATA2/ SATA1/ SATA4/ SATA3, *p.2-15*

JBL, *p.2-21*

JIR1, *p.2-16*

JAUD1, *p.2-16*

JBIOS1, *p.2-21*

FDD1, *p.2-14*   **J1394_1/2**, *p.2-18*   **JUSB1/2**, *p.2-19*   **JUSB3**, *p.2-19*   **JFP1/2**, *p.2-17*

PCI/PCI Express Slots, *p.2-22*
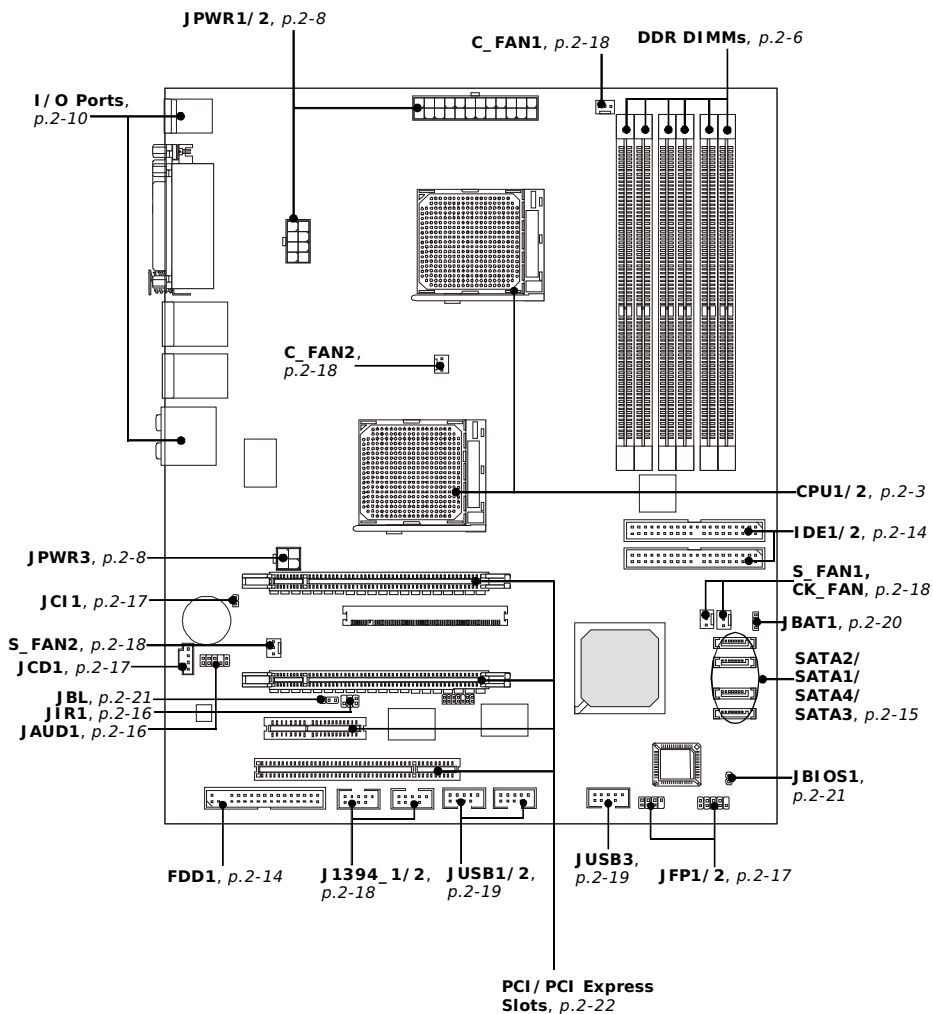
Central Processing Unit: CPU

The mainboard supports **Single/Dual** AMD® Opteron™ DP processor(s). The mainboard uses two CPU sockets called Socket 940 for easy CPU installation. You can install SINGLE or DUAL CPUs on the mainboard 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.

CPU1

CPU2
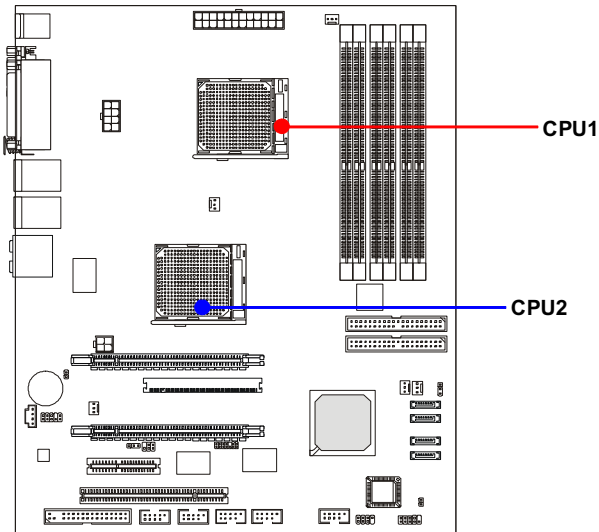
    2. To install **DUAL** CPUs on the board, you must use **the same type of CPUs running at the same frequency**.

For more information on compatible components, please visit *__http://www.msi.com. tw/program/products/server/svr/pro_svr_qvl.php__* .

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.

CPU Installation Procedures for Socket 940

1. Make sure that the computer is turned off, and the power cord disconnected before installing the CPU.

Open Lever

Sliding Plate

2. Pull the lever sideways away from the socket, and raise it up to a 90-degree angle.
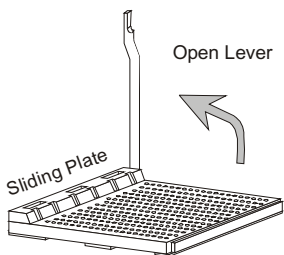
3. Locate the cut edge of the CPU. When the CPU is installed into the socket, this cut edge should be aligned with the corner marking an arrow on the Socket 940.
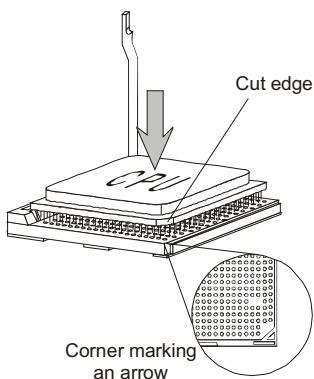
Please note that the CPU can only fit in a correct orientation, DO NOT use force to install the CPU into the socket.

Cut edge

CPU

Corner marking an arrow

4. Place the CPU onto the socket and press it down firmly into the socket. The pins of the CPU should be embedded into the socket completely.

Press down the CPU
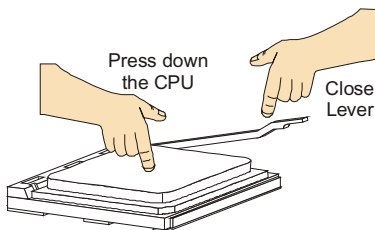
Close Lever

5. Close the lever to secure the CPU. Do not close the lever until the CPU's pins are fully inserted; otherwise, the pins may be damaged.

O   X

CPU   CPU
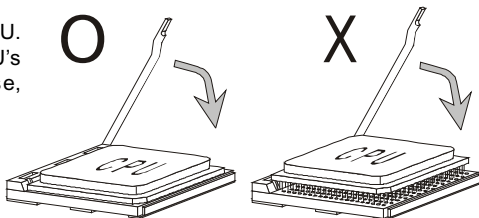
Installing AMD Opteron™ DP CPU Cooling System

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.

> **MSI Reminds You...**
> *Please refer to the recommended CPU fans at AMD® official website or consult the vendors for proper CPU cooling fan.*
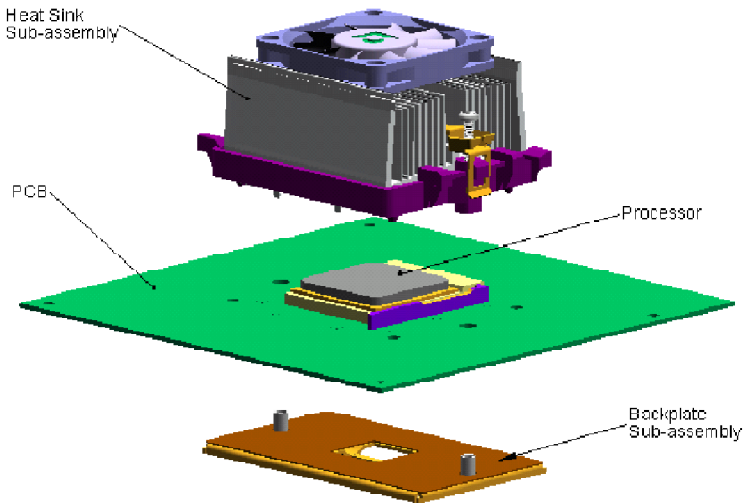
reference figure

> **MSI Reminds You...**
> *Overheating*
> *Overheating will seriously damage the CPU and system. Always make sure the cooling fan can work properly to protect the CPU from overheating.*
>
> *Replacing the CPU*
> *While replacing the CPU, always turn off the power supply or unplug the power supply's power cord from grounded outlet first to ensure the safety of CPU.*

Memory

The mainboard provides 6 slots for 184-pin DDR SDRAM DIMM (Double In-Line Memory Module) modules and supports up to 12GB memory size. You can install DDR266/333/400 modules on the DDR DIMM slots.

For more information on compatible components, please visit ***http://www.msi.com. tw/program/products/server/svr/pro_svr_qvl.php*** .

DDR 1 2 3 4 5 6
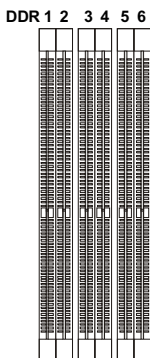
Installing DDR Modules

1. The DDR DIMM has only one notch on the center of module. The module will only fit in the right orientation.

2. Insert the DIMM memory module vertically into the DIMM slot. Then push it in until the golden finger on the memory module is deeply inserted in the socket.

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

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

Volt   **Notch**
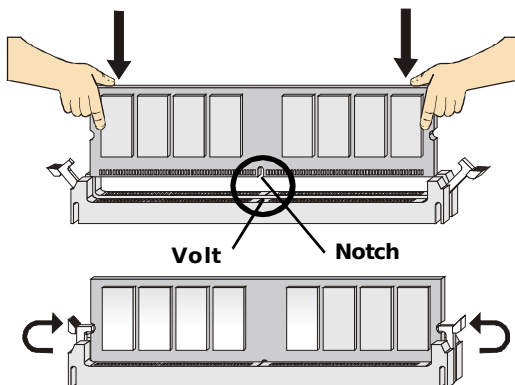
Memory Population Rules

The mainboard supports DDR266/333/400 memory interface.

Each DIMM slot supports up to a maximum size of 2GB. Users can install either single- or double-sided modules depending on their needs.

Memory modules can be installed in any combination as follows:

Slot	Memory module population rules (Single channel - 64 bits)						
DDR 1	Install			Install	Install		Install
DDR 2							
DDR 3		Install		Install		Install	Install
DDR 4							
DDR 5			Install		Install	Install	Install
DDR 6							

Slot	Memory module population rules (Dual channel - 128 bits)						
DDR 1	Install			Install		Install	Install
DDR 2	Install			Install		Install	Install
DDR 3		Install		Install	Install		Install
DDR 4		Install		Install	Install		Install
DDR 5			Install		Install	Install	Install
DDR 6			Install		Install	Install	Install

MSI Reminds You...
Make sure that you install memory modules of the same type and density on DDR DIMMs.

DDR Cooling Fan

To protect the system from overheating, make sure that you install MSI's proprietary DDR cooling fan (patent pending) before the system memory reaches **2GB** or beyond. This DDR cooling fan will help to dissipate heat produced by DDR memory modules, which in return contributes to system stability during overclocking.

Connect to the 4-pin power connector on the system power supply
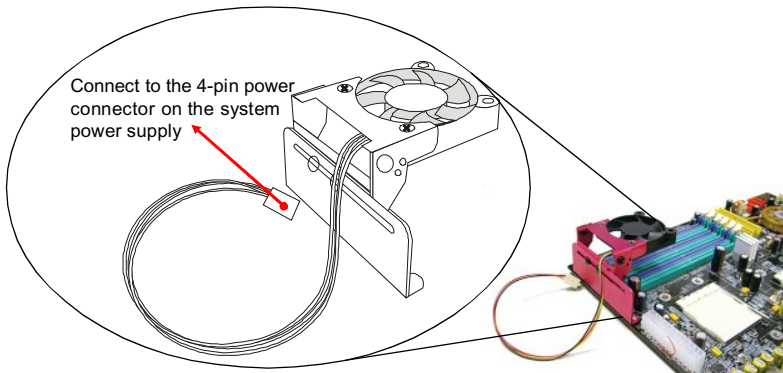
Power Supply

The mainboard supports SSI 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.

SSI 24-Pin System Power Connector: JPWR1

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

SSI 8-Pin CPU Power Connector: JPWR2

This connector provides 12V power output to the CPUs.

SSI 4-Pin VGA Power Connector: JPWR3

Make sure to connect this connector with a 12V power supply to ensure stable operation of the graphics card.
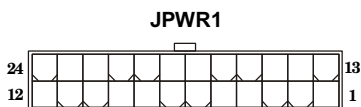
JPWR2

JPWR1

JPWR1 Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS-ON#
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWR OK	20	3VSB
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND
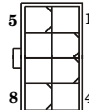
JPWR2 Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V

JPWR3 Pin Definition

JPWR3
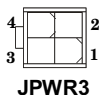
PIN	SIGNAL
1	GND
2	GND
3	12V
4	12V

MSI Reminds You...

1. Maker sure that all three connectors are connected to proper SSI power supplies to ensure stable operation of the mainboard.

2. Power supply of 600watts (and above) is highly recommended for system stability.

3. SSI 12V power connection should be greater than 18A.

4. For this model, you must use a power supply that comes with a -5V pin supply.

Important Notification about Power Issue

NForce chipset is very sensitive to ESD (Electrostatic Discharge), therefore this issue mostly happens while the users intensively swap memory modules under S5 (power-off) states, and the power code is plugged while installing modules. Due to several pins are very sensitive to ESD, so this kind of memory-replacement actions might cause system chipset unable to boot. Please follow the following solution to avoid this situation.

Unplug the AC power cable (shown in figure 1) or unplug the JPWR1/JPWR2/ JPWR3 power connectors (shown in figure 2 & figure 3) before the 1st installation or during system upgrade procedure.

Figure 1:
Unplug the AC power cable

Figure 2:
Unplug the power connector
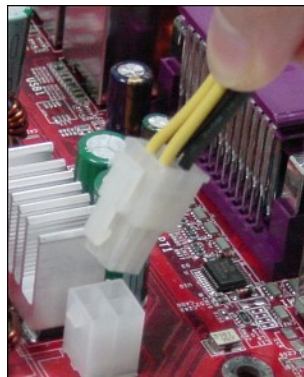
Figure 3:
Unplug the power connector

MSI Reminds You...
Mainboard photos shown in this section are for demonstration only. The appearance of your mainboard may vary depending on the model you purchase.

Back Panel

L-In RS-Out

Mouse **Parallel** **LAN** **LAN**

Keyboard COM Port **1394 Port SPDIF Out (Coaxial)** **USB Ports** **L-Out CS-Out Mic SPDIF Out (Optical)**
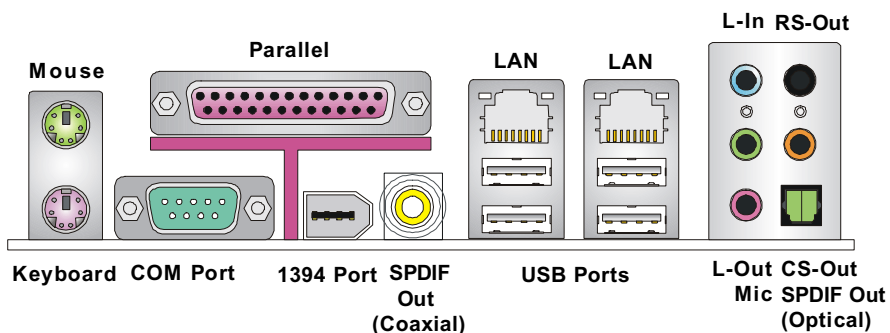
Mouse Connector (Green) / Keyboard Connector (Purple)

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

```
6    5
4      3
  2  1
```
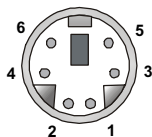
PS/2 Mouse / Keyboard (6-pin Female)

Pin Definition

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

IEEE1394 Port (Optional)

The back panel provides one standard IEEE 1394 port. The IEEE1394 high-speed serial bus complements USB by providing enhanced PC connectivity for a wide range of devices, including consumer electronics audio/video (A/V) appliances, storage peripherals, other PCs, and portable devices.
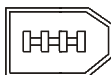
IEEE1394 Port

Serial Port Connector

The mainboard offers one 9-pin male DIN connector as the serial port. The port is a 16550A high speed communication port that sends/receives 16 bytes FIFOs. You can attach a serial mouse or other serial devices directly to the connector.

Pin Definition

1 2 3 4 5

6 7 8 9
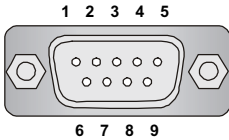
9-Pin Male DIN Connector

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

USB Connectors

The rear panel provides four OHCI (Open Host Controller Interface) Universal Serial Bus roots for attaching USB devices such as keyboard, mouse or other USB-compatible devices. You can plug the USB device directly into the connector.
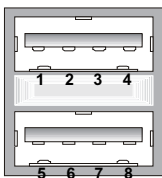
USB Port Description

1 2 3 4

5 6 7 8

USB Ports

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

LAN (RJ-45) Jacks

The mainboard provides 2 standard RJ-45 jacks for connection to single Local Area Network (LAN). This Giga-bit LAN enables data to be transferred at 1000, 100 or 10Mbps. You can connect a network cable to either LAN jack.
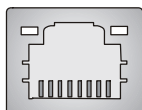
Giga-bit LAN Pin Definition

PIN	SIGNAL	DESCRIPTION
1	D0P	Differential Pair 0+
2	D0N	Differential Pair 0-
3	D1P	Differential Pair 1+
4	D2P	Differential Pair 2+
5	D2N	Differential Pair 2-
6	D1N	Differential Pair 1-
7	D3P	Differential Pair 3+
8	D3N	Differential Pair 3-

RJ-45 LAN Jack

Audio Port Connectors

The left 3 audio jacks are 2-channel mode for stereo speaker output. **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.

However, there is an advanced audio application provided by Realtek ALC850 to offer support for **7.1-channel audio operation** and can turn rear audio connectors from 2-channel to 4-/5.1-/7.1 channel audio.

S/PDIF Out-Coaxial

Line In

Line Out

MIC

Rear Speaker Out (in 7.1CH / 6CH)

Center/Subwoofer Speaker Out (in 7.1CH / 6CH)

S/PDIF Out-Optical (in 7.1CH / 6CH)
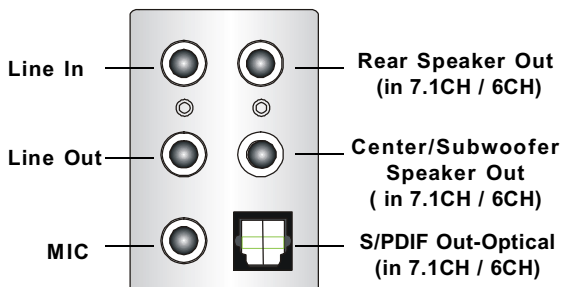
Parallel Port Connector: LPT1

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.
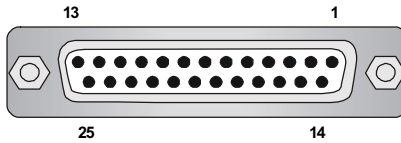
Pin Definition

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	PaperEnd
13	SELECT	Select
14	AUTO FEED#	AutomaticFeed
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

Connectors

The mainboard provides connectors to connect to FDD, IDE HDD, case, LAN, USB Ports, CPU/system power supply fans, ... and etc.

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.

FDD1

Hard Disk Connectors: IDE1 / IDE2

The mainboard provides a 32-bit Enhanced PCI IDE and Ultra DMA 33/66/100/133 controller that supports PIO mode 0 ~ 4, Bus Master, and Ultra DMA 33/66/100/133 function. You can connect up to four hard disk drives, CD-ROM drives, 120MB floppy disk drive (reserved for future BIOS), and other devices.
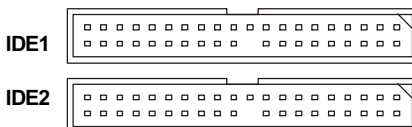
IDE1

IDE2

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

IDE2 (Secondary IDE Connector)
IDE2 can also connect a Master and a Slave drive.

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

Serial ATA RAID Connectors: SATA1 / SATA2 / SATA3 / SATA4

The nVIDIA nForce™4 Pro provides a hybrid solution that combines four independent SATA ports for support of up to four Serial ATA (Serial ATA RAID) drives and utilizes nVIDIA Serial ATA software RAID to support RAID levels 0, 1, 0+1, and JBOD for easy management of the storage subsystems. These connectors support 2nd generation serial ATA data rates of 300 MB/s and are fully compliant with Serial ATA II specifications.
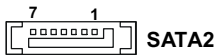
SATA1/2/3/4 Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	GND	2	TXP
3	TXN	4	GND
5	RXN	6	RXP
7	GND		

Optional Serial ATA cable

Take out the dust cover and connect to the hard disk devices

Connect to SATA1/2/3/4
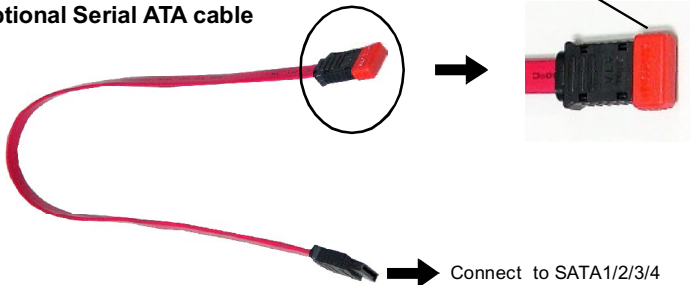
MSI Reminds You...
Please do not fold the Serial ATA cable into 90-degree angle. Otherwise, the loss of data may occur during transmission.

IrDA Infrared Module Header: JIR1

The connector allows you to connect to IrDA Infrared module. You must configure the setting through the BIOS setup to use the IR function. JIR1 is compliant with Intel® Front Panel I/O Connectivity Design Guide.

JIR1

Pin Definition

Pin	Signal
1	NC
2	NC
3	VCC5
4	GND
5	IRTX
6	IRRX

Front Panel Audio Connector: JAUD1

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

JAUD1

Pin Definition

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

MSI Reminds You...
If you don't want to connect to the front audio header, pins 5 & 6, 9 & 10 have to be jumpered in order to have signal output directed to the rear audio ports. Otherwise, the Line-Out connector on the back panel will not function.
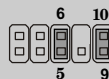
Chassis Intrusion Switch Connector: JCI1

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.

```
    GND ▢ 1
 CINTRU ▢ 2
        JCI1
```
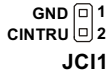
CD-In Connector: JCD1

The connector is for CD-ROM audio connector.

```
JCD1
  L
  GND
  R
```
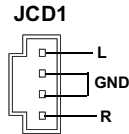
Front Panel Connectors: JFP1 / JFP2

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

JFP1 Pin Definition
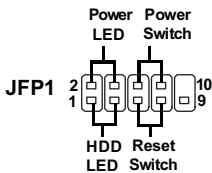
PIN	SIGNAL	DESCRIPTION
1	HD_LED_P	Hard disk LED pull-up
2	FP PWR/SLP	MSG LED pull-up
3	HD_LED_N	Hard disk active LED
4	FP PWR/SLP	MSG LED pull-up
5	RST_SW_N	Reset Switch low reference pull-down to GND
6	PWR_SW_P	Power Switch high reference pull-up
7	RST_SW_P	Reset Switch high reference pull-up
8	PWR_SW_N	Power Switch low reference pull-down to GND
9	RSVD_DNU	Reserved. Do not use.

JFP1

Power LED Power Switch

HDD LED Reset Switch

JFP2 Pin Definition
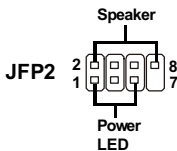
PIN	SIGNAL	PIN	SIGNAL
1	GND	2	SPK-
3	SLED	4	BUZ+
5	PLED	6	BUZ-
7	NC	8	SPK+

JFP2

Speaker

Power LED

Fan Power Connectors: C_FAN1/2, S_FAN1/2, CK_FAN

The fan power connectors support system cooling fan with +12V. When connecting the wire to the connectors, always 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 onboard, you must use a specially designed fan with speed sensor to take advantage of the CPU fan control.
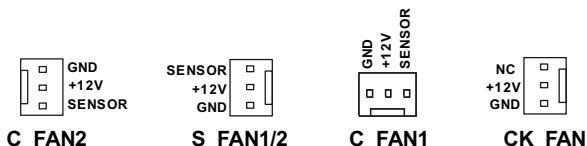
C_FAN2
- GND
- +12V
- SENSOR

S_FAN1/2
- SENSOR
- +12V
- GND

C_FAN1
- GND
- +12V
- SENSOR

CK_FAN
- NC
- +12V
- GND

MSI Reminds You...
Please refer to the recommended CPU fans at AMD® official website or consult the vendors for proper CPU cooling fan.

IEEE 1394 Connectors: J1394_1 / J1394_2

The mainboard provides two 1394 pin headers that allow you to connect IEEE 1394 ports via an external IEEE1394 bracket.

J1394_1/ J1394_2

2 1   10 9

Pin Definition
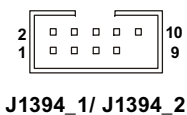
PIN	SIGNAL	PIN	SIGNAL
1	TPA+	2	TPA-
3	Ground	4	Ground
5	TPB+	6	TPB-
7	Cable power	8	Cable power
9	Key (no pin)	10	Ground
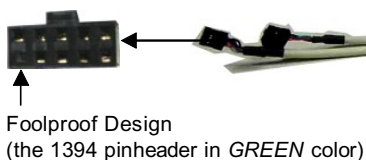
IEEE1394 Bracket
(Optional)

Foolproof Design
(the 1394 pinheader in *GREEN* color)

Front USB Connectors: JUSB1 / JUSB2 / JUSB3

The mainboard provides three standard USB 2.0 pin headers *JUSB1 & JUSB2 &* JUSB3. USB 2.0 technology increases data transfer rate up to a maximum throughput of 480Mbps, which is 40 times faster than USB 1.1, and is ideal for connecting high-speed USB interface peripherals such as **USB HDD**, **digital cameras**, **MP3 players**, **printers**, **modems and the like**.

Pin Definition

2 □ □ □ □ □ **10**
1 □ □ □ □ **9**
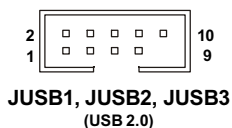
JUSB1, JUSB2, JUSB3
(USB 2.0)

PIN	SIGNAL	PIN	SIGNAL
1	VCC	2	VCC
3	USB0-	4	USB1-
5	USB0+	6	USB1+
7	GND	8	GND
9	Key (no pin)	10	USBOC

Connect to JUSB1, JUSB2, or JUSB3
(the USB pinheader in *YELLOW* color)

USB 2.0 Bracket
(Optional)

MSI Reminds You...
Note that the pins of VCC and GND must be connected correctly to avoid possible damage.

Jumper

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

Clear CMOS Jumper: JBAT1

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

JBAT1

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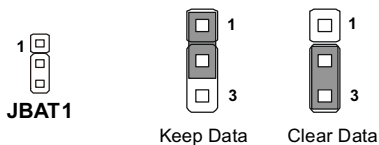
MSI Reminds You...
You can clear CMOS by shorting 2-3 pin while the system is off. Then return to 1-2 pin position. Avoid clearing the CMOS while the system is on; it will damage the mainboard.

BIOS Flash Jumper: JBIOS1

This jumper is used to enable/disable the BIOS flash. When you intend to update the BIOS code, uncap this jumper first. Under normal operation, we suggest that you disable the BIOS flash by capping the JBIOS1 jumper to protect the system BIOS from virus infection.

BIOS Boot Block Jumper: JBL

A "boot block" program is included as part of the system BIOS to recover the system from a situation when the BIOS code is incorrect/corrupted or needs to be updated. When the BIOS code is corrupted or needs to be updated, you have to at first enable the boot block by shorting 1-2 pin of the JBL jumper. Then the boot block will try to recover the BIOS code, usually by reading it from a specially-prepared floppy disk. *(Note that you also have to uncap the JBIOS1 jumper to enable BIOS flash in the meantime.)*
Under normal operation, we suggest that you disable the boot block by shorting 2-3 pin of the JBL jumper to protect the boot block from virus infection.

JBIOS1   Disable BIOS Flash   Enable BIOS Flash

JBL   Enable Boot Block   Disable Boot Block
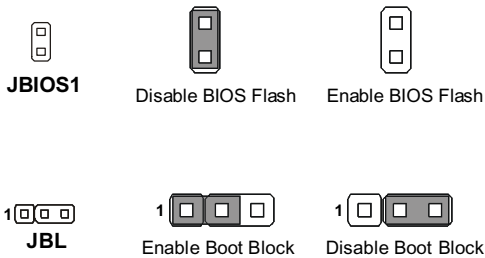
Slots

The mainboard provides two PCI Express x16 slots, one PCI Express x4 slot, and one 32-bit PCI bus slot.

PCI_E1: PCI Express x16 slot (4GB/s)
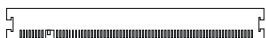
PCI_E4: NV SLI (Scalable Link Interface) connector

PCI_E3: PCI Express x16 slot (4GB/s)
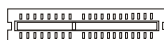
PCIE1: PCI Express x4 slot (1GB/s)
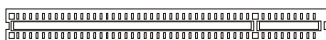
PCI1: 32-bit/33MHz PCI slot, 3.3V device only (in orange color, reserved as a communications slot)

MSI Reminds You...

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

*2. **The VGA card(s) will work only when the SLI Switch Card is properly installed onboard**. In other words, you have to install the SLI Switch Card under all circumstances even when you do not intend to use the SLI function.*

PCI Interrupt Request Routing

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

DEVICE	ICH INT Pin	IDSEL	CLOCK	REQ & GNT
5788 Gigabit LAN	INT C#	AD22	PCICLK0	0
VIA6306 IEEE1394	INT D#	AD23	PCICLK1	1
PCI 1	INT A/B/C/D#	AD24	PCICLK2	2

NV SLI (Scalable Link Interface) Connector: PCI_E4

NVIDIA SLI (Scalable Link Interface) technology allows two GPUs to run in tandem within a system to achieve up to twice the performance of a single graphics card. To utilize this technology, the two GPU cards must be connected by an SLI bridge card.

You can find an SLI switch card on the mainboard configured to **non-SLI** mode by default (fig.1).

SLI Switch Card

SLI Bridge Card

non-SLI mode

Fig.1

 If you intend to use the SLI interface for better graphics performance, please refer to the following instructions.

1. Turn the latch either right or left to loosen the SLI switch card (refer to fig.2).

Turn the latch to loosen the card

Fig.2

MSI Reminds You...
Make sure that you power off the system before removing the SLI switch card.

2. Remove the SLI switch card. Flip it over to the other side (SLI mode side) and insert it slantwise (at 45-degree angle) into the NV SLI connector (fig.3).

SLI mode

Fig.3

3. Press down the SLI switch card and secure it with the latch (fig.4). Before installing or removing an NV SLI module, make sure that you unplug the power supply first.

Turn the latch to fix the card
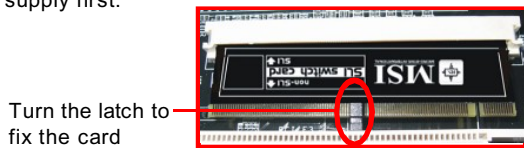
Fig.4

4. After configuring the switch card to SLI mode, you can now install two graphics cards on PCI Express x16 slots. With two cards installed, an SLI bridge card is required to connect the atop golden fingers of these two graphics cards (fig.5). Please note that although you have installed two graphics cards, only the video outputs on the first card will work. Hence, you only need to connect a monitor to the first PCI Express card.
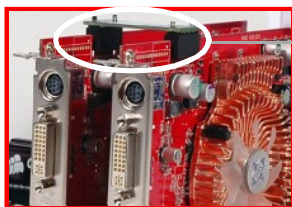
SLI bridge card

Fig.5

MSI Reminds You...

1. Mainboard photos shown in this section are for demonstration only. The appearance of your mainboard may vary depending on the model you purchase.

*2. If you intend to install only **ONE** x16 graphics card, make sure that: a. your graphics card is Installed on the PCI_E1 slot;*
*   b. the SLI switch card is set to **non-SLI** mode.*

*3. If you intend to install **TWO** x16 graphics cards, make sure that:*
*   a. these two graphics cards are of the same brand and specifications;*
*   b. the SLI switch card is set to **SLI** mode.*

5. After the hardware installation is completed, restart the system and install the NV SLI driver/utility. A configuration panel will be provided for Multi-GPU control. Check the **Enable multi-GPU** box to enable the SLI function for the onboard graphics cards (concerning the details of multi-GPU settings, please refer to your graphics card manual) .

Check the box
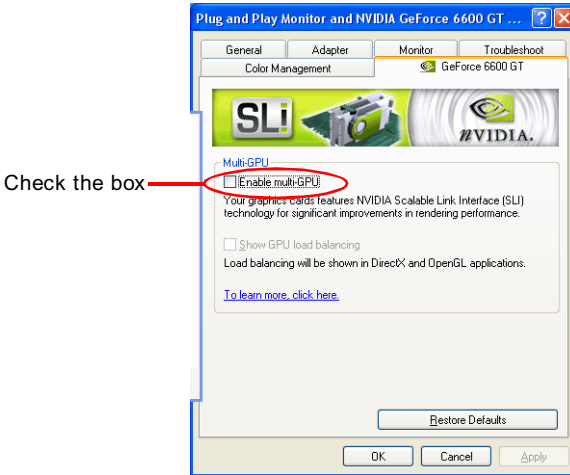
6. Restart your system and a pop-up will show in the system tray confirming that **Multi-GPU has been enabled**.

.
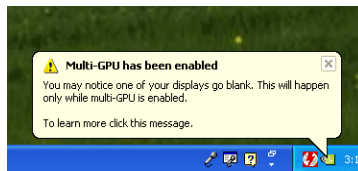
MSI Reminds You...
If you want to remove one graphics card and quit the SLI function, make sure that you reset the SLI switch card (SLI mode to non-SLI mode) and disable the "MultiGPU" function.

3

BIOS Setup

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

² An error message appears on the screen during the system booting up, and requests you to run SETUP.

² You want to change the default settings for customized features.

MSI Reminds You...

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

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

W9620NMS V1.0 150305 where:

1st digit refers to BIOS maker as A = AMI, W = AWARD, and P = PHOENIX.
2nd - 5th digit refers to the model number.
6th digit refers to the chipset as I = Intel, N = nVidia, and V = VIA.
7th - 8th digit refers to the customer as MS = all standard customers.
V1.0 refers to the BIOS version.
150305 refers to the date this BIOS was released.

Entering Setup

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

Press DEL to enter SETUP

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

Control Keys

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

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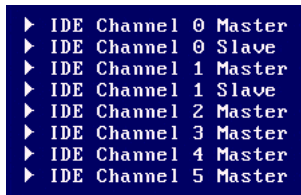
After entering the Setup menu, the first menu you will see is the Main Menu.

Main Menu

The main menu lists the setup functions you can make changes to. You can use the control keys (↑↓) 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 containing additional options can be launched from this field. You can use control keys (↑↓) 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 <Esc >.

▶ IDE Channel 0 Master
▶ IDE Channel 0 Slave
▶ IDE Channel 1 Master
▶ IDE Channel 1 Slave
▶ IDE Channel 2 Master
▶ IDE Channel 3 Master
▶ IDE Channel 4 Master
▶ IDE Channel 5 Master

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 Phoenix-Award WorkstationBIOS CMOS Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several setup functions and two exit choices. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.

```
                Phoenix - Award WorkstationBIOS CMOS Setup Utility

    ▶ Standard CMOS Features          ▶ Cell Menu

    ▶ Advanced BIOS Features            Load Fail-Safe Defaults

    ▶ Advanced Chipset Features         Load Optimized Defaults

    ▶ Integrated Peripherals            Set Supervisor Password

    ▶ Power Management Setup            Set User Password

    ▶ PnP/PCI Configurations            Save & Exit Setup

    ▶ H/W Monitor                      Exit Without Saving

    Esc : Quit                      ↑ ↓ → ←   : Select Item
    F10 : Save & Exit Setup

                    Time, Date, Hard Disk Type...
```

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

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

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.

H/W Monitor
This entry shows your PC health status.

Cell Menu
Use this menu to specify your settings for CPU/AGP frequency/voltage control and overclocking.

Load Fail-Safe Defaults
Use this menu to load the default values set by the BIOS vendor for stable system performance.

Load Optimized Defaults
Use this menu to load the default values set by the mainboard manufacturer specifically for optimal performance of the mainboard.

Set Supervisor Password
Use this menu to set Supervisor Password.

Set User Password
Use this menu to set User Password.

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

Exit Without Saving
Abandon all changes and exit setup.

Standard CMOS Features

The items in Standard CMOS Features Menu includes some basic 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.

```
                Phoenix - Award WorkstationBIOS CMOS Setup Utility
                            Standard CMOS Features
    ┌──────────────────────────────────────────────────┬──────────────────────┐
    │  Date (mm:dd:yy)              Thu, Jan  2 2003    │     Item Help        │
    │  Time (hh:mm:ss)                0 : 15 : 40       │                      │
    │                                                   │  Menu Level   ▶      │
    │ ▶ IDE Channel 0 Master        [ None]             │                      │
    │ ▶ IDE Channel 0 Slave         [ None]             │  Change the day, month,│
    │ ▶ IDE Channel 1 Master        [ None]             │  year and century    │
    │ ▶ IDE Channel 1 Slave         [ None]             │                      │
    │ ▶ IDE Channel 2 Master        [ None]             │                      │
    │ ▶ IDE Channel 3 Master        [ None]             │                      │
    │ ▶ IDE Channel 4 Master        [ None]             │                      │
    │ ▶ IDE Channel 5 Master        [ None]             │                      │
    │                                                   │                      │
    │   Drive A                     [1.44M, 3.5 in.]    │                      │
    │   Halt On                     [All , But Keyboard]│                      │
    │                                                   │                      │
    │   Base Memory                      640K           │                      │
    │   Extended Memory               1047552K          │                      │
    │   Total Memory                  1048576K          │                      │
    └──────────────────────────────────────────────────┴──────────────────────┘
    ↑↓→←:Move   Enter:Select   +/-/PU/PD:Value   F10:Save   ESC:Exit   F1:General Help
         F5: Previous Values      F6: Fail-Safe Defaults    F7: Optimized Defaults
```

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

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

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

IDE Channel 0/1 Master/Slave, IDE Channel 2/3/4/5 Master
Press PgUp/<+> or PgDn/<-> to select [Manual], [None] or [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.

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
This item allows you to set the type of floppy drive installed. Available options: [None], [360K, 5.25 in.], [1.2M, 5.25 in.], [720K, 3.5 in.], [1.44M, 3.5 in.], [2.88M, 3.5 in.].

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

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

Base Memory/Extended Memory/Total Memory
The items show the memory status of your system (read only).

Advanced BIOS Features

```
          Phoenix - Award WorkstationBIOS CMOS Setup Utility
                        Advanced BIOS Features
 ▶ Removable Device Priority     [Press Enter]   ▲        Item Help
 ▶ Hard Disk Boot Priority       [Press Enter]   ▒
   Virus Warning                 [Disabled]      ▒   Menu Level    ▶
   CPU Internal Cache            [Enabled]       ▒
   External Cache                [Enabled]       ▒   Select Removable Boot
   Quick Boot                    [Enabled]       ▒   Device Priority
   1st Boot Device               [Removable]     ▒
   2nd Boot Device               [CDROM]         ▒
   3rd Boot Device               [Hard Disk]     ▒
   Boot Other Device             [Enabled]       ▒
   Seek Floppy                   [Disabled]      ▒
   Boot Up NumLock LED           [On]            ▒
   Gate A20 Option               [Fast]          ▒
   Typematic Rate Setting        [Disabled]      ▒
 x Typematic Rate (Chars/Sec)    6               ▒
 x Typematic Delay (Msec)        250             ▒
   APIC Mode                     Enabled         ▒
   MPS Table Version             [1.4]           ▒
   Boot OS/2 For DRAM > 64MB     [Non-OS2]       ▼
   Small Logo(EPA) Show          [Disabled]      ▼
 ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
      F5: Previous Values     F6: Fail-Safe Defaults   F7: Optimized Defaults
```

Removable Device Priority
This feature allows you to specify the priority of removable devices.

Hard Disk Boot Priority
This feature allows you to specify the hard disk boot priority. Press <Enter> to enter the sub-menu. Then you may use the arrow keys (↑↓) to select the desired device, then press <+>, <-> or <PageUp>, <PageDown> key to move it up/down in this hard disk boot priority list.

Virus Warning
The item is to set the Virus Warning feature for IDE Hard Disk boot sector protection. If the function is enabled and any attempt to write data into this area is made, BIOS will display a warning message on screen and beep. Settings: [Disabled] and [Enabled].

CPU Internal Cache
The item allows you to turn on or off CPU's internal (L1) cache. Settings: [Enabled] and [Disabled].

External Cache
The item allows you to turn on or off CPU's external (L2) cache. Settings: [Enabled] and [Disabled].

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

1st/2nd/3rd Boot Device
The items allow you to set the sequence of boot devices where BIOS attempts to load the disk operating system.

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

Boot Other Device
Setting the option to [Enabled] allows the system to try to boot from other device if the system fails to boot from the 1st/2nd/3rd boot device.

Seek Floppy
Setting to [Enabled] will make BIOS seek floppy drive A: before booting the system. Settings: [Enabled], [Disabled].

Boot Up Num-Lock LED
This setting is to set the Num Lock status when the system is powered on. Setting to [On] will turn on the Num Lock key when the system is powered on. Setting to [Off] will allow users to use the arrow keys on the numeric keypad. Setting options: [On], [Off].

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 Port92 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
This item is used to enable or disable the typematic rate setting including Typematic Rate & Typematic Delay.

Typematic Rate (Chars/Sec)
After *Typematic Rate Setting* is enabled, this item allows you to set the rate (characters/second) at which the keys are accelerated. Settings: [6], [8], [10], [12], [15], [20], [24], [30].

Typematic Delay (Msec)
This item allows you to select the delay between when the key was first pressed and when the acceleration begins. Settings: [250], [500], [750], [1000].

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

MPS Table Version

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

Boot OS/2 for DRAM > 64MB

This allows you to run the OS/2® operating system with DRAM larger than 64MB. Setting options: [Yes], [No].

Small Logo(EPA) Display

This item enables you to show the EPA logo (brand specific graphics) on the bootup screen. Settings are:

       [Disabled]   Shows the normal POST screen at boot.

       [Enabled]   Shows a still image (EPA logo) on the screen at boot.

Advanced Chipset Features

```
                Phoenix - Award WorkstationBIOS CMOS Setup Utility
                        Advanced Chipset Features

   System BIOS Cacheable       [Disabled]              Item Help

                                               Menu Level    ▶

                                               Enable this item to
                                               allow the system to
                                               cache this RAM to
                                               increases performance.








   ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
     F5: Previous Values     F6: Fail-Safe Defaults    F7: Optimized Defaults
```
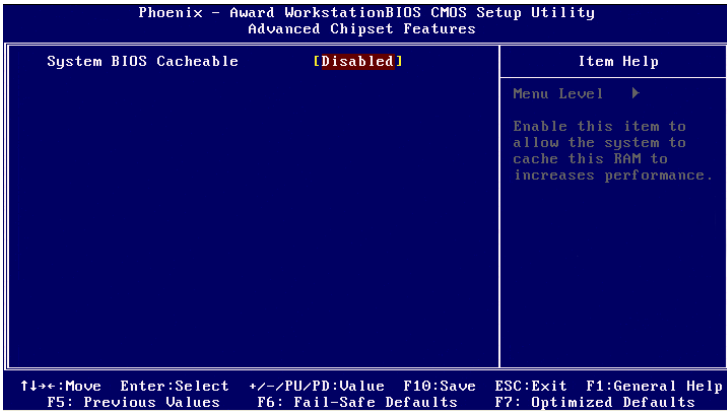
System BIOS Cacheable
Selecting [Enabled] allows caching of the system BIOS ROM at F0000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result. Setting options: [Enabled], [Disabled].

Integrated Peripherals

```
            Phoenix - Award WorkstationBIOS CMOS Setup Utility
                         Integrated Peripherals
  ▶ IDE Function Setup          [Press Enter]    │     Item Help
  ▶ nVidia RAID Config          [Press Enter]    │
  ▶ Onboard Device              [Press Enter]    │ Menu Level    ▶
  ▶ Onboard I/O Chip Setup      [Press Enter]    │
                                                 │ Press [Enter] to enter
                                                 │ next page for detail
                                                 │ settings.

  ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
     F5: Previous Values    F6: Fail-Safe Defaults  F7: Optimized Defaults
```
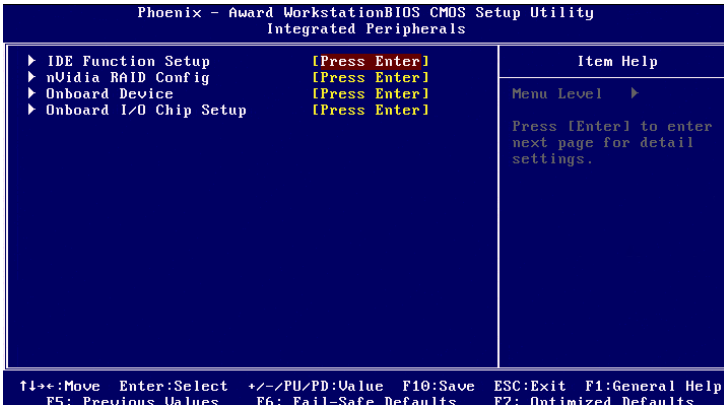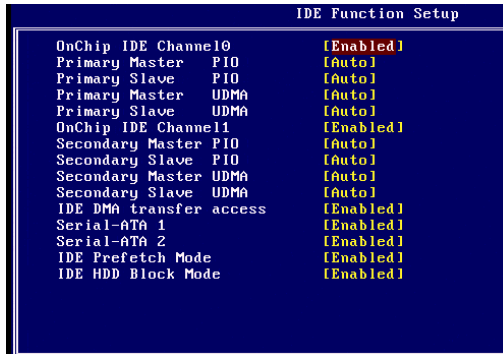
IDE Function Setup
Press <Enter> to enter the sub-menu and the following screen appears:

```
                            IDE Function Setup
    OnChip IDE Channel0          [Enabled]
    Primary Master   PIO         [Auto]
    Primary Slave    PIO         [Auto]
    Primary Master   UDMA        [Auto]
    Primary Slave    UDMA        [Auto]
    OnChip IDE Channel1          [Enabled]
    Secondary Master PIO         [Auto]
    Secondary Slave  PIO         [Auto]
    Secondary Master UDMA        [Auto]
    Secondary Slave  UDMA        [Auto]
    IDE DMA transfer access      [Enabled]
    Serial-ATA 1                 [Enabled]
    Serial-ATA 2                 [Enabled]
    IDE Prefetch Mode            [Enabled]
    IDE HDD Block Mode           [Enabled]
```

OnChip IDE Channel 0/1
The integrated peripheral controller contains an IDE interface with support for two IDE channels. Choose [Enabled] to activate each channel separately. Settings: [Enabled], [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], [Disabled].

IDE DMA Transfer Access

This item is used to enable or disable the DMA transfer function of the IDE Hard Drive. The settings are: [Enabled], [Disabled].

Serial-ATA 1/2

This item is used to enable or disable onchip SATA controller. The settings are: [Enabled], [Disabled].

IDE Prefetch Mode

The onboard IDE drive interfaces support IDE prefetching, for faster drive accesses. When you install a primary and/or secondary add-in IDE interface, set this option to [Disabled] if the interface does not support prefetching. The settings are: [Enabled], [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/ write per sector the drive can support. Setting options: [Enabled], [Disabled].

nVidia RAID Config

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

RAID Enable
This item is used to enable/disable the onchip RAID function. When you set to enable and the following fields will be selectabled. Setting options: [Enabled], [Disabled].

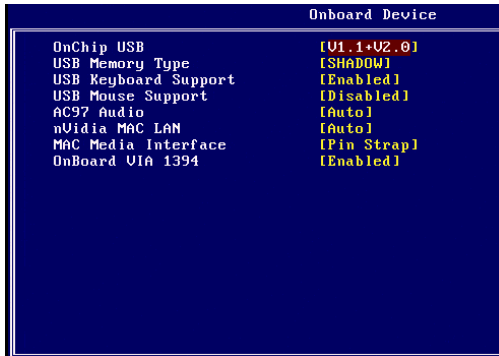### IDE Primary/Secondary Master/Slave RAID
This feature allows users to enable or disable the RAID function for each IDE hard disk drive. Settings: [Enabled], [Disabled].

SATA1/2 Primary/Secondary RAID
This feature allows users to enable or disable the RAID function for each SATA hard disk drive. The settings are: [Enabled], [Disabled].

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

```
                              Onboard Device
     OnChip USB              [V1.1+V2.0]
     USB Memory Type         [SHADOW]
     USB Keyboard Support    [Enabled]
     USB Mouse Support       [Disabled]
     AC97 Audio              [Auto]
     nVidia MAC LAN          [Auto]
     MAC Media Interface     [Pin Strap]
     OnBoard VIA 1394        [Enabled]
```

OnChip USB
This setting allows you to enable/disable the onboard USB controller. Selecting [V1.1+V2.0] enables the system to support both USB 1.1 and 2.0 spec. Setting options: [Disabled], [V1.1], [V1.1+V2.0].

USB Memory Type
This setting specifies the USB memory type. Setting options: [SHADOW], [Base Memory(640K)].

USB Keyboard/Mouse Support
Select [Enabled] if you need to use a USB-interfaced keyboard or mouse in the operating system. Setting options: [Enabled], [Disabled].

AC97 Audio
[Auto] allows the mainboard to detect whether an audio device is used. If an audio device is detected, the onboard AC'97 (Audio Codec'97) controller will be enabled; if not, it is disabled. Disable the controller if you want to use other controller cards to connect an audio device. Settings: [Auto], [Disabled].

nVidia MAC LAN
Setting to [Auto] allows the BIOS to auto-detect the nVIDIA LAN controller and enable it. Setting options: [Auto] and [Disabled].
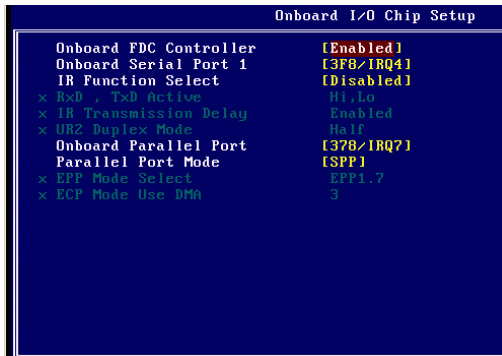
MAC Media Interface
This setting specifies the MAC media interface. Setting options: [Pin Strap], [MII], [RGMII].

OnBoard VIA 1394
This item allows you to enable/disable the onboard IEEE1394 controller. The settings are: [Enabled], [Disabled].

Onboard I/O Chip Setup
Press <Enter> to enter the sub-menu and the following screen appears:

```
                         Onboard I/O Chip Setup

        Onboard FDC Controller        [Enabled]
        Onboard Serial Port 1         [3F8/IRQ4]
        IR Function Select            [Disabled]
      x RxD , TxD Active               Hi,Lo
      x IR Transmission Delay          Enabled
      x UR2 Duplex Mode                Half
        Onboard Parallel Port         [378/IRQ7]
        Parallel Port Mode            [SPP]
      x EPP Mode Select                EPP1.7
      x ECP Mode Use DMA               3
```

Onboard FDC Controller
Select [Enabled] if your system has a floppy disk controller (FDD) 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] in this field. The settings are: [Enabled], [Disabled].

Onboard Serial Port 1
Select an address and corresponding interrupt for the first serial port. The settings are: [3F8/IRQ4], [2E8/IRQ3], [3E8/IRQ4], [2F8/IRQ3], [Disabled], [Auto].

IR Function Select

This setting allows you to specify the operation mode for serial port 2. Setting options: [IrDA], [ASKIR], [Disabled].

    [Disabled]   IR function Disabled
    [IrDA]   IrDA-compliant Serial Infrared Port
    [ASKIR]   Amplitude Shift Keyed Infrared Port

RxD, TxD Active

This setting controls the receiving and transmitting speed of the IR peripheral in use. Setting options: [Hi,Hi], [Hi,Lo], [Lo,Hi], [Lo,Lo].

IR Transmission Delay

This setting determines whether the IR transmission rate will be delayed while converting to receiving mode. Setting options: [Disabled], [Enabled].

UR2 Duplex Mode

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

Onboard Parallel Port

There is a built-in parallel port on the on-board Super I/O chipset that provides Standard, ECP, and EPP features. It has the following options:

    [Disabled]
    [3BC/IRQ7]   Line Printer port 0
    [278/IRQ5]   Line Printer port 2
    [378/IRQ7]   Line Printer port 1UART Mode Select

Parallel Port Mode

    [SPP]   Standard Parallel Port
    [EPP]   Enhanced Parallel Port
    [ECP]   Extended Capability Port
    [ECP+EPP]   Extended Capability Port + Enhanced Parallel Port

To operate the onboard parallel port as Standard Parallel Port only, choose [SPP]. To operate the onboard parallel port in the EPP mode simultaneously, choose [EPP]. By choosing [ECP], the onboard parallel port will operate in ECP mode only. Choosing [ECP + EPP] will allow the onboard parallel port to support both the ECP and EPP modes simultaneously.
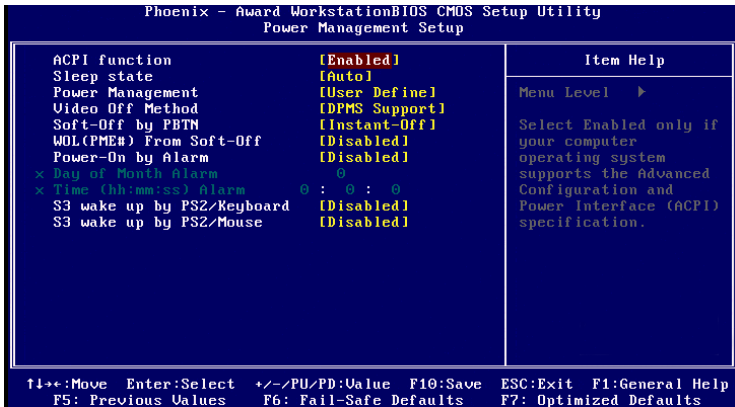
EPP Mode Select

The onboard parallel port is EPP Spec. compliant, so after the user chooses the onboard parallel port with the EPP function, the following message will be displayed on the screen: "EPP Mode Select." At this time either [EPP 1.7] spec or [EPP 1.9] spec can be chosen.

ECP Mode Use DMA
The ECP mode has to use the DMA channel, so choose the onboard parallel port with the ECP feature. After selecting it, the following message will appear: "ECP Mode Use DMA." At this time, the user can choose between DMA channel [3] or [1].

Power Management Setup

```
           Phoenix - Award WorkstationBIOS CMOS Setup Utility
                        Power Management Setup
    ACPI function                 [Enabled]              Item Help
    Sleep state                   [Auto]
    Power Management              [User Define]    Menu Level    ▶
    Video Off Method              [DPMS Support]
    Soft-Off by PBTN              [Instant-Off]    Select Enabled only if
    WOL(PME#) From Soft-Off       [Disabled]       your computer
    Power-On by Alarm             [Disabled]       operating system
  x Day of Month Alarm                0            supports the Advanced
  x Time (hh:mm:ss) Alarm          0 : 0 : 0      Configuration and
    S3 wake up by PS2/Keyboard    [Disabled]       Power Interface (ACPI)
    S3 wake up by PS2/Mouse       [Disabled]       specification.



    ↑↓→←:Move   Enter:Select   +/-/PU/PD:Value   F10:Save   ESC:Exit   F1:General Help
       F5: Previous Values     F6: Fail-Safe Defaults     F7: Optimized Defaults
```

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

ACPI Function

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

Sleep State

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

[S1 (POS)]	The S1 sleep mode is a low power state. In this state, no system context is lost (CPU or chipset) and hardware maintains all system context.
[S3 (STR)]	The S3 sleep mode is a lower power state where the in formation of system configuration and open applications/files is saved to main memory that remains powered while most other hardware components turn off to save energy. The information stored in memory will be used to restore the system when a "wake up" event occurs.
[Auto]	The system will decide when to enter S1 or S3 state.

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

      [Min Saving]   Minimum Power Management. Suspend Mode=1 Hour
      [Max Saving]   Maximum Power Management. Suspend Mode=1 Min
      [User Define]   Allows end users to configure each mode separately.

Video Off Method
This determines the manner in which the monitor is blanked.

      [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.
      [Blank Screen]   This option only writes blanks to the video buffer.
      [DPMS Support]   Initial display power management signalling.

Soft-Off by PBTN
This feature allows users to configure the power button function. Settings are:

      [Instant-Off]   The power button functions as a normal power-on/-off button.
      [By HardWare] When you press the power button, the computer enters the suspend/sleep mode, but if the button is pressed for more than four seconds, the computer is turned off.

WOL (PME#) From Soft-Off
When set to [Enabled], the feature allows your system to be awakened from the power saving modes through any event on PME (Power Management Event). Settings: [Enabled], [Disabled].

Power-On by Alarm
The field is used to enable or disable the feature of booting up the system on a scheduled time/date. Settings: [Enabled], [Disabled].

Day of Month Alarm
The field specifies the date for *Power-On by Alarm*. Settings: [0]~[31].

Time (hh:mm:ss) Alarm
The field specifies the time for *Power-On by Alarm*. Format is <hour><minute><second>.

S3 wake up by PS2/Keyboard, S3 wake up by PS2/Mouse
These fields allow the activity of the PS2 (keyboard and mouse) to wake up the system from S3 sleep state. Settings: [Enabled], [Disabled].

PNP/PCI Configurations

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

```
            Phoenix - Award WorkstationBIOS CMOS Setup Utility
                         PnP/PCI Configurations

   Init Display First          [PCI Slot]              Item Help

   Resources Controlled By     [Auto(ESCD)]      Menu Level  ▶
 x IRQ Resources                Press Enter
                                                To select the initial
   PCI/VGA Palette Snoop       [Disabled]       display interface.

   ** PCI Express relative items **
   Maximum Payload Size        [4096]




↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
        F5: Previous Values    F6: Fail-Safe Defaults   F7: Optimized Defaults
```

Init Display First
This item specifies which graphic card is your primary graphics adapter. Settings: [First PCIE], [PCI Slot].

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 cannot boot. Setting options: [Enabled] and [Disabled].

Resources Controlled By
The Award Plug and Play BIOS has the capacity to automatically configure all of the boot and Plug and Play compatible devices. However, this capability means absolutely nothing unless you are using a Plug and Play operating system such as Windows® 95/98. If you set this field to [Manual], choose specific resources by going into each of the sub menu that follows this field (a sub menu is preceded by a "}"). The settings are: [Auto (ESCD)], [Manual].

IRQ Resources
The items are adjustable only when *Resources Controlled By* is set to [Manual].

Press <Enter> and you will enter the sub-menu of the items. IRQ Resources list IRQ 3/4/5/7/9/10/11/12/14/15 for users to set each IRQ a type depending on the type of device using the IRQ. Settings are:

[PCI Device]   For Plug & Play compatible devices designed for PCI bus architecture.

[Reserved]   The IRQ will be reserved for further request.

MSI Reminds You...

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.

** PCI Express relative items **
Maximum Payload Size
This item allows you to set the PCI Express Maximum payload size per time. Settings: [4096], [128], [256], [512], [1024], [2048].

H/W Monitor

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

```
              Phoenix - Award WorkstationBIOS CMOS Setup Utility
                                  H/W Monitor
    Chassis Intrusion Detect       [Disabled]           Item Help
    Smart CPU1 Fan Target          [Disabled]
  × Smart CPU1 Fan Tolerance           5        Menu Level     ▶
    Smart CPU2 Fan Target          [Disabled]
  × Smart CPU2 Fan Tolerance           5        The chassis intrusion
    Smart SYSTEM Fan Target        [Disabled]   monitor can detect
  × Smart SYSTEM Fan Tolerance         5        whether the computer
  ▶ PC Health Status               [Press Enter] is opened


 ↑↓→←:Move   Enter:Select   +/-/PU/PD:Value   F10:Save   ESC:Exit   F1:General Help
       F5: Previous Values      F6: Fail-Safe Defaults    F7: Optimized Defaults
```

Chassis Intrusion Detect
The field enables or disables the feature of recording the chassis intrusion status and issuing a warning message if the chassis is once opened. To clear the warning message, set the field to [Reset]. The setting of the field will automatically return to [Enabled] later. Setting options: [Enabled], [Reset], [Disabled].

Smart CPU1/CPU2 Fan Target
System Temperature with CPU Temperature with CPU Fan. The BIOS povides the Smart Fan system which can control the fan speed automatically depending on the current temperature to keep it with in a specific range. Settings: [Enabled], [Disabled].

Smart CPU1/CPU2 Fan Tolerance
You can select a fan tolerance value here for the specific range for the *Smart CPU Fan* items. If the current temperatures of CPU fan reach to the maximum threshold (the temperatures set in the *Smart CPU Fan* plus the tolerance values you set here), the fans will speed up for cooling down. On the contrary if the current temperatures reach to the minimum threshold (the set temperatures minus the tolerance values), the fans will slow down to keep the temperatures stable.
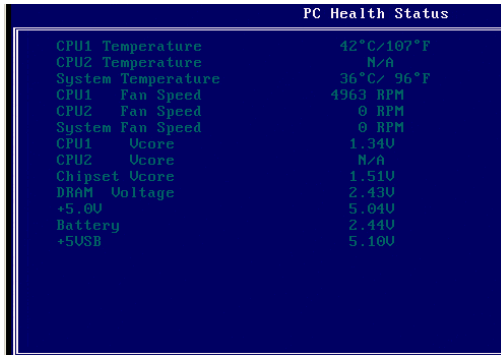
Smart SYSTEM Fan Target
The BIOS povides the Smart Fan system which can control the system fan speed automatically depending on the current temperature to keep it within a specific range. Settings: [Enabled], [Disabled].

Smart SYSTEM Fan Tolerance
You can select a fan tolerance value here for the specific range for the **Smart SYSTEM Fan** items. If the current temperatures of system fans reach to the maximum threshold (the temperatures set in the **Smart SYSTEM Fan** plus the tolerance values you set here), the fans will speed up for cooling down. On the contrary if the current temperatures reach to the minimum threshold (the set temperatures minus the tolerance values), the fans will slow down to keep the temperatures stable.

PC Health Status
Press <Enter> and the following sub-menu appears.

```
                              PC Health Status
      CPU1 Temperature              42°C/107°F
      CPU2 Temperature              N/A
      System Temperature           36°C/ 96°F
      CPU1   Fan Speed            4963 RPM
      CPU2   Fan Speed               0 RPM
      System Fan Speed              0 RPM
      CPU1   Vcore               1.34V
      CPU2   Vcore               N/A
      Chipset Vcore              1.51V
      DRAM  Voltage              2.43V
      +5.0V                      5.04V
      Battery                    2.44V
      +5VSB                      5.10V
```

CPU1/CPU2/System Temperature, CPU1/CPU2/System Fan Speed, CPU1/ CPU2/Chipset Vcore, DRAM Voltage, +5.0V, Battery, +5VSB
These items display the current status of all of the monitored hardware devices/ components such as CPU voltage, temperatures and all fans' speeds.

Cell Menu

The items in Cell Menu include some important settings of CPU, AGP, DRAM and overclocking functions.

```
          Phoenix - Award WorkstationBIOS CMOS Setup Utility
                              Cell Menu
┌─────────────────────────────────────────────┬──────────────────────────┐
│   Current CPU Clock          2211 MHz        │       Item Help          │
│   Current DDR Clock          167 MHz         ├──────────────────────────┤
│                                              │ Menu Level    ▶          │
│ ▶ DRAM Configuration         [Press Enter]   │                          │
│   High Performance Mode      [Manual]        │ DRAM timing and          │
│   Aggressive timing          [Disabled]      │ control                  │
│   Dynamic Overclocking       [Disabled]      │                          │
│   NV/ATI Speed Up            [Disabled]      │                          │
│ x NV4X Memory Speed Up(%)        7           │                          │
│ x NV4X Core Speed Up(%)          7           │                          │
│ x Add NV4X Memory CLK(Mhz)       0           │                          │
│ x Add NV4X Core CLK(Mhz)         0           │                          │
│   Adjust CPU FSB Frequency   [200]           │                          │
│   HT Frequency               [5x]            │                          │
│   HT Width                   [↓16 ↑16]       │                          │
│   CPU Spread Spectrum        [Center Spread] │                          │
│   SATA Spread Spectrum       [Disabled]      │                          │
│   PCIE Spread Spectrum       [Disabled]      │                          │
│   PCIE Clock                 [100Mhz]        │                          │
│   SSE/SSE2 Instructions      [Enabled]       │                          │
│   Cool'n'Quiet               [Auto]          │                          │
│   Hammer Fid control         [StartUp]       │                          │
│   Hammer Vid control         [StartUp]       │                          │
│   CPU Voltage                [By CPU VID]    │                          │
│   Memory Voltage             [AUTO]          │                          │
│   NF4 Voltage                [1.50 V]        │                          │
│   PCI Clock Auto Detect      [Enabled]       │                          │
├─────────────────────────────────────────────┴──────────────────────────┤
│ ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help │
│     F5: Previous Values   F6: Fail-Safe Defaults  F7: Optimized Defaults │
└─────────────────────────────────────────────────────────────────────────┘
```

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

Current CPU / DDR Clock
These two items show the current clocks of CPU & DDR. Read-only.

DRAM Configuration
Press <Enter> to enter the sub-menu and the following screen appears.

Timing Mode
This field has the capacity to automatically detect all of the DRAM timing. If you set this field to [Manual], the following fields will be selectable. The settings are: [Auto], [Manual].

Memclock index value (Mhz)
When it is set to [Manual] in *Timing Mode*, user can place an artificial memory clock on the system. Please note that memory is prevented from running faster than this frequency.

CAS# Latency (Tcl)
When the *Timing Mode* is set to [Manual], the field is adjustable.This controls the CAS latency, which determines the timing delay (in clock cycles) before SDRAM starts a read command after receiving it. Settings: [Auto], [CL2.0], [CL=2.5], [CL=3.0]. [CL=2.0] increases the system performance the most while [CL=3.0] provides the most stable performance.

Min RAS# Active Time (Tras)
When the *Timing Mode* is set to [Manual], the field is adjustable. This setting determines the time RAS takes to read from and write to a memory cell. Setting options: [Auto], [5T], [6T], [7T], [8T], [9T], [10T], [11T], [12T], [13T], [14T], [15 T].

RAS# to CAS# delay (Trcd)
When the *Timing Mode* is set to [Manual], the field is adjustable. When DRAM is refreshed, both rows and columns are addressed separately. This setup item allows you to determine the timing of the transition from RAS (row address strobe) to CAS (column address strobe). The less the clock cycles, the faster the DRAM performance. Setting options: [Auto], [2T], [3T], [4T], [5T], [6T], [7T].

Row Precharge Time (Trp)
When the *Timing Mode* is set to [Manual], the field is adjustable. This item controls the number of cycles for Row Address Strobe (RAS) to be allowed to precharge. If insufficient time is allowed for the RAS to accumulate its charge before DRAM refresh, refreshing may be incomplete and DRAM may fail to retain data. This item applies only when synchronous DRAM is installed in the system. Available settings: [Auto], [2T], [3T], [4T], [5T], [6T], [7T].

Bottom of 32-bit [31:24] IO
When the *User Config mode* is set to [Manual], the field is adjustable. This field specifies the memory which could be remapped to another address higher than 00E0. (This item only activities in 64-bit OS) The settings are: [0000~00E0].

Node Memory Interleaving
Interleave memory blocks across Processor Nodes. BIOS will AUTO detect the capability of Memory System. Options: [Disabled], [AUTO].

Node Interleaving Interlock
This setting controls the node interlock times. Options: [At least not], [All present are].

H/W memory hole Remapping
This field enables hardware to remap the physical memory to the address higher than 00E0. (This item only activities in 64-bit OS.) Setting options: [Disabled], [Enabled].

H/W memory hole interlock
This setting controls the hardware memory hole interlock times. Options: [At least not], [All present are].

MTRR Mapping Mode
This setting controls the MTRR mapping mode. To install the WinXP64, this setting should be set to [Continuous]. Setting options: [Continuous], [Discrete].

DRAM ECC Feature Control
If all memory in the system supports ECC, enabling this will initial scrub dram and enable system requests to dram to be checked and/or corrected. Options: [Enabled], [Disabled].

ECC memory interlock
This setting controls the ECC memory interlock times. Options: [At least not], [All present are].

ECC MCE enable
This setting enables/disables the ECC MCE function. Options: [Enabled], [Disabled].

Chip-Kill mode enable
This item allows you to enable/disable Chip-Kill ECC on Nodes with all x4 ECC capable dimms. Options: [Enabled], [Disabled].

ECC Redirection
Enable Scrubber to correct errors detected in DRAM during normal CPU requests (foreground scrubbing). Options: [Enabled], [Disabled].

DRAM background scrubber
This feature sets the rate of BACKGROUND scrubbing for DRAM. (In addition to normal ECC scrubbing from system requests.) Options: [Disabled], [1.31 ms], [2.62 ms], [5.24 ms], [10.49 ms], [20.97 ms], [42.0 ms], [84.0 ms]. ***Note: BACK-GROUND agent works independently of CPU requests and bus masters, but cannot be enabled without first enabling DRAM ECC.***

L2 cache background scrubber
This feature sets the rate of background scrubbing for L2 cache lines.Options: [Disabled], [40 ns], [80 ns], [160 ns], [320 ns], [640 ns], [1.28 us], [2.56 us].

DCache background scrubber
This feature sets the rate of background scrubbing for DCACHE lines.Options: [Disabled], [40 ns], [80 ns], [160 ns], [320 ns], [640 ns], [1.28 us], [2.56 us].

High Performance Mode
This field allows you to select the DDR timing setting. Setting to [Optimized] enables *Adjust DDR Memory Frequency* automatically to be determined by SPD. Selecting [Manual] allows users to configure these fields manually. Setting options: [Optimized], [Manual].

Aggressive timing
This item allows you to enable or disable the memory clock. When [Enabled] is selected, the timing delay of memory will be shorten to increase the performance. Setting options: [Enabled], [Disabled].

Dynamic Overclocking
Dynamic Overclocking Technology is the automatic overclocking function, included in the MSI™'s newly developed CoreCell™ Technology. It is designed to detect the load balance of CPU while running programs, and to adjust the best CPU frequency automatically. When the motherboard detects CPU is running programs, it will speed up CPU automatically to make the program run smoothly and faster. When the CPU is temporarily suspending or staying in the low load balance, it will restore the default settings instead. Usually the Dynamic Overclocking Technology will be powered only when users' PC need to run huge amount of data like 3D games or the video process, and the CPU frequency need to be boosted up to enhance the overall performance. Setting options:

[Disabled]	Disable Dynamic Overclocking function.
[Private]	1st level of overclocking, increasing the CPU frequency by 1%.
[Sergeant]	2nd level of overclocking, increasing the CPU frequency by 3%.
[Captain]	3rd level of overclocking, increasing the CPU frequency by 5%.

[Colonel]   4th level of overclocking, increasing the CPU frequency by 7%.
[General]   5th level of overclocking, increasing the CPU frequency by 9%.
[Commander]   6th level of overclocking, increasing the CPU frequency by 11%.

> **MSI Reminds You...**
> *Even though the Dynamic Overclocking Technology is more stable than manual overclocking, basically, it is still risky. We suggest user to make sure that your CPU can afford to overclocking regularly first. If you find the PC appears to be unstable or reboot incidentally, it's better to disable the Dynamic Overclocking or to lower the level of overclocking options. By the way, if you need to conduct overclocking manually, you also need to disable the **D.O.T Ranger** first.*

NV/ATI Speed Up
This setting disables/enables the following chipset speed-up functions.

NV4X Memory Speed Up(%)
This setting increases the memory speed of the NV4X chipset as a way to enhance system performance.

NV4X Core Speed Up(%)
This setting increases the core speed of the NV4X chipset as a way to enhance system performance.

Add NV4X Memory CLK(Mhz)
This setting speeds up the memory clock of the NV4X chipset as a way to enhance system performance.

Add NV4X Core CLK(Mhz)
This setting speeds up the core clock of the NV4X chipset as a way to enhance system performance.

Adjust CPU FSB Frequency
This item allows you to select the CPU Front Side Bus clock frequency (in MHz). Select the number between [200]~[400] for needed frequency.

HT Frequency
This setting specifies the maximum operating frequency of the link's transmitter clock. Setting options: [1x], [1.5x], [2x], [2.5x], [3x], [4x], [5x].

HT Width
This field allows you to set the HT Width between CPU & Chip.↑ mark means Chip to CPU HT Width. And ↓ mark means CPU to Chip HT Width. Setting options: [↓ 8 ↑ 8], [↓ 16 ↑ 8], [↓ 8 ↑16], [↓16 ↑16].

CPU Spread Spectrum
This setting is used to enable or disable the CPU Spread Spectrum feature. When

overclocking the CPU, always set it to [Disabled]. Setting options: [Center Spread], [Disabled].

SATA Spread Spectrum
This setting is used to enable or disable the SATA Spread Spectrum feature. Setting options: [Disabled], [Down Spread].

PCIE Spread Spectrum
This setting is used to enable or disable the CPU Spread Spectrum feature. When overclocking the CPU, always set it to [Disabled]. Setting options: [Disabled], [Down Spread].

PCIE Clock
This item allows you to select the PCIE Bus clock frequency (in MHz).   Select the number between [100]~[145] for needed frequency.

SSE/ SSE2 Instructions
This setting disables/enables the SSE/SSE2 Instructions. The Streaming SIMD Extensions (SSE) were introduced in the Pentium III processor. The SSE extensions consist of a new set of instructions and a new set of registers. These instructions and registers are designed to allow Single-Instruction Multiple-Data (SIMD) computations to be made on single-precision floating-point numbers.
The Streaming SIMD Extensions 2 (SSE2) were introduced in the Pentium 4 and Intel Xeon processors. They consist of a new set of instructions that operate on the XXM and MXCSR registers and perform SIMD operations on double-precision floating-point values and on integer values. Several of these new SSE/SSE2 instructions also operate in the MMX registers. Setting options: [Enabled], [Disabled].

Cool'n'Quiet
This feature is especially designed for AMD Athlon processor, which provides a CPU temperature detecting function to prevent your CPU's from overheating due to the heavy working loading. Setting options: [Disabled], [Auto].

> **MSI** **MSI Reminds You...**
> *For the purpose of ensuring the stability of Cool'n'Quiet function, it is always recommended to have the memories plugged in DIMM1.*

Hammer Fid Control
This item lets you adjust the CPU ratio. Setting to [Startup] enables the CPU running at the fastest speed which is detected by system. Setting options are: [Startup], [x4]~[x11].

Hammer Vid Control
This item lets you adjust the CPU VID. Setting to [Startup] enables the CPU running at the default VID which is detected by system. Setting options are: [Startup], [0.825V], [0.850V], [0.875V],~, [1.550V].

CPU Voltage
This feature allows you to trim the voltage of CPU.

Memory Voltage
Adjusting the DDR voltage can increase the DDR speed. Any changes made to this setting may cause a stability issue, so *changing the DDR voltage for long-term purpose is NOT recommended*.

NF4 Voltage
NF4 voltage is adjustable in the field.

> **MSI Reminds You...**
> *The settings shown in different color in **CPU Voltage**, **Memory Voltage** and **AGP Voltage** help to verify if your setting is proper for your system.*
> *Gray: Default setting.*
> *Yellow: High performance setting.*
> *Red: Not recommended setting and the system may be unstable.*
> *Changing **CPU Voltage, Memory Voltage** and **AGP Voltage** may result in the instability of the system; therefore, it is **NOT** recommended to change the default setting for long-term usage.*

PCI Clock Auto Detect
This option allows you to enable/disable the feature of auto detecting the clock frequency of the installed PCI bus. Setting options: [Enabled], [Disabled].

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 optimal performance of the mainboard. The Fail-Safe Defaults are the default values set by the BIOS vendor for stable system performance.

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

Load Fail-Safe Defaults (Y/N)? N

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:

Load Optimized Defaults (Y/N)? N

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:

```
Enter Password:
```

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. Retype the password and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.

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

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

Additionally, when a password is enabled, you can also have 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* of the Advanced BIOS Feature 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 you try to enter Setup.

MSI Reminds You...
About Supervisor Password & User Password:

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

Appendix A: nVIDIA RAID Introduction

NVIDIA brings Redundant Array of Independent Disks (RAID) technology—which is used by the world's leading businesses—to the common PC desktop. This technology uses multiple drives to either increase total disk space or to offer data protection. For all levels, RAID techniques optimize storage solutions by using multiple disks grouped together and treating them as a single storage resource.

Introduction

System Requirement

Operating System Support
NVRAID supports the following operating systems:
- Windows XP Home Edition
- Windows XP Professional Edition
- Windows 2000 Professional

RAID Arrays

NVRAID supports the following types of RAID arrays described in this section:
RAID 0: RAID 0 defines a disk striping scheme that improves the disk read and write times for many applications.
RAID 1: RAID 1 defines techniques for mirroring data.
RAID 0+1: RAID 0+1 combines the techniques used in RAID 0 and RAID 1 arrays.
Spanning (JBOD): JBOD provides a method for combining drives of different sizes into one large disk.

Summary of RAID Configurations

Array	Uses	Advantages	Drawbacks	# Hard Disks	Fault Tolerance
RAID 0	Non-critical data requiring high performance.	High data throughput.	No fault tolerance.	multiple	None
RAID 1	Small databases or any other small capacity environment requiring fault tolerance.	100% data redundancy.	Requires 2 drives for the storage space of 1 drive.	2	Yes
RAID 0+1	Critical data requiring high performance.	Optimized for both 100% data redundancy and performance. Allows spare disks.	Requires 2 drives for the storage space of 1 drive—the same as RAID level 1.	4+	Yes
JBOD	Combining odd size drives into one big drive	Combines and uses the capacity of odd size drives.	Decreases performance because of the difficulty in using drives concurrently or to optimize drives for different uses.	Multiple	No

MSI

MSI Reminds You...
*Please note that the companion MSI Driver/Utility CD supports this mainboard with **Windows 2000/XP** system drivers ONLY. Hence, users cannot install OS, either WinME or Win98, in their SATA hard drives.*

RAID Configuration

Basic Configuration Instructions

The following are the basic steps for configuring NVRAID:

Non-Bootable RAID Array

1. Choose the hard disks that are to be RAID enabled in the system BIOS. (Check p. 3-17 for details.)
2. Specify the RAID level, either Mirroring (RAID 1), Striping (RAID 0), Striping and Mirroring (RAID 0+1), or Spanning (JBOD) and create the desired RAID array.
3. Enter the Windows OS, run the Windows nForce Setup application and install the RAID software. (Check p.A-7 for details.)
4. Initialize the NVRAID Array Disks.

Bootable RAID Array

1. Choose the hard disks that are to be RAID enabled in the system BIOS. (Check p. 3-17 for details.)
2. Specify the RAID level, either Mirroring (RAID 1), Striping (RAID 0), Striping and Mirroring (RAID 0+1), or Spanning (JBOD) and create the desired RAID array.
3. Boot from the Windows CD, use the floppy disk that has the RAID driver to copy and install the nForce RAID software. (Check p.A-7 for details.)
4. Initialize the NVRAID Array Disks.

Setting Up the NVRAID BIOS

Be sure to enable the *IDE RAID or SATA RAID* items in **SATA Devices Configuration** of **Integrated Peripherals** in BIOS (refer to p.3-17 for details) before configuring the NVRAID BIOS. After that press F10 to save the configuration and exit. The PC will reboot right away. Then enter the RAID BIOS Setup by pressing **F10** when prompted, and follow the procedures described below to set up the NVRAID BIOS. NVRAID BIOS setup lets you choose the RAID array type and which hard drives you want to make part of the array.

Entering the RAID BIOS Setup

1. After rebooting your PC, wait until you see the RAID software prompting you to press **F10**. The RAID prompt appears as part of the system POST and boot process prior to loading the OS.
2. Press **F10**, and the NVIDIA RAID Utility --- **Define a New Array** window will appear.
   The default **RAID Mode** is set to *Mirroring* and **Striping Block** is set to *Optimal*.
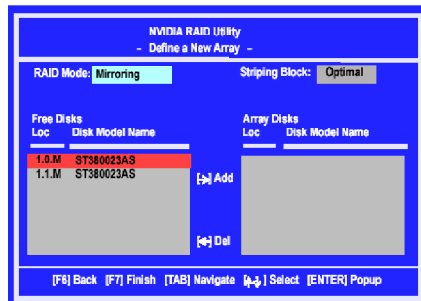
Understanding the "Define a New Array" Window

Use the Define a New Array window to
• Select the RAID Mode
• Set up the Striping Block
• Specify which disks to use for the RAID Array

Depending on the platform used, the system can have one or more channels. In a typical system there is usually one controller and multiple channels, and each channel has a slave and a master.

The channel/controller/master/slave status of each hard disk is given in the Loc (location) columns of the Free Disks and Array Disks lists.
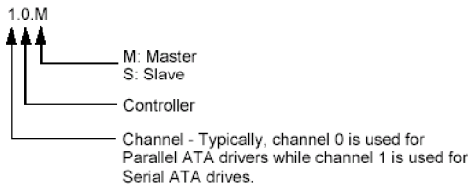
In the example above, 1.0.M means the hard drive is attached to Channel 1, Controller 0, and the drive is set to Master. The following is a list of all possible combinations:

Parallel ATA

0.0.M	Channel 0, controller 0, Master
0.0.S	Channel 0, controller 0, Slave
0.1.M	Channel 0, controller 1, Master
0.1.S	Channel 0, controller 1, Slave

Serial ATA

1.0.M	Channel 1, controller 0, Master
1.1.M	Channel 1, controller 1, Master
2.0.M	Channel 2, controller 0, Master
2.1.M	Channel 2, controller 1, Master

MSI Reminds You...
There is no such thing as Slave drive in Serial ATA. All drives are considered to be Master since there is a one to one connection between the drive and the controller.

Using the Define a New Array Window
If necessary, press the tab key to move from field to field until the appropriate field is highlighted.

• Selecting the RAID Mode
By default, this is set to [Mirroring]. To change to a different RAID mode, press the down arrow key until the mode that you want appears in the RAID Mode box—either [Mirroring], [Striping], [Spanning], or [Stripe Mirroring].

• Selecting the Striping Block Size
Striping Block size is given in kilobytes, and affects how data is arranged on the disk. It is recommended to leave this value at the default [Optimal], which is 32KB, but the
values can be between [4 KB] and [128 KB].

• Assigning the Disks
The disks that you enabled from the RAID Config BIOS setup page appear in the **Free Disks** block. These are the drives that are available for use as RAID array disks.
To designate a free disk to be used as a RAID array disk,
1. Tab to the F**ree Disks** section. The first disk in the list is selected.
2. Move it from the Free Disks block to the Array Disks block by pressing the right arrow key (-->). The first disk in the list is moved, and the next disk in the list is selected and ready to be moved.
3. Continue pressing the right-arrow key (<--) until all the disks that you want to use as RAID array disks appear in the **Array Disks** block.
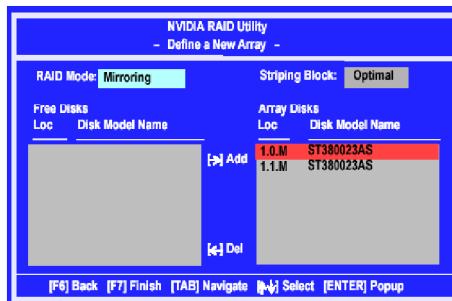
It shows that two disks have been assigned as RAID1 array disks in the figure above.

Completing the RAID BIOS Setup

1. After assigning your RAID array disks, press **F7.** The Clear disk data prompt appears.
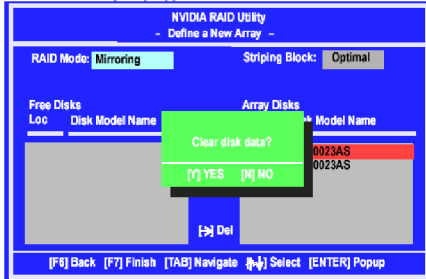
2. Press **Y** if you want to wipe out all the data from the RAID array, otherwise press **N**. You must choose **Yes** if the drives were previously used as RAID drives.
   The **Array List** window appears, where you can review the RAID arrays that you have set up.
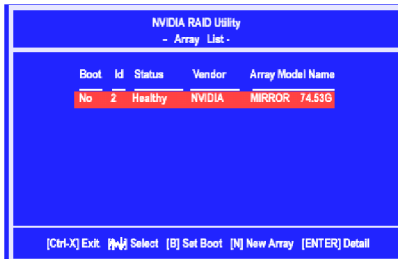
3. Use the arrow keys to select the array that you want to set up, then press **Enter.** The **Array Detail** window appears.
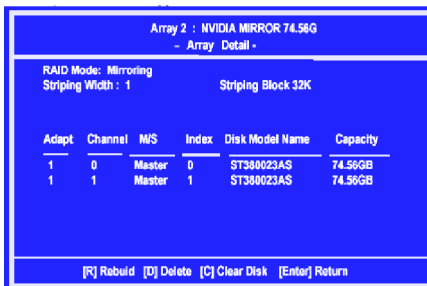
4. If you want to mark this disk as empty and wipe out all its contents then press **C**.
5. At the prompt, press **Y** to wipe out all the data, otherwise press **N**.
6. Press **Enter** again to go back to the previous window and then press **Ctrl-X** to exit the RAID setup. Now that the RAID setup has been configured from the RAID BIOS, the next step is to configure and load NVRAID drivers under Windows, as explained in "Installing the NVIDIA RAID Software Under Windows" on pA-7.

NVIDIA RAID Utility Installation

Installing the NVIDIA RAID Software Under Windows
(for Non-bootable RAID Array)

The existing Windows IDE Parallel ATA driver (as well as the Serial ATA driver if SATA is enabled) must be upgraded to use the NVIDIA IDE Parallel ATA driver (as well as the NV Serial ATA driver if SATA is enabled).

This section describes how to run the setup application and install the RAID software which will upgrade the Windows IDE driver and install the RAID software.

1. Start the nForce Setup program to open the NVIDIA Windows nForce Drivers page.
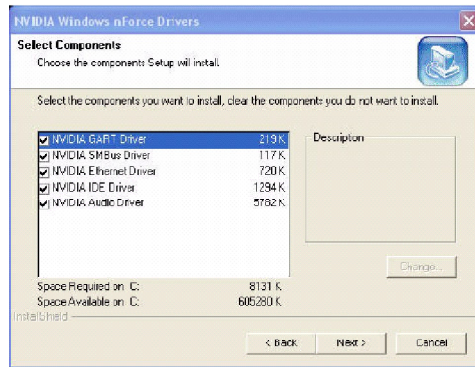
2. Select the modules that you want to install. Make sure that the "NVIDIA IDE Driver" is selected.
3. Click **Next** and then follow the instructions.
4. After the installation is completed, be sure to reboot the PC.
5. After the reboot, initialize the newly created array. See "Initializing and Using the Disk Array" on pA-10.

Installing the RAID Driver (for bootable RAID Array)

1. After you complete the RAID BIOS setup, boot from the Windows CD, and the Windows Setup program starts.
2. Press **F6** and wait for the Windows Setup screen to appear.
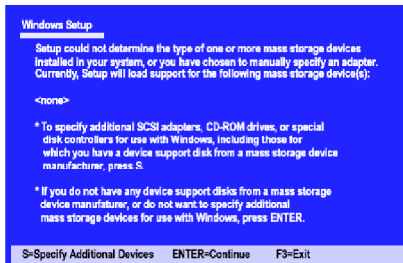
3. Specify the NVIDIA drivers:
   (1) Insert the floppy that has the RAID driver, press S, then press Enter. The Windows Setup screen appears as below:
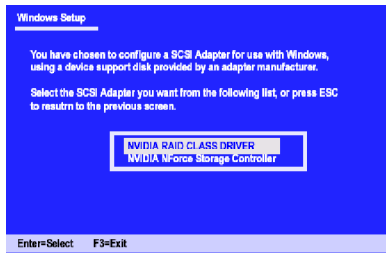
> **MSI Reminds You...**
> *Please follow the instruction below to make an nVIDIA RAID driver for yourself.*
> 1. *Insert the MSI CD into the CD-ROM drive.*
> 2. *Ignore the Setup screen and use "Explorer" to browse the CD.*
> 3. *Copy all the contents (excluding the subfolders) in the*
>   *\\nVidia\System\CK804\IDE\WinXP or*
>   *\\nVidia\System\CK804\IDE\Win2K to a formatted floppy disk.*
> 4. *The driver disk for nVIDIA RAID driver is done.*

   (2) Select "NVIDIA RAID CLASS DRIVER" and then press **Enter**.
   (3) Press **S** again at the Specify Devices screen, then press **Enter.**
   (4) Select "NVIDIA NForce Storage Controller" and then press **Enter.** The following Windows Setup screen appears listing both drivers:
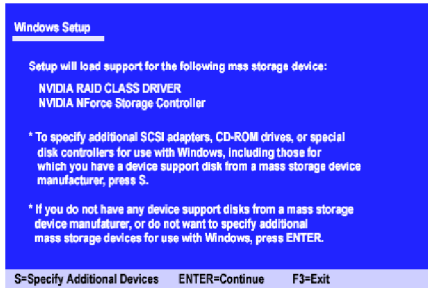
4. Press **Enter** to continue with Windows XP Installation. Be sure to leave the floppy disk inserted in the floppy drive until the blue screen portion of Windows XP installation is completed, then take out the floppy.

5. Follow the instructions on how to install Windows XP. During the GUI portion of the install you might be prompted to click **Yes** to install the RAID driver. Click **Yes** as many times as needed in order to finish the installation. This will not be an issue with a signed driver.

MSI Reminds You...
Each time you add a new hard drive to a RAID array, the RAID driver will have to be installed under Windows once for that hard drive. After that, the driver will not have to be installed

Initializing and Using the Disk Array

The RAID array is now ready to be initialized under Windows.

1. Launch Computer Management by clicking "Start" --> "Settings" --> "Control Panel" --> "Switch to Classic View" then open the "Administrative Tools" folder and double click on "Computer Management".

2. Click "Disk Management" (under the "Storage" section). The Initialize and Convert Disk Wizards appears.

3. Click **Next**. The Select Disks to Initialize window appears. The disks listed depend on how many arrays you have configured.
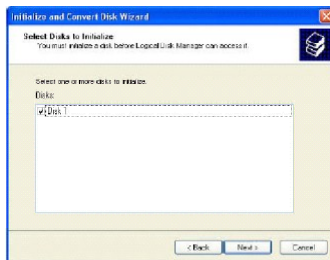
4. Click **Next**. The Select Disks to Convert window appears.
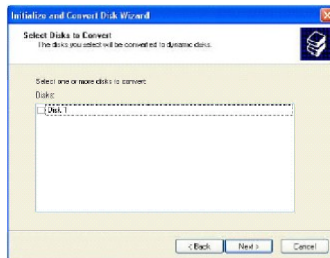
5. Check the disk in the list if you want to make the array a dynamic disk, then click **Next**. The Completing the Initialize and Convert Disk Wizard window appears.
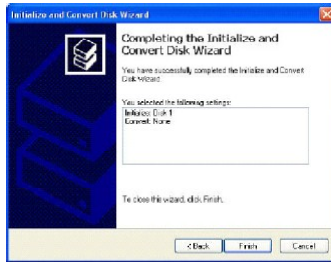
6. Click **Finish**. The "Computer Management" window appears.
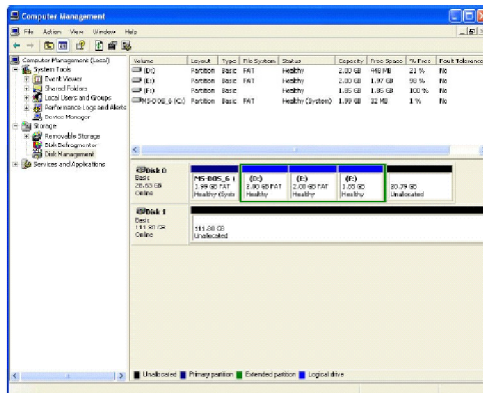
The actual disks listed will depend on your system, and the unallocated partition is the total combined storage of two hard disks. You must format the unallocated disk space in order to use it.

7. Format the unallocated disk space. Right click "Unallocated space", select "New Partition…" and follow the wizard. After the drive has been formatted, it is ready for use.

RAID Drives Management

There is an application called NVRAIDMAN which helps you perform the following tasks of nVDIA RAID.

• **Viewing RAID Array Configurations**
  View an array configuration (mirrored, striped, mirror-striped, JBOD, or any supported combination)
• **Setting Up a Spare RAID Disk**
    • View free and/or dedicated free disks
    • Designate a free disk to a particular array
• **Rebuilding a RAID Mirrored Array**
    • Rebuild a broken mirrored array
    • Watch the progress of rebuilding an array

Viewing RAID Array Configurations

To view your RAID configuration from Windows, launch the NVRAID Management utility by double-clicking NvRaidMan.exe (the default location of NvRaidMan.exe is in \\nVidia\System\CK804\IDE\WinXP\raidtool or \\nVidia\System\CK804\IDE\Win2K\raidtool of the setup CD accompanied with your mainboard).
The RAID configuration information appears in the right-side pane, as shown below.
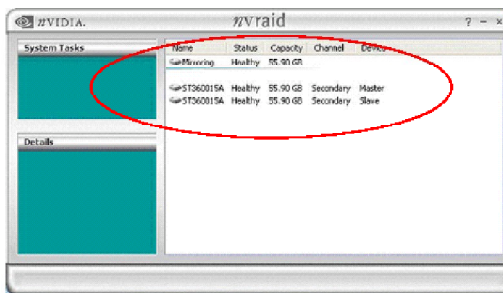
MSI Reminds You...
The information in the figures in this part may very from what it is shown in your system.

NVRAID Mirrored Array
The figure below shows an example of a two hard drive mirrored array using identical 55.90 GB IDE hard drives (ST360015A), where one drive is configured as Master and the other drive is configured as Slave. The total hard disk space used is 55.90 GB. (1.1 GB = 1,073,741,824 bytes)

NVRAID Striped Array

The figure below shows an example of a two hard drive striped array using identical 55.90 GB IDE hard drives (ST360015A), where one drive is configured as Master and the other drive is configured as Slave. The total disk space used is 111.80 GB.

NVRAID Striped Mirror Array

The figure below shows an example of a four hard drive stripe-mirrored array. The total disk space used is 111.80 GB.

NVRAID Spanning (JBOD) Array

The figure below shows an example of a two hard drive spanning array. The total disk space used is 111.80 GB.

NVRAID Mirrored Array and a Striped Array

The figure below shows an example of a two hard drive mirrored array as well as a two hard drive striped array.

Setting Up a Spare RAID Disk

You can designate a hard drive to be used as a spare drive for a RAID 1 or RAID 0+1 array2. The spare drive can take over for a failed disk. NVRAID supports two types of spare drives:

• Free Disk

A free disk is a disk that is not part of any RAID array, but can be used by any available RAID 1 or RAID 0+1 array that requires a particular disk when one of its disks crashes or becomes unusable. The process is automatic and doesn't require any user interaction.

For example, if you have a system with four hard disks where one disk is used to boot the OS, two hard drives are set up in a mirrored array, and a fourth hard disk is set up as a free disk, then if one of the mirrored array drives fails, the free disk will be automatically assigned to the mirrored array to be used instead of the failed disk.

• Dedicated Disk

A dedicated free disk is a disk that is assigned to a RAID 1 or RAID 0+1 array and that disk is used by that array only when needed, for example during a system crash where a RAID mirrored drive is broken. The dedicated disk can be used only by the array that it is assigned to and not by any other array, unlike a free disk which can be used by any available RAID 1 or RAID 0+1 array.

Assigning a Free Disk

To mark a disk as free, or not a part of any array,

1. Enter the system BIOS setup and make sure that the drive that you want to mark as free is RAID enabled.
2. Enter the RAID BIOS and make sure that the drive is not part of any array (if one exists).
3. Boot into Windows and run the NVRAIDMAN program. The drive appears under the Free Disk section. The figure below shows an example of the NVRAIDMAN display if you have a mirror array and one free disk.
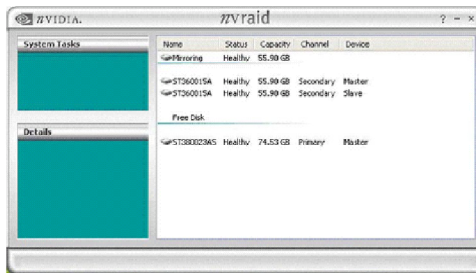
Assigning a Dedicated Disk
To mark a disk as dedicated, or reserve it for use by a specific array,

Step 1: Mark the Disk as a Free Disk
1. Enter the system BIOS setup and make sure that the drive that you want to mark as free is RAID enabled.
2. Enter the RAID BIOS and make sure that the drive is not part of any array (if one exists).
3. Boot into Windows and run the NVRAIDMAN program. The drive appears under the Free Disk section.

Step 2: Dedicate the Free Disk to an Array
While running NVRAIDMAN, dedicate the free disk to an array using one of the following two methods:
   • Method 1: Select a free disk and then assign it to an array.
   • Method 2: Select an array and then assign a free disk to it.
Both methods are equally simple ways of accomplishing the same task.

Method 1: Select a free disk and then assign it to an array.

1. Right click one of the available disks under the Free Disk section. The pop-up menu appears.
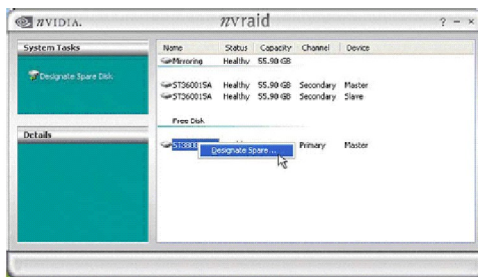
2. Select **Designate Spare** from the menu to launch the Spare Disk Allocation Wizard.

3. Click **Next**.
The RAID Array Selection page appears.
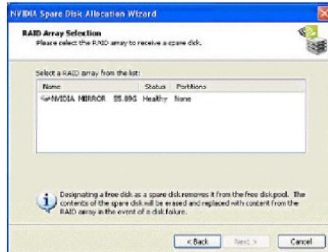
4. From the RAID Array Selection page, select one of the arrays from the list.
This is the array to which you want to allocate the dedicated free disk.
Note: There is only one array created on the system.
5. Click **Next**.
The Completing the NVIDIA Spare Disk Allocation page appears.

6. Click **Finish**.
As shown in figure below, the ST380023AS drive is now a dedicated free disk in the mirrored array. If a system crash occurs that causes any of the two ST360015A drives to fail, the ST380023AS hard drive will take over and be used in the newly formed mirrored array.
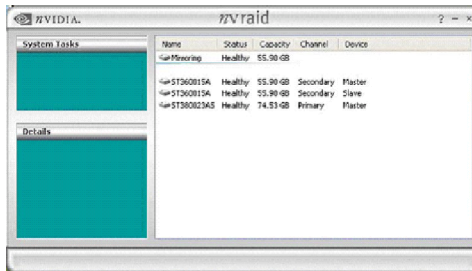
Once a dedicated disk has been assigned to a particular array, it can be removed at any time. To remove the disk, right click on the dedicated disk and select the option to remove it.

Method 2: Select an array and then assign a free disk to it.

1. Right click on the array to which you want to assign a dedicated free disk. The pop-up menu appears.
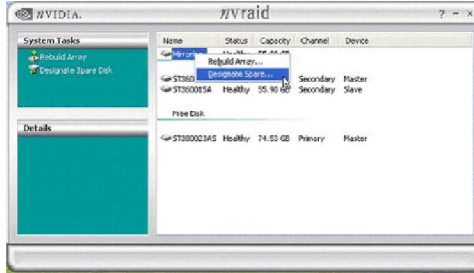
2. Select **Designate Spare** from the menu to launch the Spare Disk Allocation Wizard.

3**.** Click **Next.** The Free Disk Selection page appears.
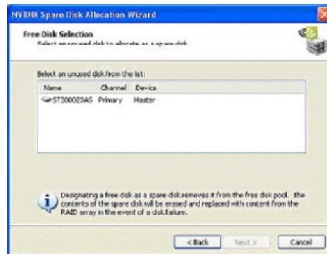
4. From the Free Disk Selection page, select one of the disks from the list. Please note that there can be more than one disk to choose from.

5. Click **Next**. The Completing the NVIDIA Spare Disk Allocation page appears.

6. Click **Finish**.
You have now assigned a dedicated free disk to a mirrored array.
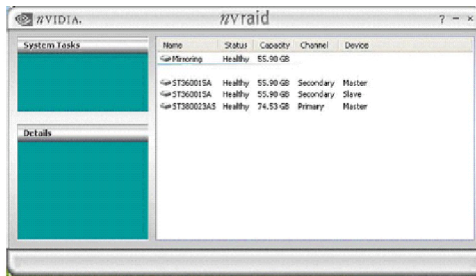
Once a dedicated disk has been assigned to a particular array, it can be removed at any time. To remove the disk, right click on the dedicated disk and select the option to remove it.

Example of Dedicating a Free Disk in a RAID 1 or RAID 0+1 Array

You can also assign a dedicated free disk to a RAID 1 or a RAID 0+1 array, using the same process.

1. Right-click either the free disk that you want to dedicate to an array, the array type, or the array drives as shown in the figure below. Then click Designate Spare to launch the Spare Disk Allocation Wizard.
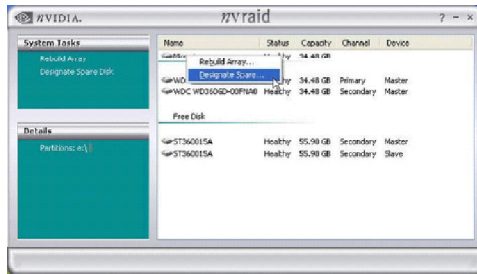
2. Click **Designate Spare** and then follow the instructions in the Wizard. The figure below shows an example of a RAID 1 array that has one spare disk dedicated to it.

Once a dedicated disk has been assigned to a particular array, it can be removed at any time. To remove the disk, right click on the dedicated disk and select the option to remove it.

Rebuilding a RAID Mirrored Array

Rebuilding is the process of recovering data from one hard drive to another. All data is copied from one hard drive to another and then the data is synchronized between the two hard drives. This only applies to RAID 1 array as well as a RAID 0+1 array.

Rebuilding Instructions

After creating a mirrored array, you can rebuild the array using the following steps:

1. Go to Windows and run the NVRAID Management utility. The figure below shows an example of a system with one mirrored array.

2. Right-click on Mirroring. The popup menu appears.

3. From the popup menu, click **Rebuild Array**. The NVIDIA Rebuild Array Wizard appears.

4**.** Click **Next.** The Disk Selection page appears.
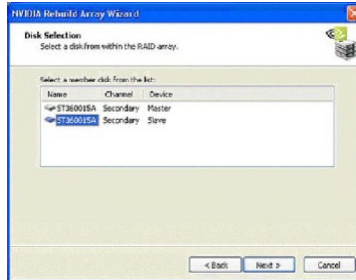
5. Select the drive that you want to rebuild by clicking it from the list, then click **Next**. The Completing the NVIDIA Rebuild Array page appears.

6. Click **Finish**. The array rebuilding starts after a few seconds, and a small pop-up message appears towards the bottom right corner of the screen as shown in the figure below.
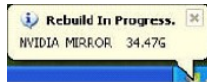
During the rebuilding process, the NVRAID Management utility screen shows the status under the System Tasks and Details sections.

More About Rebuilding Arrays
• *Rebuilding Occurs in the Background*
The rebuilding process is very slow (it can take up to a day) and occurs in the background so as not to affect the performance of the system.
• *Rebuilding Applies Only to RAID 1 or RAID 0+1 Arrays*
Rebuilding an array works only when using RAID1 and/or RAID 0+1. Rebuilding does not apply to RAID 0 and JBOD arrays.
• *You Can Use Any Available Free Disk*
You can rebuild a mirrored array using any available Free Disk or Dedicated Disk. For example, the figure below shows a mirrored array using 34.48 GB HD while having two Free Disks each 55.90 GB large.
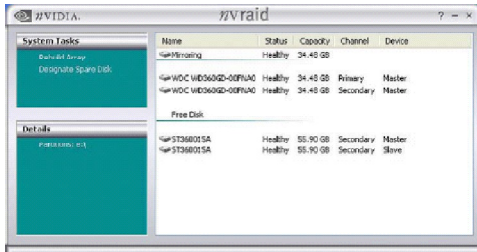
To use one of these available free disks to rebuild your array, follow the same steps as explained in "Rebuilding a RAID Mirrored Array" on p.A-20, except when prompted to select a disk, choose one of the two available free disks.

Appendix B: Using 2-, 4-, 6- or 8- Channel Audio Function

The mainboard is equipped with Realtek ALC850 chip, which provides support for 8-channel audio output, including 2 Front, 2 Rear, 1 Center and 1 Subwoofer channel. ALC850 allows the board to attach 2, 4, 6 or 8 speakers for better surround sound effect. The section will tell you how to install and use 2-, 4-, 6- or 8-channel audio function on the board.

Installing the Audio Driver

You need to install the driver for Realtek ALC850 codec to function properly before you can get access to 2-, 4-, 6- or 8- channel audio operations. Follow the procedures described below to install the drivers for different operating systems.

Installation for Windows 98SE/ME/2000/XP

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

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

1. Insert the companion CD into the CD-ROM drive. The setup screen will automatically appear.

2. Click **Realtek AC97 Audio Drivers**.
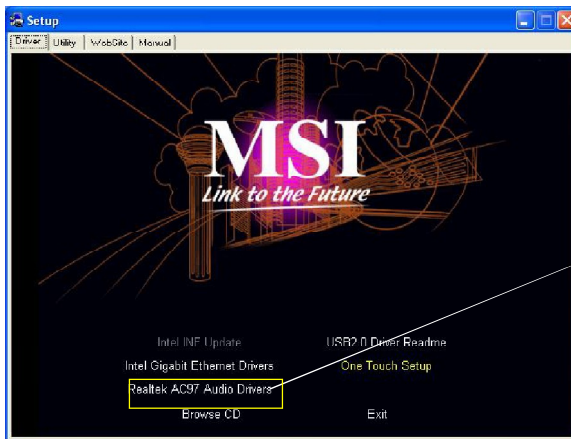
Click here

MSI	**MSI Reminds You...**
	*The **AC97 Audio Configuration** software utility is under continuous update to enhance audio applications. Hence, the program screens shown here in this appendix may be slightly different from the latest software utility and shall be held for reference only.*

3. Click **Next** to install the AC'97 Audio software.
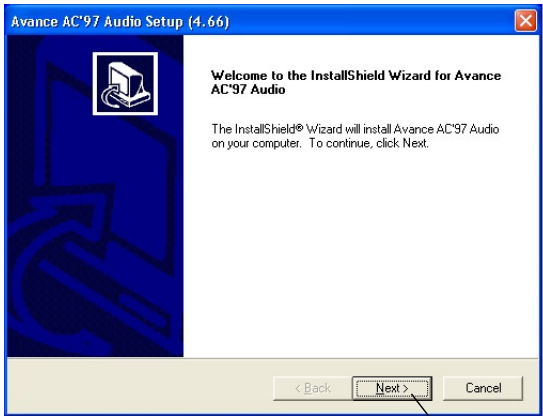
Click here

*4.* Click **Finish** to restart the system.
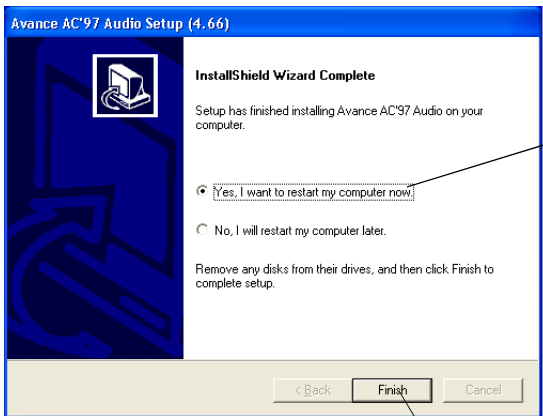
Select this option

Click here

Software Configuration

After installing the audio driver, you are able to use the 2-, 4-, 6- or 8- channel audio feature now. Click the audio icon from the system tray at the lower-right corner of the screen to activate the **AC97 Audio Configuration**. It is also available to enable the audio driver by clicking the **Sound Effect Manager** from the **Control Panel**.
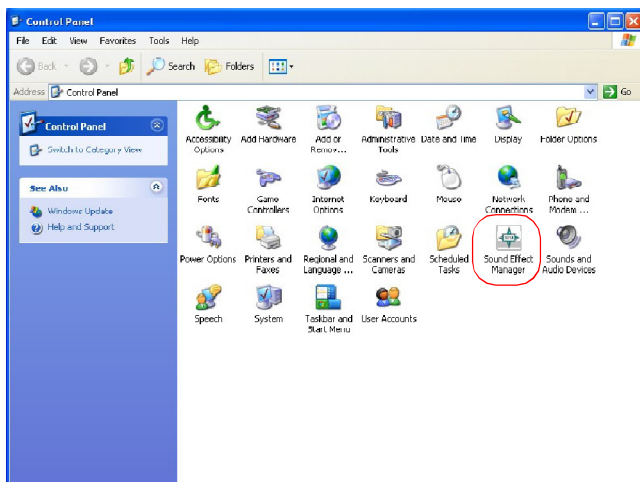
Sound Effect

Here you can select a sound effect you like from the **Environment** list.

You may also edit the properties for an environment as you wish by clicking the "**Edit**" button, then just scroll the bar in the bottom for each property to adjust.
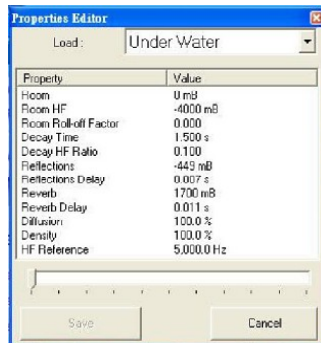
You may choose the provided sound effects, and the equalizer will adjust automatically. If you like, you may also load an equalizer setting or make an new equalizer setting to save as an new one by using the "**Load EQ Setting**" and "**Save Preset**" button, click "**Reset EQ Setting**" button to use the default value, or click "**Delete EQ Setting**" button to remove a preset EQ setting.

There are also other pre-set equalizer models for you to choose by clicking "**Others**" under the **Equalizer** part.
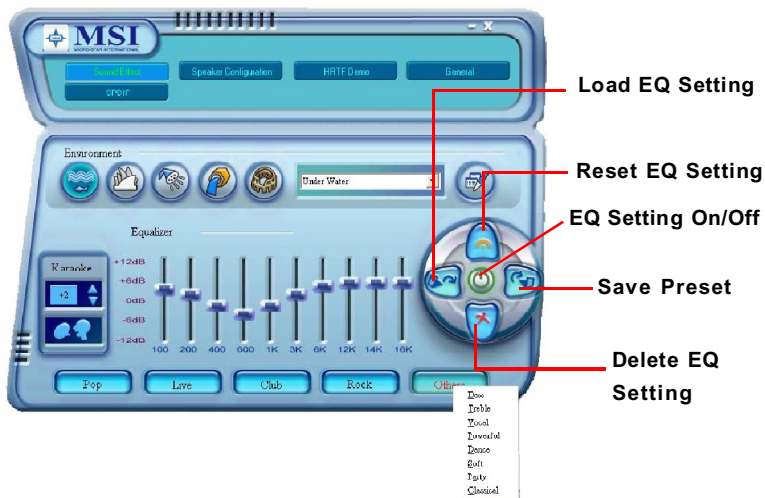
Here it provides the Karaoke function which will automatically remove human voice (lyrics) and leave melody for you to sing the song. You may use the "up arrow" and "down arrow" button to raise/lower the key, and press the lower button to remove the human voice.

Speaker Configuration

In this tab, you can easily configure your multi-channel audio function and speakers.

1. First you have to select the audio configuration below which is identical to the audio jack on your mainboard. In this model it uses Realtek ALC850 codec which supports 8-channel S/PDIF, therefore you should choose **8CH-S/PDIF (Optical & Coaxial).**

2. Select a desired multi-channel operation here.

    a. **Headphone** for the common headphone

    b. **2CH Speaker** for Stereo-Speaker Output

    c. **4CH Speaker** for 4-Speaker Output

    d. **6CH Speaker** for 5.1-Speaker Output

    e. **8CH Speaker** for 8-Speaker Output

Select the speaker by clicking it to test its functionality. The one you select will light up and make testing sound. If any speaker fails to make sound, then check whether the cable is inserted firmly to the connector or replace the bad speakers with good ones. Or you may click the **"Auto Test"** button to test the sounds of each speaker automatically.

Center

Front Left

Front Right

Subwoofer

Side Left

Side Right

Rear Left

Rear Right
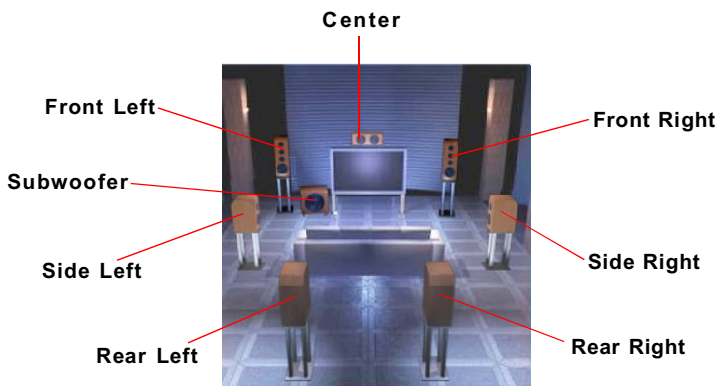
3. While you are testing the speakers in 8-Channel / 6-Channel Mode, if the sound coming from the center speaker and subwoofer is swapped, you should select **Swap Center/Subwoofer Output** to readjust these two channels.

HRTF Demo

In this tab you may adjust your HRTF (Head Related Transfer Functions) 3D positional audio before playing 3D audio applications like gaming. You may also select different environment to choose the most suitable environment you like.

General

In this tab it provides some information about this AC97 Audio Configuration utility, including Audio Driver Version, DirectX Version, Audio Controller & AC97 Codec. You may also select the language of this utility by choosing from the **Language** list.
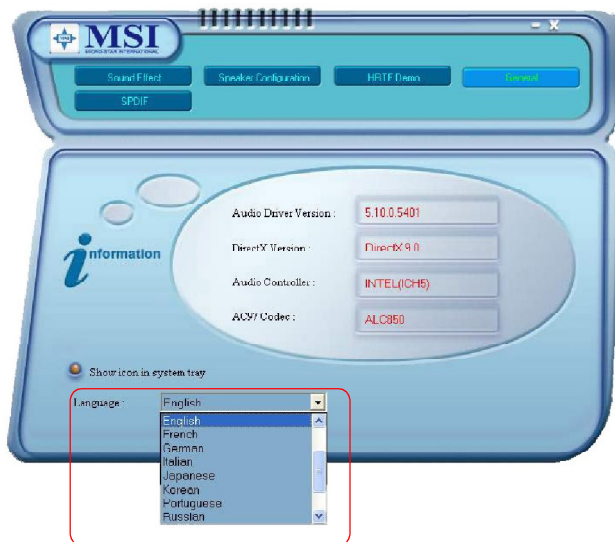
Also there is a selection **Show icon in system tray**. Switch it on and an icon will show in the system tray. Right-click on the icon and the **Audio Accessories** dialogue box will appear which provides several multimedia features for you to take advantage of.

SPDIF

In this tab it provides options about SPDIF-Out for you to configure.

† **No Output:** With this option, there is no S/PDIF output signal while playing analog and digital audio.
† **Output digital only:** With this option, only digital audio will be allowed to play via SPDIF out while playing analog and digital audio.
† **Output digital and analog:** With this option, both digital and analog audio will be allowed to play via SPDIF out while playing analog and digital audio.

Using 2-, 4-, 6- & 8- Channel Audio Function

Connecting the Speakers

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

n **2-Channel Mode for Stereo-Speaker Output**
   Refer to the following diagram and caption for the function of each phone jack on the back panel when 2-Channel Mode is selected.

Back Panel
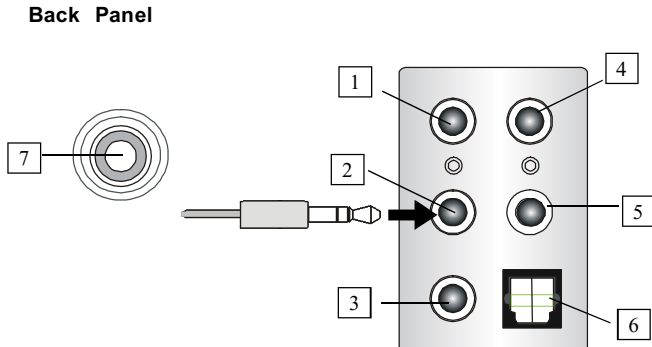
2-Channel Analog Audio Output

1 Line In
2 Line Out *(Front channels)*
3 MIC
4 Line Out *(Rear channels, but not functioning in this mode)*
5 Line Out *(Center and Subwoofer channel, but not functioning in this mode)*
6 Optical SPDIF jack
7 Coaxial SPDIF jack

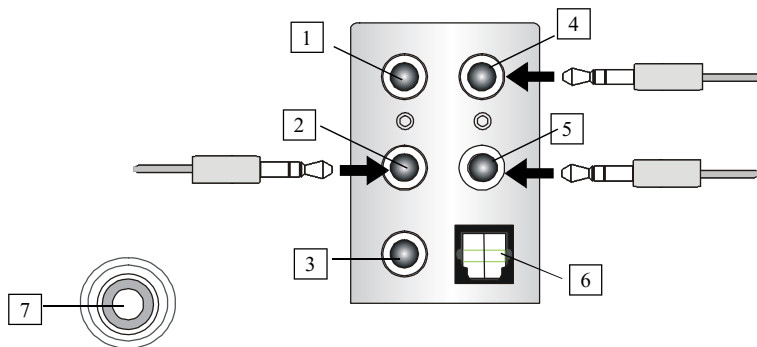n **4-Channel Mode for 4-Speaker Output**
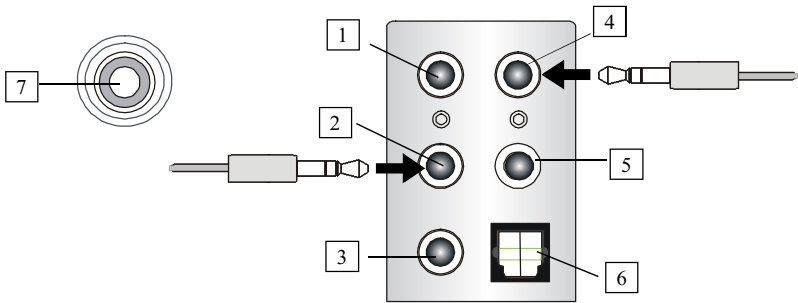
Description:
Connect two speakers to back panel's Line Out connector and two speakers to the real-channel Line Out connector.

4-Channel Analog Audio Output

1 Line In
2 Line Out *(Front channels)*
3 MIC
4 Line Out *(Rear channels)*
5 Line Out *(Center and Subwoofer channel, but no functioning in this mode)*
6 Optical SPDIF jack
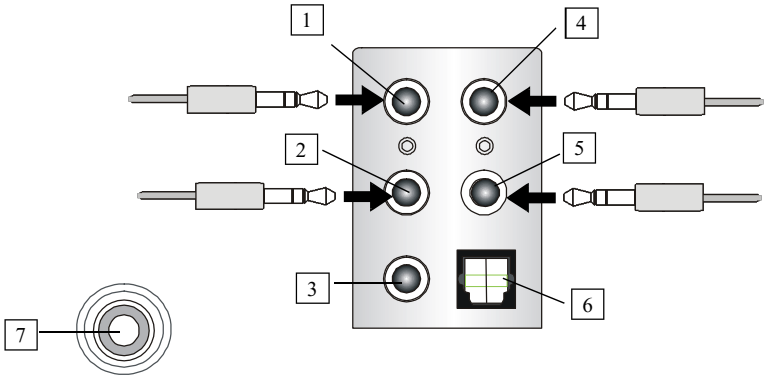7 Coaxial SPDIF jack

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

Description:
Connect two speakers to back panel's Line Out connector, two speakers to the rear-channel and two speakers to the center/subwoofer-channel Line Out connectors.

6-Channel Analog Audio Output

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

n **8-Channel Mode for 8-Speaker Output**

Description:
Connect two speakers to back panel's Line Out connector, two speakers to the rear-channel, two speakers to the center/subwoofer-channel Line Out connectors, and two speakers to the side-channel Line Out connectors.

8-Channel Analog Audio Output

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