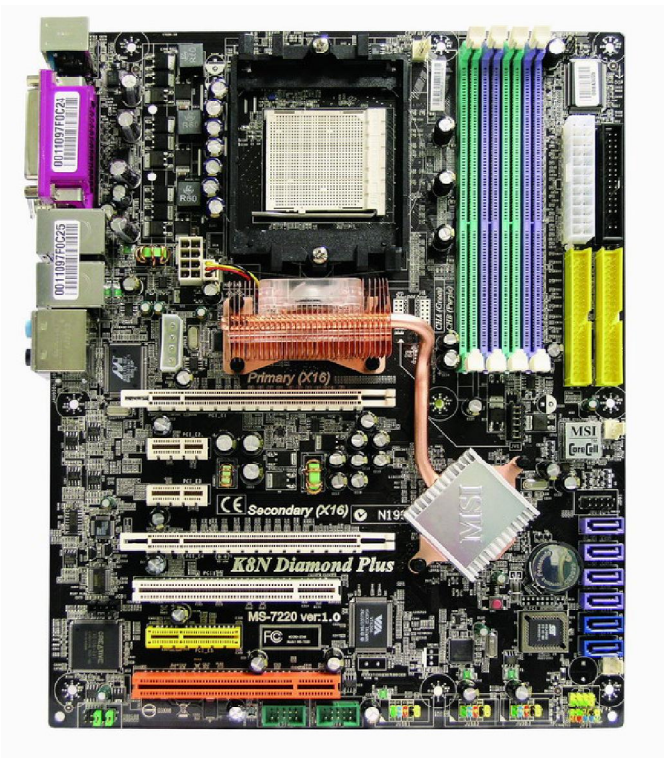
# K8N Diamond Plus Series

## MS-7220 (v1.X) ATX Mainboard




G52-M7220X1

## FCC-B Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the measures listed below.

CE N1996

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

**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-7220**

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

## Copyright Notice

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## Revision History

| Revision | Revision History | Date |
|---|---|---|
| V1.0 | First release for PCB 1.X with nVIDIA C51D & nForce 4 SLI | December 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 homepage & FAQ site for technical guide, BIOS updates, driver updates, and other information: **http://www.msi.com.tw** & **http://www.msi.com.tw/program/service/faq/faq/esc_faq_list.php**

† Contact our technical staff at: **support@msi.com.tw**

## Safety Instructions

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



廢電池請回收

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

## WEEE Statement



### ENGLISH

**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.**

### DEUTSCH

**Hinweis von MSI zur Erhaltung und Schutz unserer Umwelt**

**Gemäß der Richtlinie 2002/96/EG über Elektro- und Elektronik-Altgeräte dürfen Elektro- und Elektronik-Altgeräte nicht mehr als kommunale Abfälle entsorgt werden. MSI hat europaweit verschiedene Sammel- und Recyclingunternehmen beauftragt, die in die Europäische Union in Verkehr gebrachten Produkte, am Ende seines Lebenszyklus zurückzunehmen. Bitte entsorgen Sie dieses Produkt zum gegebenen Zeitpunkt ausschliesslich an einer lokalen Altgerätesammelstelle in Ihrer Nähe.**

### FRANÇAIS

**En tant qu'écologiste et afin de protéger l'environnement, MSI tient à rappeler ceci...**

**Au sujet de la directive européenne (EU) relative aux déchets des équipement électriques et électroniques, directive 2002/96/EC, prenant effet le 13 août 2005, que les produits électriques et électroniques ne peuvent être déposés dans les décharges ou tout simplement mis à la poubelle. Les fabricants de ces équipements seront obligés de récupérer certains produits en fin de vie. MSI prendra en compte cette exigence relative au retour des produits en fin de vie au sein de la communauté européenne. Par conséquent vous pouvez retourner localement ces matériels dans les points de collecte.**

### РУССКИЙ

**Компания MSI предпринимает активные действия по защите окружающей среды, поэтому напоминаем вам, что....**

**В соответствии с директивой Европейского Союза (ЕС) по предотвращению загрязнения окружающей среды использованным электрическим и электронным оборудованием (директива WEEE 2002/96/EC), вступающей в силу 13 августа 2005 года, изделия, относящиеся к электрическому и электронному оборудованию, не могут рассматриваться как бытовой мусор, поэтому производители вышеперечисленного электронного оборудования обязаны принимать его для переработки по окончании срока службы. MSI обязуется соблюдать требования по приему продукции, проданной под маркой MSI на территории ЕС, в переработку по окончании срока службы. Вы можете вернуть эти изделия в специализированные пункты приема.**

## ESPAÑOL

**MSI como empresa comprometida con la protección del medio ambiente, recomienda:**

**Bajo la directiva 2002/96/EC de la Unión Europea en materia de desechos y/o equipos electrónicos, con fecha de rigor desde el 13 de agosto de 2005, los productos clasificados como "eléctricos y equipos electrónicos" no pueden ser depositados en los contenedores habituales de su municipio, los fabricantes de equipos electrónicos, están obligados a hacerse cargo de dichos productos al termino de su período de vida. MSI estará comprometido con los términos de recogida de sus productos vendidos en la Unión Europea al final de su periodo de vida. Usted debe depositar estos productos en el punto limpio establecido por el ayuntamiento de su localidad o entregar a una empresa autorizada para la recogida de estos residuos.**

## NEDERLANDS

**Om het milieu te beschermen, wil MSI u eraan herinneren dat....**

**De richtlijn van de Europese Unie (EU) met betrekking tot Vervuiling van Electrische en Electronische producten (2002/96/EC), die op 13 Augustus 2005 in zal gaan kunnen niet meer beschouwd worden als vervuiling.**

**Fabrikanten van dit soort producten worden verplicht om producten retour te nemen aan het eind van hun levenscyclus. MSI zal overeenkomstig de richtlijn handelen voor de producten die de merknaam MSI dragen en verkocht zijn in de EU. Deze goederen kunnen geretourneerd worden op lokale inzamelingspunten.**

## SRPSKI

**Da bi zaštitili prirodnu sredinu, i kao preduzeće koje vodi računa o okolini i prirodnoj sredini, MSI mora da vas podesti da...**

**Po Direktivi Evropske unije ("EU") o odbačenoj ekektronskoj i električnoj opremi, Direktiva 2002/96/EC, koja stupa na snagu od 13. Avgusta 2005, proizvodi koji spadaju pod "elektronsku i električnu opremu" ne mogu više biti odbačeni kao običan otpad i proizvođači ove opreme biće prinuđeni da uzmu natrag ove proizvode na kraju njihovog uobičajenog veka trajanja. MSI će poštovati zahtev o preuzimanju ovakvih proizvoda kojima je istekao vek trajanja, koji imaju MSI oznaku i koji su prodati u EU. Ove proizvode možete vratiti na lokalnim mestima za prikupljanje.**

## POLSKI

**Aby chronić nasze środowisko naturalne oraz jako firma dbająca o ekologię, MSI przypomina, że...**

**Zgodnie z Dyrektywą Unii Europejskiej ("UE") dotyczącą odpadów produktów elektrycznych i elektronicznych (Dyrektywa 2002/96/EC), która wchodzi w życie 13 sierpnia 2005, tzw. "produkty oraz wyposażenie elektryczne i elektroniczne " nie mogą być traktowane jako śmieci komunalne, tak więc producenci tych produktów będą zobowiązani do odbierania ich w momencie gdy produkt jest wycofywany z użycia. MSI wypełni wymagania UE, przyjmując produkty (sprzedawane na terenie Unii Europejskiej) wycofywane z użycia. Produkty MSI będzie można zwracać w wyznaczonych punktach zbiorczych.**

## TÜRKÇE

**Çevreci özelliğiyle bilinen MSI dünyada çevreyi korumak için hatırlatır:**

**Avrupa Birliği (AB) Kararnamesi Elektrik ve Elektronik Malzeme Atığı, 2002/96/EC Kararnamesi altında 13 Ağustos 2005 tarihinden itibaren geçerli olmak üzere, elektrikli ve elektronik malzemeler diğer atıklar gibi çöpe atılamayacak ve bu elektonik cihazların üreticileri, cihazların kullanım süreleri bittikten sonra ürünleri geri toplamakla yükümlü olacaktır. Avrupa Birliği'ne satılan MSI markalı ürünlerin kullanım süreleri bittiğinde MSI ürünlerin geri alınması isteği ile işbirliği içerisinde olacaktır. Ürünlerinizi yerel toplama noktalarına bırakabilirsiniz.**

## ČESKY

**Záleží nám na ochraně životního prostředí - společnost MSI upozorňuje...**

**Podle směrnice Evropské unie ("EU") o likvidaci elektrických a elektronických výrobků 2002/96/EC platné od 13. srpna 2005 je zakázáno likvidovat "elektrické a elektronické výrobky" v běžném komunálním odpadu a výrobci elektronických výrobků, na které se tato směrnice vztahuje, budou povinni odebírat takové výrobky zpět po skončení jejich životnosti. Společnost MSI splní požadavky na odebírání výrobků značky MSI, prodávaných v zemích EU, po skončení jejich životnosti. Tyto výrobky můžete odevzdat v místních sběrnách.**

## MAGYAR

**Annak érdekében, hogy környezetünket megvédjük, illetve környezetvédőként fellépve az MSI emlékezteti Önt, hogy ...**

**Az Európai Unió („EU") 2005. augusztus 13-án hatályba lépő, az elektromos és elektronikus berendezések hulladékairól szóló 2002/96/EK irányelve szerint az elektromos és elektronikus berendezések többé nem kezelhetőek lakossági hulladékként, és az ilyen elektronikus berendezések gyártói kötelessé válnak az ilyen termékek visszavételére azok hasznos élettartama végén. Az MSI betartja a termékvisszavétellel kapcsolatos követelményeket az MSI márkanév alatt az EU-n belül értékesített termékek esetében, azok élettartamának végén. Az ilyen termékeket a legközelebbi gyűjtőhelyre viheti.**

## ITALIANO

**Per proteggere l'ambiente, MSI, da sempre amica della natura, ti ricorda che....**

**In base alla Direttiva dell'Unione Europea (EU) sullo Smaltimento dei Materiali Elettrici ed Elettronici, Direttiva 2002/96/EC in vigore dal 13 Agosto 2005, prodotti appartenenti alla categoria dei Materiali Elettrici ed Elettronici non possono più essere eliminati come rifiuti municipali: i produttori di detti materiali saranno obbligati a ritirare ogni prodotto alla fine del suo ciclo di vita. MSI si adeguerà a tale Direttiva ritirando tutti i prodotti marchiati MSI che sono stati venduti all'interno dell'Unione Europea alla fine del loro ciclo di vita. È possibile portare i prodotti nel più vicino punto di raccolta.**

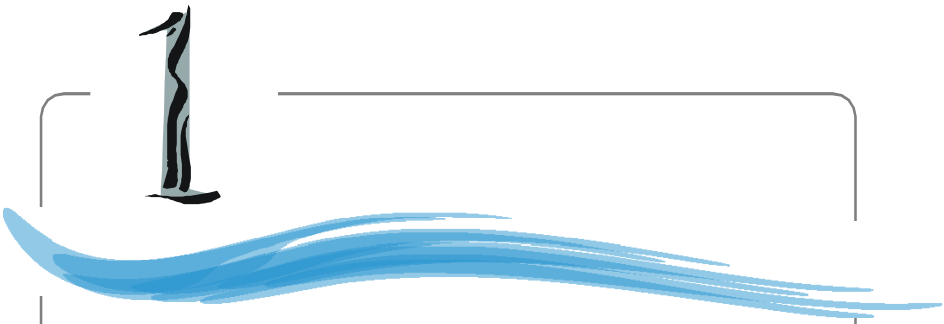
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# *Getting Started*

Thank you for choosing the **K8N Diamond Plus** (MS-7220) Series v1.X ATX mainboard. The **K8N Diamond Plus** mainboard is based on ***n*VIDIA® C51D & nForce™4 SLI** chipsets for optimal system efficiency. Designed to fit the advanced **AMD® K8 Athlon 64 FX / Athlon 64X2/ Athlon 64** processor, the **K8N Diamond Plus** Series mainboard delivers a high performance and professional desktop platform solution.

# Mainboard Specifications

**CPU**

† Supports Socket-939 for AMD K8 Athlon 64 FX / Athlon 64X2/ Athlon 64 processor
† Supports up to 4000+ Athlon FX55 , or higher CPU
(For the latest information about CPU, please visit http://www.msi.com.tw/program/products/mainboard/mbd/pro_mbd_cpu_support.php)

**Chipset**

† nVIDIA C51D Chipset
- HyperTransport link to the AMD Athlon 64 FX / Athlon 64X2/ Athlon 64 CPU
- HyperTransport supporting speed up to 1GHz (2000MT/s)
- Supports 1 PCI Express x16 interface

† nVIDIA nForce4 SLI Chipset
- Supports 1 PCI Express x16/ 2 PCI Express x1/ 1 PCI Express x2 connection
- Two independent SATA controllers, for four drives
- Dual Fast ATA-133 IDE controllers
- IEEE802.3 nVIDIA MAC for 1000BASE-T

**Main Memory**

† Supports dual channel, eight memory banks DDR 266/333/400, using four 184-pin DDR DIMMs
† Supports a maximum memory size up to 4GB
† Supports 2.6v DDR SDRAM DIMM
(For the updated supporting memory modules, please visit http://www.msi.com.tw/program/products/mainboard/mbd/pro_mbd_trp_list.php.)

**Slots**

† Supports 2 PCI Express x16 slots (supports PCI Express Bus specification v1.0a compliant)
† Supports 2 PCI Express x1 slots (supports PCI Express Bus specification v1.0a compliant)
† Supports 1 PCI Express x4 slot interface supports PCI Express x2 transfer rate (supports PCI Express Bus specification v1.0a compliant)
† Two 32-bit 3.3V/5V Master PCI Bus slots, includes one orange slot which supports 2 master for MSI special PCI function card (ex. wireless LAN and bluetooth combo card.).

**On-Board IDE**

† An IDE controller on the nVIDIA® nForce4 SLI chipset provides IDE HDD/CD-ROM with PIO, Bus Master and Ultra DMA 66/100/133 operation modes
† Can connect up to 4 IDE devices

**On-Board SATA**

† nForce 4 SLI supports 4 SATA-II ports (SATA1-4). Transfer speed is up to 3 Gb/s. Supports RAID 0/ 1/ 0+1/ RAID 5 or JBOD mode.

† Silicon Image's SATARAID supports another 2 SATA-II ports (SATA5/6). Transfer rate is up to 3 Gb/s. Supports RAID 0 & 1 mode. (optional)

**USB Interface**

† 10 USB ports
- Controlled by nForce4 SLI chipset
- 4 ports in the rear I/O, 6 ports via the external bracket

**NV RAID (software)**

† RAID 0, 1, 0+1, 5 or JBOD is supported

† Support up to 4 SATA devices

**Silicon Image's SATARAID (Software) (Optional)**

† RAID 0 or 1 and multiple RAID groups are supported

† Support up to 2 SATA devices connected to a single controller

**Dual LAN**

† Supports dual LAN jacks
- PCI LAN supports 10/100/1000 Fast Ethernet by Marvell 88E1115 PHY.
- PCIE LAN supports 10/100/1000 Fast Ethernet by Marvell 88E8053.

**IEEE 1394 (optional)**

† Supports up to three 1394 ports (rear panel x 1, pinheader x 2). Transfer rate is up to 400Mbps

**Audio**

† Power by Creative Sound Blaster Audigy H/W audio
- 24-bit / 96 KHz audio quality
- Up to 100 db SNR clarity
- 7.1 Channel output supported
- Supports S/PDIF digital interface
- PCI 2.3 Specification compliant

**On-Board Peripherals**

† On-Board Peripherals include:
- 1 floppy port supports 1 FDD with 360K, 720K, 1.2M, 1.44M and 2.88Mbytes
- 1 serial port (COM1)
- 1 parallel port supporting SPP/EPP/ECP mode
- 1 Audio jack(5-in-1), coaxial/optical SPDIF out
- 1 D-Bracket™ 2 pinheader

- 1 CD-In pinheader
- 3 IEEE 1394 (Rear * 1 / Front * 2)
- 10 USB1.1/2.0 ports (Rear * 4 / Front * 6)
- 1 IrDA pinheader

**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 24.4 cm)

**Mounting**

† 9 mounting holes



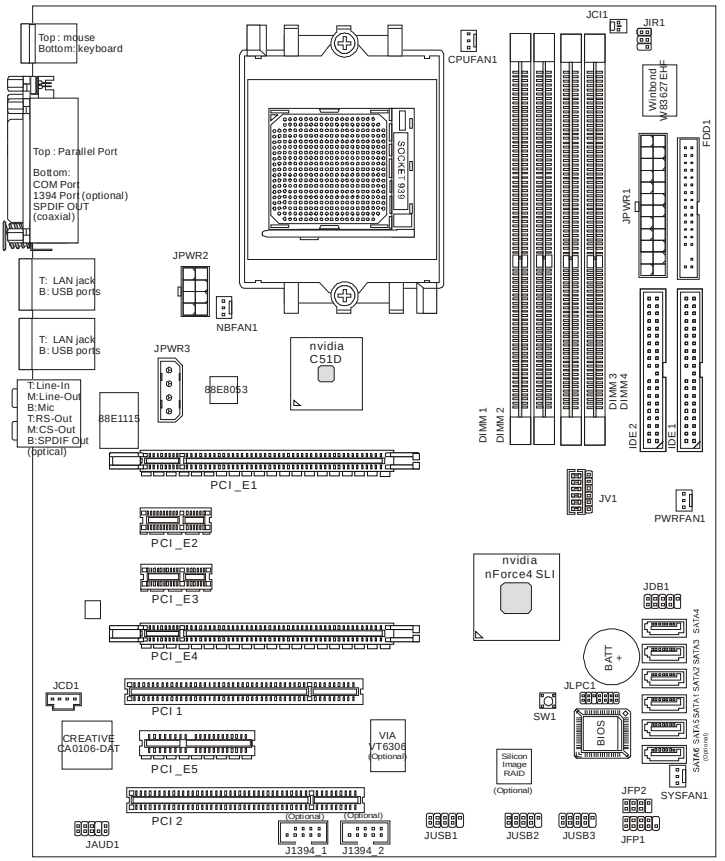

**MSI Reminds You...**

*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

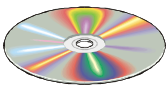



**K8N Diamond Plus (MS-7220 v1.X) Series ATX Mainboard**

# Packing Contents



MSI motherboard



MSI Driver/ Creative Audio Driver/ Utility CD



SATA RAID Driver Diskette



SATA Cable/ Power Cable (Optional)



SLI Video Link Card



D-Bracket 2 (Optional)



Round Cable of Floppy Disk



1394 Cable (Optional)



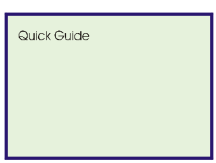
Round Cable of IDE Devices



Back IO Shield



User's Guide/ Test Report




Quick Guide

* The pictures are for reference only and may vary from the packing contents of the product you purchased.

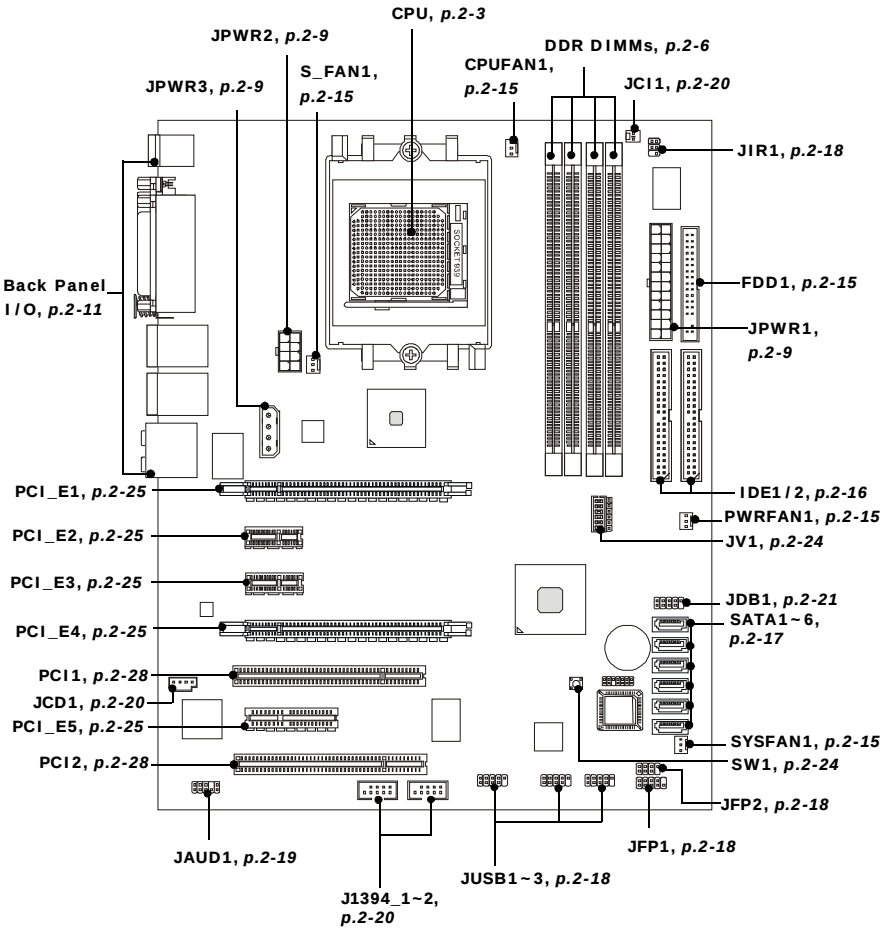


# Hardware Setup

This chapter tells you how to install the CPU, memory modules, and expansion cards, as well as how to setup the jumpers on the mainboard. Also, it provides the instructions on connecting the peripheral devices, such as the mouse, keyboard, etc.

While doing the installation, be careful in holding the components and follow the installation procedures.

# Quick Components Guide



# Central Processing Unit: CPU

The mainboard supports AMD® Athlon64 X2/ Athlon64 FX/ Athlon64 processors. The mainboard uses a CPU socket called Socket-939 for easy CPU installation. When you are installing the CPU, **make sure the CPU has a heat sink and a cooling fan attached on the top to prevent overheating.** If you do not have the heat sink and cooling fan, contact your dealer to purchase and install them before turning on the computer.

For the latest information about CPU, please visit http://www.msi.com.tw/program/products/mainboard/mbd/pro_mbd_cpu_support.php.




**MSI Reminds You...**

***Overheating***

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

***Replacing the CPU***

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

***Overclocking***

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

## CPU Installation Procedures for Socket 939

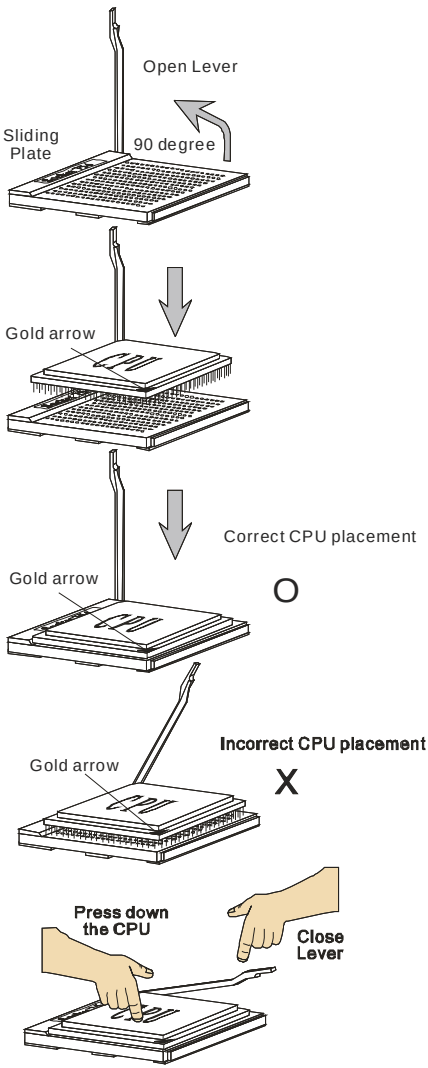
1. Please turn off the power and unplug the power cord before installing the CPU.

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

3. Look for the gold arrow of the CPU. The gold arrow should point as shown in the picture. The CPU can only fit in the correct orientation.

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

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



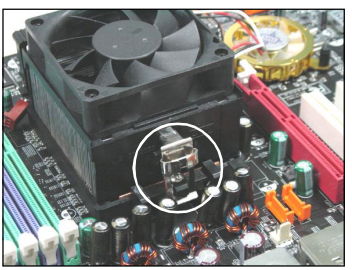
## Installing AMD Socket 939 CPU Cooler Set

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 have the heat sink and cooling fan, contact your dealer to purchase and install them before turning on the computer.

**MSI Reminds You...**
*Mainboard photos shown in this section are for demonstration of the cooler installation for Socket 939 CPUs only. The appearance of your mainboard may vary depending on the model you purchase.*

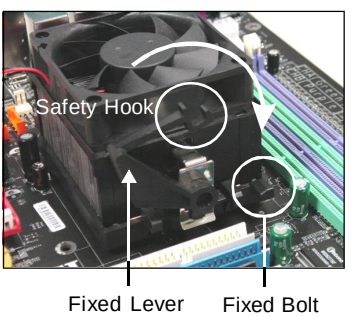
1. Position the cooling set onto the retention mechanism.

   Hook one end of the clip to hook first, and then press down the other end of the clip to fasten the cooling set on the top of the retention mechanism.

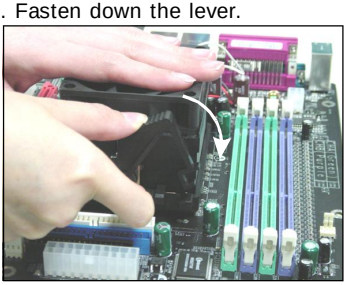


2. Locate the Fix Lever, Safety Hook and the Fixed Bolt.

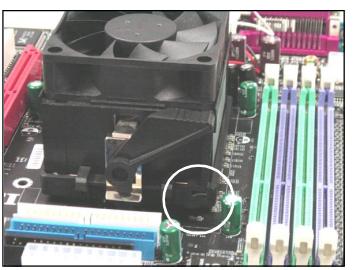
   Lift up the intensive fixed lever.



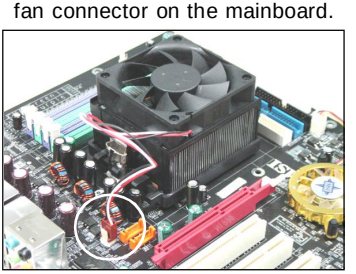

3. Fasten down the lever.



4. Make sure the safety hook completely clasps the fixed bolt of the retention mechanism.

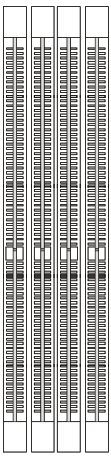


5. Attach the CPU Fan cable to the CPU fan connector on the mainboard.



# Memory

The mainboard provides 4 slots for 184-pin DDR SDRAM DIMM (Double In-Line Memory Module) modules and supports the memory size up to 4GB. You can install DDR266/333/400 modules on the DDR DIMM slots (DIMM1~4).
For the updated supporting memory modules, please visit http://www.msi.com.tw/program/products/mainboard/mbd/pro_mbd_trp_list.php.



**DIMM1~4**
**(from left to right)**

**Channel A (DIMM1 & DIMM3): Green**
**Channel B (DIMM2 & DIMM4): Purple**

## Introduction to DDR SDRAM

DDR (Double Data Rate) SDRAM is similar to conventional SDRAM, but doubles the rate by transferring data twice per cycle. It uses 2.5 volts as opposed to 3.3 volts used in SDR SDRAM, and requires 184-pin DIMM modules rather than 168-pin DIMM modules used by SDR SDRAM. High memory bandwidth makes DDR an ideal solution for high performance PC, workstations and servers.

## DIMM Module Combination

Install at least one DIMM module on the slots. Each DIMM slot supports up to a maximum size of 1GB. Users can install either single- or double-sided modules to meet their own needs. Please note that ***each DIMM can work respectively for single-channel DDR, but there are some rules while using dual-channel DDR*** (Please refer to the suggested DDR population table below)**.** Users may install memory modules of different type and density on different-channel DDR DIMMs. However, the ***same type and density memory modules*** are necessary while using dual-channel DDR, or instability may happen. Please refer to the following table for detailed dual-channel DDR. Other combination not listed below will function as single-channel DDR.

| GREEN | PURPLE | GREEN | PURPLE | |
|---|---|---|---|---|
| DIMM1 (Ch A) | DIMM2 (Ch B) | DIMM3 (Ch A) | DIMM4 (Ch B) | System Density |
| 128MB~1GB | 128MB~1GB | | | 256MB~2GB |
| | | 128MB~1GB | 128MB~1GB | 256MB~2GB |
| 128MB~1GB | 128MB~1GB | 128MB~1GB | 128MB~1GB | 512MB~4GB |




**MSI Reminds You...**

- *Dual-channel DDR works **ONLY** in the 3 combinations listed in the table shown in the previous page.*
- *Please select the identical memory modules to install on the dual channel, and DO NOT install three memory modules on three DIMMs, or it may cause some failure.*
- *Always insert the memory modules into the GREEN slots first, and it is strongly recommended not to insert the memory modules into the PURPLE slots while the GREEN slots are left empty.*
- *Due to the South Bridge resource deployment, the system density will only be detected up to 3+GB (not full 4GB) when each DIMM is installed with an 1GB memory module.*

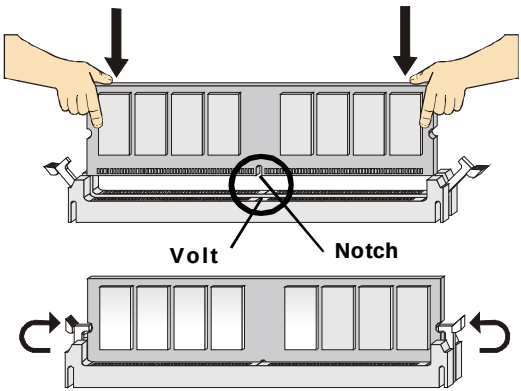
## Recommended Memory Combination List

| DIMM Slots | | | | Max Speed |
|---|---|---|---|---|
| Green | Purple | Green | Purple | |
| DIMM1 | DIMM2 | DIMM3 | DIMM4 | |
| S | - | - | - | DDR400 |
| - | - | S | - | DDR400 |
| D | - | - | - | DDR400 |
| - | - | D | - | DDR400 |
| S | - | S | - | DDR400 |
| D | - | D | - | DDR333 |
| S | S | - | - | DDR400 |
| - | - | S | S | DDR333 |
| D | D | - | - | DDR400 |
| - | - | D | D | DDR400 |
| S | S | S | S | DDR400 |
| D | D | D | D | DDR333 |

S: Single Side D: Double Side

## Installing DDR Modules

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



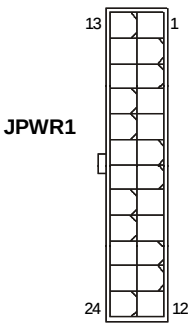

**MSI Reminds You...**
*You can barely see the golden finger if the module is properly inserted in the socket.*

# Power Supply

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

## ATX 24-Pin Power Connector: JPWR1

This connector allows you to connect an SSI power supply. To connect 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.



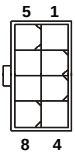

JPWR1

**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 | PWROK | 20 | NC |
| 9 | 5VSB | 21 | +5V |
| 10 | +12V | 22 | +5V |
| 11 | +12V | 23 | +5V |
| 12 | +3.3V | 24 | GND |

## ATX 12V Power Connector: JPWR2/ JPWR3

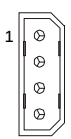
The 12V power connector (JPWR2) is used to provide power to the CPU. The other one 12V power connector(JPWR3) is used to provide power to the installed PCI Express graphics card.




JPWR2

**JPWR2 Pin Definition**

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




JPWR3

**JPWR3 Pin Definition**

| PIN | SIGNAL |
|---|---|
| 1 | 5V |
| 2 | GND |
| 3 | GND |
| 4 | 12V |

**MSI Reminds You...**

1. *These three connectors connect to the ATX power supply and have to work together to ensure stable operation of the mainboard.*
2. *Power supply of 450 watts (and above) is highly recommended for system stability.*
3. *For ATX 12V power connection, it should be greater than 18A.*

## 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 & 3) before the 1st installation or during system upgrade procedure.

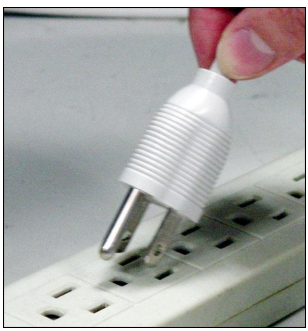


**Figure 1:**
**Unplug the AC power cable**

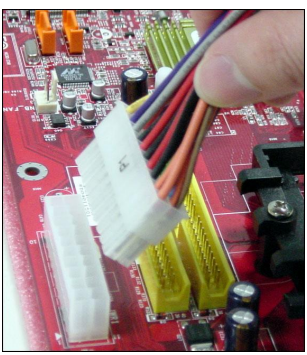


**Figure 2:**
**Unplug the JPWR1 power conn.**

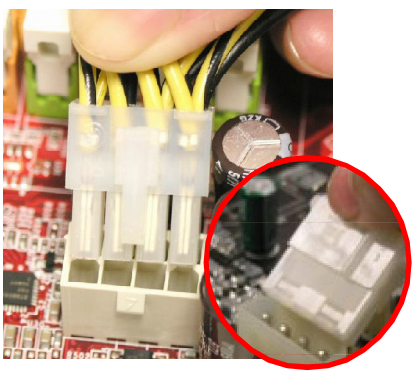
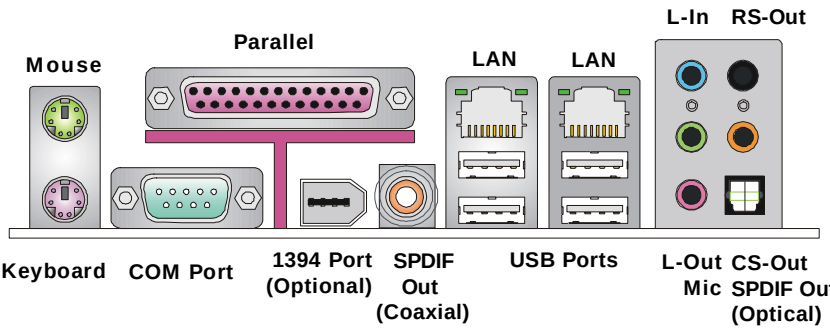


**Figure 3:**
**Unplug the JPWR2/JPWR3 power connectors**

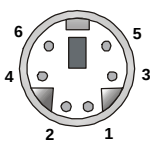
# Back Panel

The back panel provides the following connectors:




## 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:



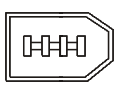

**PS/2 Mouse / Keyboard (6-pin Female)**

**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)

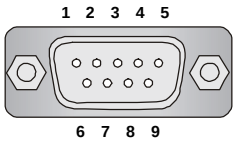
The back panel provides one standard IEEE 1394 port. The IEEE1394 high-speed serial bus complements USB by providing enhanced PC connectivity for a wide range of devices, including consumer electronics audio/video (A/V) appliances, storage peripherals, other PCs, and portable devices.



**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.



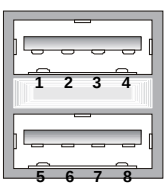

**9-Pin Male DIN Connector**

**Pin Definition**

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

## USB Connectors

The mainboard provides two 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.



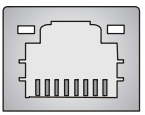

**USB Ports**

**USB Port Description**

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

## LAN (RJ-45) Jack

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.



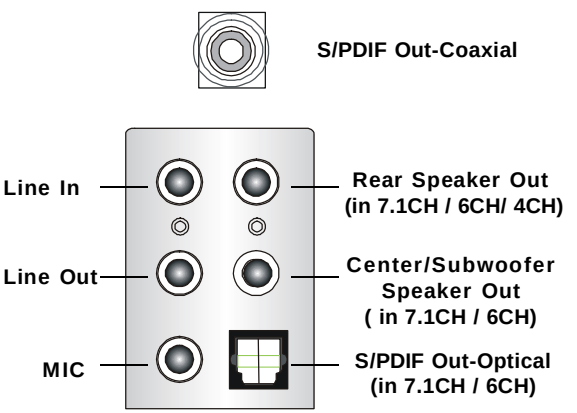
**RJ-45 LAN Jack**

**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- |

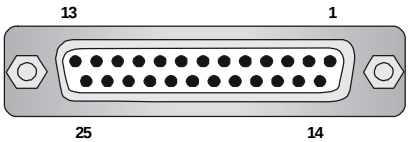
## Audio Port Connectors

The left 3 audio jacks are for 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 Creative CA0106 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.



## 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, IR module and CPU/System FAN.

## Floppy Disk Drive Connector: FDD1

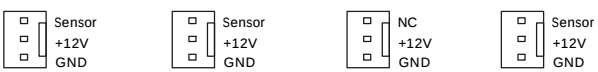
The mainboard provides a standard floppy disk drive connector that supports 360K, 720K, 1.2M, 1.44M and 2.88M floppy disk types.



FDD1

## Fan Power Connectors: CPUFAN1 / SYSFAN1 / PWRFAN1 / NBFAN1

The CPUFAN1 (processor fan), SYSFAN1 (system fan), PWRFAN (power fan ) and NBFAN1 (NorthBridge Chipset fan) support system cooling fan with +12V. It supports three-pin head connector. When connecting the wire to the connectors, always take note that the red wire is the positive and should be connected to the +12V, the black wire is Ground and should be connected to GND. If the mainboard has a System Hardware Monitor chipset on-board, you must use a specially designed fan with speed sensor to take advantage of the CPU fan control.



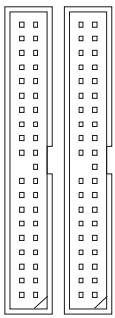

CPUFAN1 SYSFAN1 PWRFAN1 NBFAN1

**MSI Reminds You...**

1. *Always consult the vendors for proper CPU cooling fan.*
2. *CPUFAN1 supports fan control. You can install **Core Center** utility that will automatically control the CPU fan speed according to the actual CPU temperature.*
3. *Please refer to the recommended CPU fans at AMD® official website.*

## Hard Disk Connectors: IDE1 / IDE2

The mainboard has a 32-bit Enhanced PCI IDE and Ultra DMA 33/66/100/133 controller that provides PIO mode 0~4, Bus Master, and Ultra DMA 33/66/100/133 function. You can connect up to four hard disk drives, CD-ROM, or other devices.



IDE2 IDE1

**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.

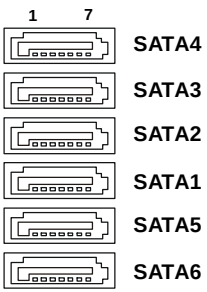
**MSI Reminds You...**

*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/Serial ATA RAID Connectors controlled by nForce4 SLI: SATA1 / SATA2 / SATA3 / SATA4;
## Serial ATA/Serial ATA RAID Connectors controlled by Silicon Image's SATARAID: SATA5 / SATA6 (Optional)

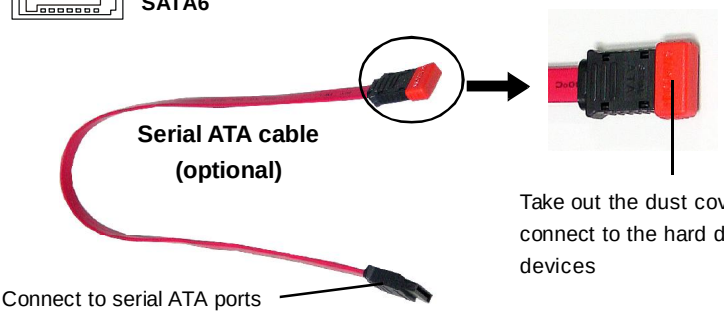
The single chip of this mainboard is nForce4 SLI which supports four serial ATA connectors SATA1~SATA4. Silicon Image's SATARAID of this mainboard supports another two serial ATA connectors SATA5/ SATA6.

SATA1~SATA6 are high-speed Serial ATA interface ports. Each supports serial ATA data rates of 3 Gb/s. Both connectors are fully compliant with Serial ATA 1.0 specifications. Each Serial ATA connector can connect to 1 hard disk device. Please refer to the *nVidia RAID Introduction* & *Silicon Image RAID Introduction* for detail software installation procedure.




**SATA1~ SATA6 Pin Definition**

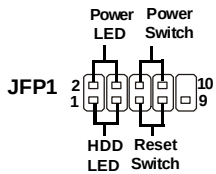
| PIN | SIGNAL | PIN | SIGNAL |
|---|---|---|---|
| 1 | GND | 2 | TXP |
| 3 | TXN | 4 | GND |
| 5 | RXN | 6 | RXP |
| 7 | GND | | |




**MSI Reminds You...**
*Please do not fold the serial ATA cable in a 90-degree angle, which will cause the loss of data during the transmission.*

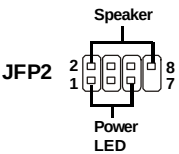
## Front Panel Connectors: JFP1 / JFP2

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




**JFP1 Pin Definition**

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




**JFP2 Pin Definition**

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

## Front 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**.




**JUSB1, JUSB2, JUSB3**
**(USB 2.0)**

**JUSB1 & JUSB2 & JUSB3 Pin Definition**

| 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 |

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



**MSI Reminds You...**
*Note that the pins of VCC and GND must be connected correctly, or itmay cause some damage.*

## 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.*




## 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.



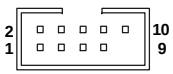

**JIR1**

**JIR1 Pin Definition**

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

## IEEE 1394 Connectors: J1394_1 / J1394_2 (optional)

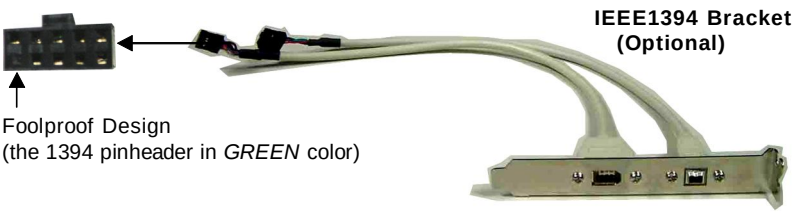
The mainboard provides two 1394 pin headers that allow you to connect IEEE 1394 ports via an external IEEE1394 bracket.




J1394_1/ J1394_2

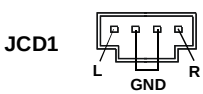
**Pin Definition**

| 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 |




## CD-In Connector: JCD1

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




## Chassis Intrusion Switch Connector: JCI1

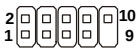
This connector is connected to a 2-pin chassis switch. If the chassis is opened, the switch will be short. The system will record this status and show a warning message on the screen. To clear the warning, you must enter the BIOS utility and clear the record.




JCI1

## D-Bracket™ 2 Connector: JDB1

The mainboard comes with a JDB1 connector for you to connect to D-Bracket™ 2. D-Bracket™ 2 is a USB Bracket that supports both USB1.1 & 2.0 spec. It integrates four LEDs and allows users to identify system problem through 16 various combinations of LED signals.




**JDB1**

**Pin Definition**

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



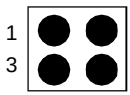
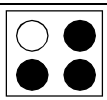
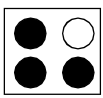
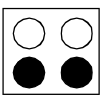
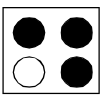
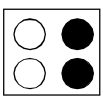
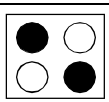
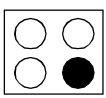
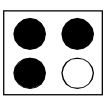

D-Bracket™ 2 is an external USB bracket integrating four Diagnostic LEDs, which use graphic signal display to help users understand their system. The LEDs provide up to 16 combinations of signals to debug the system. The 4 LEDs can debug all problems that fail the system, such as VGA, RAM or other failures.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

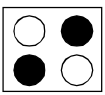
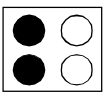
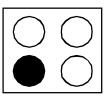
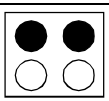
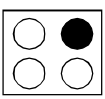
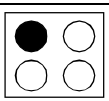
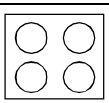
D-Bracket™ 2 supports both USB 1.1 & 2.0 specification.

**D-Bracket™ 2**



● Red ○ Green

| D-Bracket™ 2 | Description |
|---|---|
|  | System Power ON<br>The D-LED will hang here if the processor is damaged or not installed properly. |
|  | Early Chipset Initialization |
|  | Memory Detection Test<br>Testing onboard memory size. The D-LED will hang if the memory module is damaged or not installed properly. |
|  | Decompressing BIOS image to RAM for fast booting. |
|  | Initializing Keyboard Controller. |
|  | Testing VGA BIOS<br>This will start writing VGA sign-on message to the screen. |
|  | Processor Initialization<br>This will show information regarding the processor (like brand name, system bus, etc...) |
|  | Testing RTC (Real Time Clock) |
|  | Initializing Video Interface<br>This will start detecting CPU clock, checking type of video onboard. Then, detect and initialize the video adapter. |

| D-Bracket™ 2 | Description |
|---|---|
|  | BIOS Sign On<br>This will start showing information about logo, processor brand name, etc... |
|  | Testing Base and Extended Memory<br>Testing base memory from 240K to 640K and extended memory above 1MB using various patterns. |
|  | Assign Resources to all ISA. |
|  | Initializing Hard Drive Controller<br>This will initialize IDE drive and controller. |
|  | Initializing Floppy Drive Controller<br>This will initialize Floppy Drive and controller. |
|  | Boot Attempt<br>This will set low stack and boot via INT 19h. |
|  | Operating System Booting |

# Button & Jumper

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

## Clear CMOS Button: SW1

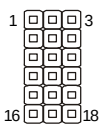
There is a CMOS RAM on board that has a power supply from external battery to keep the system configuration data. With the CMOS RAM, the system can automatically boot OS every time it is turned on. If you want to clear the system configuration, use the SW1 (Clear CMOS Button) to clear data. Press the button in the middle of the connector top side to clear the data:



**SW1**

## Select DDR Power Jumper: JV1

The DDR Power Jumper is used to boost the DDR power. The BIOS will auto detect the mode you configure by hardware and provide the properly selection for DDR Voltage field. The hardware jumper setting and the software BIOS selection have to complement each other.




**JV1**



**Normal Mode**
**(2.6V~3.2V for you to select in BIOS)**



**Boost Mode**
**(3.3V~4.1V for you to select in BIOS)**

**MSI Reminds You...**
We are not responsible for any damage from changing the default value of DDR voltage.

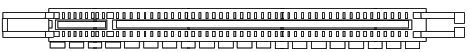
# Slots

The mainboard provides two PCI Express x16 slots, two PCI Express x1 slots , one PCI Express x4 slot and two 32-bit PCI bus slots.

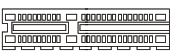
## PCI Express Slots: PCI_E1 ~ PCI_E5

The PCI Express slots, as a high-bandwidth, low pin count, serial, interconnect technology. You can insert the expansion cards to meet your needs. When adding or removing expansion cards, make sure that you unplug the power supply first.

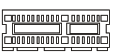
PCI Express architecture provides a high performance I/O infrastructure for Desktop Platforms with transfer rates starting at 2.5 Giga transfers per second over a PCI Express x1 lane for Gigabit Ethernet, TV Tuners, 1394 controllers, and general purpose I/O. Also, desktop platforms with PCI Express Architecture will be designed to deliver highest performance in video, graphics, multimedia and other sophisticated applications. Moreover, PCI Express architecture provides a high performance graphics infrastructure for Desktop Platforms doubling the capability of existing AGP8x designs with transfer rates of 4.0 GB/s over a PCI Express x16 lane for graphics controllers, while PCI Express x1 supports transfer rate of 250 MB/s.



**PCI Express x 16 Slot (PCI_E1/ PCI_E4)**



**PCI Express x 4 Slot (PCI_E5 which suppports PCI Express x 2 transfer rate)**



**PCI Express x 1 Slot (PCI_E2/ PCI_E3)**

**MSI Reminds You...**

*Due to the North Bridge FAN's location limitation, insert a graphics card that its back side depth value is less than 1.5 cm to the PCI_E1 (Primary PCIE x 16) slot.*

## NV SLI Technology

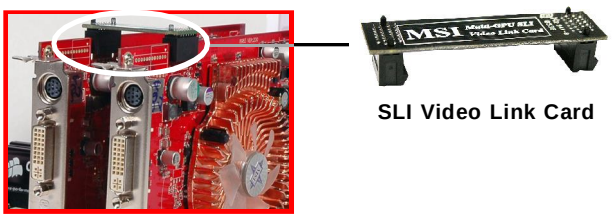
NVIDIA SLI (Scalable Link Interface) technology allows two GPUs to run in tandem within a system to achieve up to twice the performance of a single graphics card. To utilize this technology, the two GPU cards must be connected by an *SLI Video Link card*.




**SLI Video Link Card**

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

1.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 (refer to the picture below). 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.

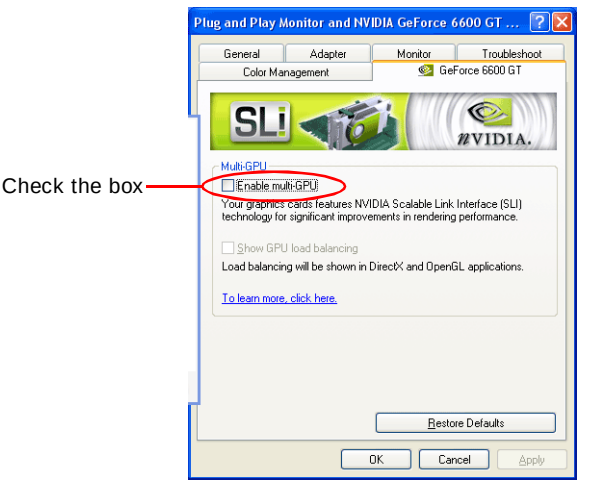



**SLI Video Link Card**

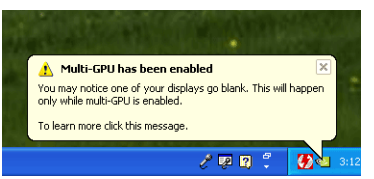
**MSI Reminds You...**

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 **TWO** x16 graphics cards, make sure that, these two graphics cards are of the same brand and specifications.*
3. *Make sure that you connect an adequate power supply to the JPWR3 connector (or to the power connection on the graphics card) to ensure stable operation of the graphics card.*

2. 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) .




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

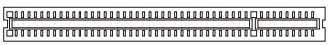



**MSI Reminds You...**
*If you want to remove one graphics card and quit the SLI function, make sure the "MultiGPU" function is disabled.*

## PCI (Peripheral Component Interconnect) Slots: PCI1/ PCI2

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

The orange PCI slot also works as a communcation slot, which allows you to insert the communcation card.



**PCI Slots**

## PCI Interrupt Request Routing

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

| | Order 1 | Order 2 | Order 3 | Order4 |
|---|---|---|---|---|
| PCI Slot 1 | INT Y# | INT Z# | INT W# | INT X# |
| PCI Slot 2 | INT Z# | INT W# | INT X# | INT Y# |



# BIOS Setup

This chapter provides information on the BIOS Setup program and allows you to configure the system for optimum use.

You may need to run the Setup program when:

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

**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. While booting up, the BIOS version is shown in the 1st line appearing after the memory counting. It is usually in the format: example: A7220NMS V1.0 103005*

*where:*

*1st digit refers to BIOS maker as A=AMI(R); W=AWARD(R)*
*2nd - 5th digit refers to the model number.*
*6th digit refers to the nVIDIA chipset.*
*7th - 8th digit refers to the customer, MS=all standard customers.*
*V1.0 refers to the BIOS version.*
*103005 refers to the date this BIOS is 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 |
| <F6> | Load the default CMOS value from Fail-Safe default table, only for Option Page Setup Menu |
| <F7> | Load Optimized defaults |
| <F10> | Save all the CMOS changes and exit |

## Getting Help

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

**Main Menu**

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

**Sub-Menu**



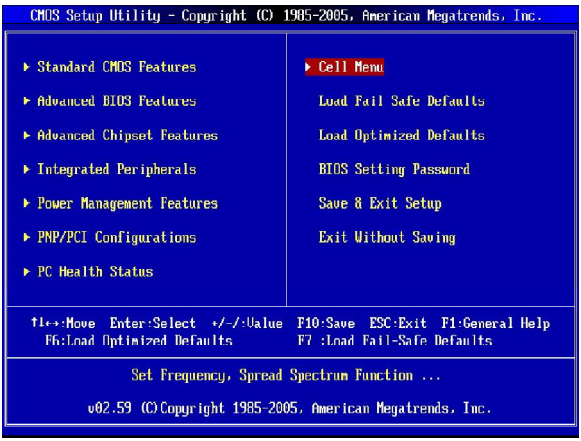

If you find a right pointer symbol (as shown in the right view) appears to the left of certain fields that means a sub-menu containing additional options can be launched from this field. You can use control keys ( ↑↓ ) to highlight the field and press <Enter> to call up the sub-menu. Then you can use 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 >.

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




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

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

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

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

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

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

**PC Health Status**
This entry shows your PC health status.

**Cell Menu**
Use this menu to specify your settings for 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.

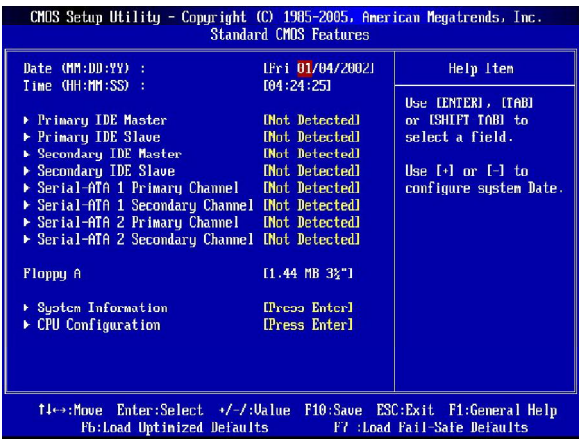
**BIOS Setting Password**
Use this menu to set the password for BIOS.

**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.




**Date (MM:DD:YY)**

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

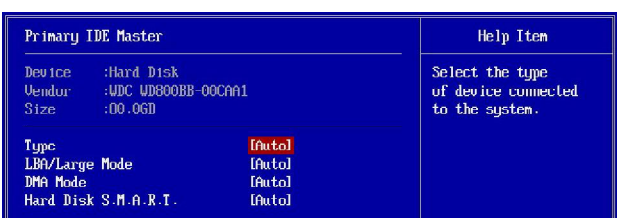
| | |
|---|---|
| **day** | Day of the week, from Sun to Sat, determined by BIOS. Read-only. |
| **month** | The month from Jan. through Dec. |
| **date** | The date from 1 to 31 can be keyed by numeric function keys. |
| **year** | The year can be adjusted by users. |

**Time (HH:MM:SS)**

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

**Primary/Secondary IDE Master/ Slave, Serial-ATA 1/ 2 Primary/ Secondary Channel**

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



**Device/ Vender/ Size**
It will showing the device information that you connected to the IDE/SATA connector .

**Type**
Select the type of IDE device. Setting options: [Not Installed], [Auto], [CD/DVD], [ARMD].

**LBA/Large Mode**
This allows you to enable or disable the LBA Mode. Setting to Auto enables LBA mode if the device supports it and the devices is not already formatted with LBA mode disabled. Setting options: [Auto], [Disabled].

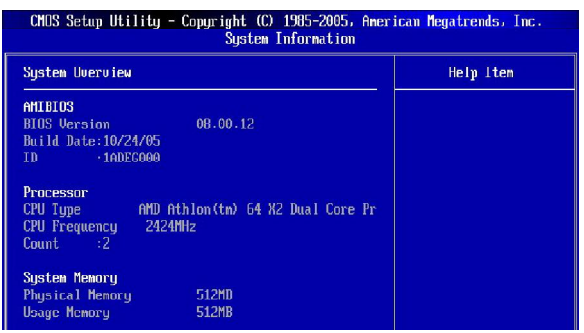
**DMA Mode**
Select DMA Mode.

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

**MSI Reminds You...**
**Primary/Secondary IDE Master/ Slave, Serial-ATA 1/ 2 Primary/ Secondary Channel** *are appearing when you connect the HD devices to the IDE/ SATA connector on the mainboard.*

**Floppy A**
This item allows you to set the type of floppy drives 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.].

**System Information**
Press <Enter> to enter the sub-menu, and the following screen appears.

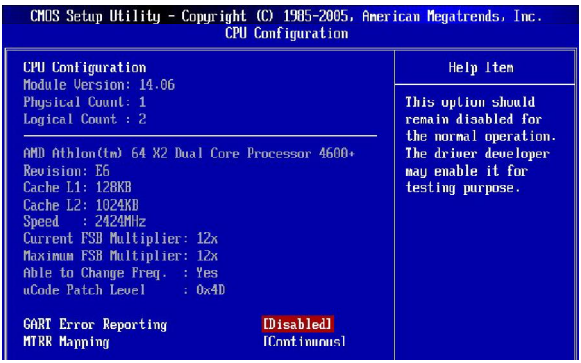


### BIOS / Processor / System Memory Information

The items show the CPU information, BIOS version and memory status of your system (read only).

### CPU Configuration

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




### CPU Configuration

The items show the detail CPU information (read only).

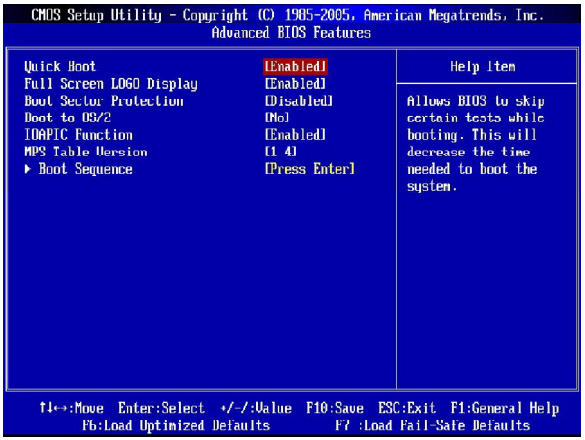
### GART Error Reporting

This option should remain disabled for the normal operation. The driver developer may enable it for testing purpose.

### MTRR Mapping Mode

This field allows you to control the MTRR mapping Mode. Setting options: [Discrete], [Continuous].

# Advanced BIOS Features




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

**Full Screen LOGO Display**
This item enables you to show the company logo on the bootup screen. Setting options are:

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

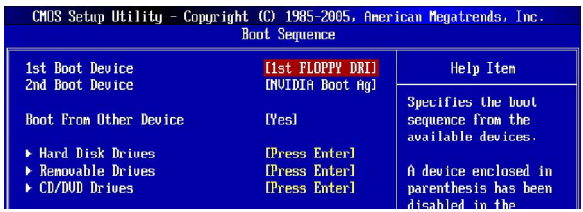
**Boot Sector Protection**
This function protects the BIOS from accidental corruption by unauthorized users or computer viruses. When enabled, the BIOS' data cannot be changed when attempting to update the BIOS with a Flash utility. To successfully update the BIOS, you'll need to disable this Flash BIOS Protection function.
You should enable this function at all times. The only time when you need to disable it is when you want to update the BIOS. After updating the BIOS, you should immediately re-enable it to protect it against viruses. Setting options: [Enabled], [Disabled].

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

**IOAPIC 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. Setting options: [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 Sequence**
Press <Enter> to enter the sub-menu and the following screen appears:




**1st/2nd/3rd/4th Boot Device**
The items allow you to set the sequence of boot devices where BIOS attempts to load the disk operating system.

**Boot From Other Device**
Setting the option to [Yes] allows the system to try to boot from other device if the system fails to boot from the 1st/2nd/3rd/4th boot device.

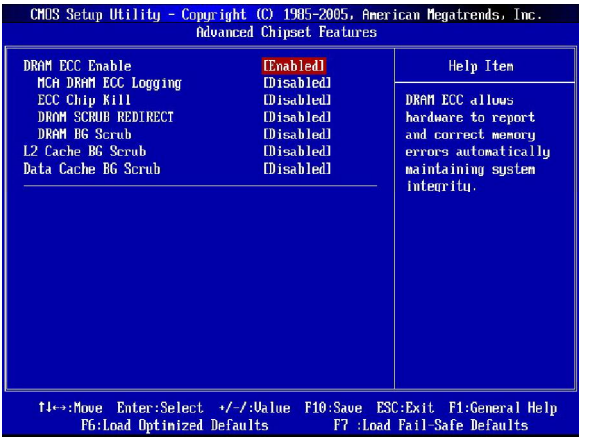
**Hard Disk Boot Priority**
Press <Enter> to enter the sub-menu. Then you may use the arrow keys ( -Ż ) to select the desired device, then press <+>, <-> or <PageUp>, <PageDown> key to move it up/down in this hard disk boot priority list.

**Hard Disk Drives**
This feature allows you to specify the hard disk boot priority.

**Removable Drives**
This feature allows you to specify the removable device boot priority.

**CD/DVD Drives**
This feature allows you to specify the CD/DVD device boot priority.

# Advanced Chipset Features




**DRAM ECC Enable**
This item allows hardware to report and correct memory errors automatically to maintain system integrity. Setting options: [Enabled], [Disabled].

**MCA DRAM ECC Logging**
This item allows to enable or disable the MCA DRAM ECC logging / reporting. Setting options: [Enabled], [Disabled].

**ECC Chip Kill**
This item allows to enable or disable the ECC chip kill. Setting options: [Enabled], [Disabled].

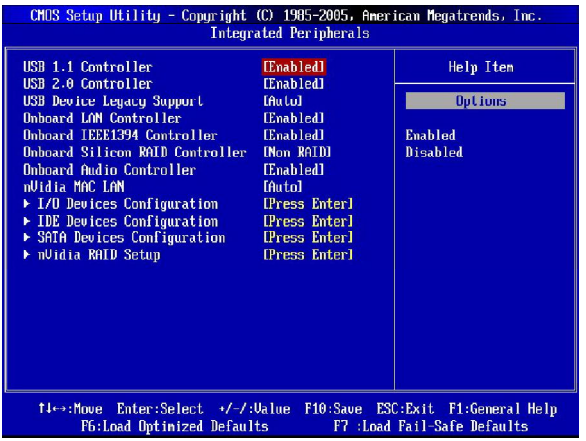
**DRAM SCRUB REDIRECTD**
This item allows the system to correct DRAM ECC (Error Checking Correcting) immediately when they occur, even if background scrubbing is on. Setting options: [Enabled], [Disabled].

**DRAM BG Scrub**
This item corrects memory errors so later reads are correct. Setting options: [Disabled], [40ns], [80ns], [160ns], [320ns], [640ns], [1.28us], [2.56us], [5.12us], [10.2us], [20.5us], [41.0us], [81.9us], [163.8us], [327.7us], [655.4us].

**L2 Cache BG Scrub**
This item allows the L2 cache to be corrected while idle. Setting options: [Disabled], [40ns], [80ns], [160ns], [320ns], [640ns], [1.28us], [2.56us], [5.12us], [10.2us], [20.5us], [41.0us], [81.9us], [163.8us], [327.7us], [655.4us].

**Data Cache BG Scrub**
This item allows the L1 Data cache to be corrected while idle. Setting options: [Disabled], [40ns], [80ns], [160ns], [320ns], [640ns], [1.28us], [2.56us], [5.12us], [10. 2us], [20.5us], [41.0us], [81.9us], [163.8us], [327.7us], [655.4us].

# Integrated Peripherals




**USB 1.1/ 2.0 Controller**
This setting allows you to enable/disable the onboard USB 1.1/ 2.0 controller. Setting options: [Disabled], [Enabled].

**USB Device Legacy Support**
Select [Enabled] if you need to use a USB-interfaced device in the operating system. Setting options: [Enabled], [Disabled].

**Onboard LAN Controller**
This item controls the LAN controller. Setting options: [Enabled], [Disabled].

**Onboard IEEE1394 Controller**
This item allows you to enable/disable the onboard IEEE1394 controller. Setting options: [Disabled], [Enabled].

**OnBoard Silicon RAID Controller**
This item allows you to select the onboard Silicon RAID mode. Setting options: [Non RAID], [RAID], [Disabled].

**OnBoard Audio Controller**
This setting is used to enable/disable the onboard Creative audio. Setting options: [Enabled], [Disabled].

**nVidia MAC LAN**
This setting controls the nVidia LAN controller. Setting options: [Auto], [Disabled].

**OnBoard LAN Controller**
This setting controls the Onboard LAN controller. Setting options: [Enabled], [Disabled].

**I/O Device Configuration**
Press <Enter> to enter the sub-menu and the following screen appears:




**Onboard Floppy 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].

**COM 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], [Disabled].

| | |
|---|---|
| [IrDA] | IrDA-compliant Serial Infrared Port |
| [Disabled] | Disabled the Infrared Port |

**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] | Line Printer port 0 |
| [278] | Line Printer port 2 |
| [378] | Line Printer port 1 |

**Parallel Port Mode**
EPP : Enhanced Parallel Port
ECP : Extended Capability Port
ECP & EPP: Extended Capability Port + Enhanced Parallel Port
Normal
Bi-Directional

**Parallel Port IRQ**
This item allows you to set parallel port IRQ. Setting options: [IRQ5], [IRQ7].

### IDE Devices Configuration

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




#### PCI IDE BusMaster

This item allows you to enable/ disable the PCI IDE busmaster. Setting options: [Disabled], [Enabled].

#### On-Chip IDE Controller

The integrated peripheral controller contains an IDE interface with support for two IDE channels. Choose [Both] to activate the two channels. Setting options: [Both], [Primary], [Secondary], [Disabled].

### SATA Devices Configuration

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

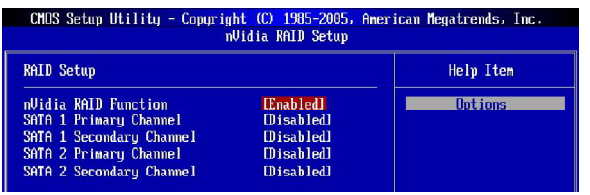



#### Serial-ATA 1/ Serial-ATA 2

These items allow users to enable or disable the SATA controller. Setting options: [Enabled], [Disabled].

### nVidia RAID Setup

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



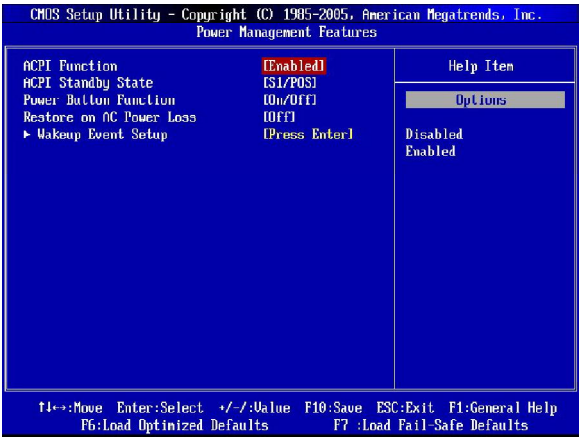

#### nVidia RAID Function

This item is used to enable/disable the nVidia RAID function. Setting options: [Enabled], [Disabled].

#### SATA 1/ SATA 2 Primary/ Secondary Channel

These itemsallow users to enable or disable the RAID function for each PATA/ SATA hard disk drive. Setting options: [Enabled], [Disabled].

# Power Management Setup




**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]. Setting options: [Enabled], [Disabled].

**ACPI Standby State**

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

[S1/POS] The S1 sleep mode is a low power state. In this state, no system context is lost (CPU or chipset) and hardware maintains all system context.

[S3/STR] The S3 sleep mode is a lower power state where the information 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]

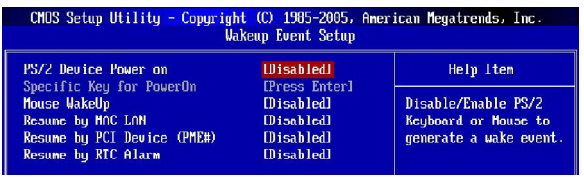
**Power Button Function**
This feature sets the function of the power button. Settings are:

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

**Restore On AC Power Loss**
This item specifies whether your system will reboot after a power failure or interrupt occurs. Available settings are:

[Off] Always leaves the computer in the power off state.
[On] Always leaves the computer in the power on state.
[Last State] Restores the system to the status before power failure or interrupt occurred.

**Wakeup Event Setup**
Press <Enter> and the following sub-menu appears.




**PS2 Device Power on**
These fields allow the activity of the PS2 devices (keyboard and mouse) to wake up the system from power-off state. Setting options: [Enabled], [Disabled].

**Keyboard WakeUp**
This controls how the PS/2 keyboard is able to power on the system. If you choose *Specific Key*, the power button on the case will not function anymore and you must type the password to power on the system. Setting options: [Disabled], [Any Key], [Specific Key].

**KB Power ON Password**
If Keyboard WakeUp is set to *Specific Key*, then you can set a password in the field for the PS/2 keyboard to power on the system.

**Mouse Wakeup**
This setting determines whether the system will be awakened from what power saving modes when input signal of the mouse is detected. Setting options: [Disabled], [Enabled].

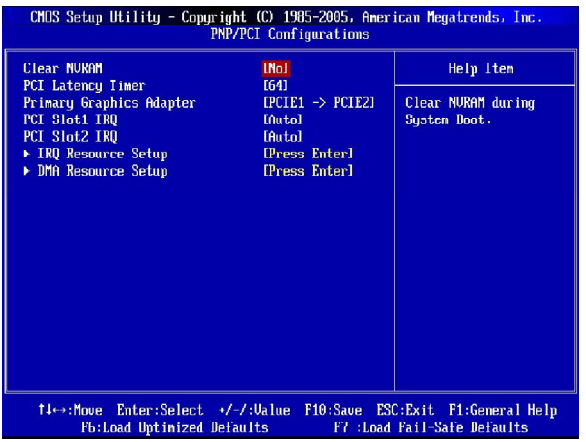
**Resume by MAC LAN**
An input signal on modem awakens the system from a soft off state. Setting options: [Enabled], [Disabled].

**Resume by PCI Device (PME#)**
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].

**Resume by RTC Alarm**
The field is used to enable or disable the feature of booting up the system on a scheduled time/date. 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.




**Clear NVRAM**

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

**PCI Latency Timer**

This item controls how long each PCI device can hold the bus before another takes over. When set to higher values, every PCI device can conduct transactions for a longer time and thus improve the effective PCI bandwidth. For better PCI performance, you should set the item to higher values. Setting options: [32], [64], [96], [128], [160], [192], [224], [248].

**Primary Graphics Adapter**

This item specifies which graphic card is your primary graphics adapter. Setting options: [PCIE2 -> PCIE1 -> PCI], [PCIE1 -> PCIE2 -> PCI].

**PCI Slot 1/2 IRQ**

These items specify the IRQ line for each PCI slot.

**IRQ Resource Setup**

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

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

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

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




**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.*

**DMA Resource Setup**

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



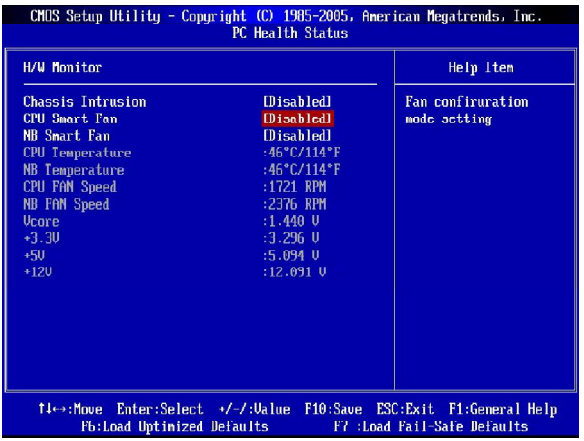

**DMA Channel 0/1/3/5/6/7**

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

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

# PC Health

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.




**Chassis Intrusion**
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].

**CPU Smart Fan**
This field allows you to set the CPU smart fan mode or disables the CPU smart fan. Setting options: [Step Smart Fan], [Thermal Cruise], [Disabled].

**CPU Fan TargetTemp Value**
When the ***CPU Smart Fan*** set to the "*Thermal Cruise*" this item will appear. The mainboard provides the Smart Fan system which can control the fan speed automatically depending on the current temperature to keep it with in a specific range. Setting options: [1~255].

**CPU Fan Tolerance Value**
When the ***CPU Smart Fan*** set to the "*Thermal Cruise*" this item will appear. You can select a fan tolerance value here for the specific range for the "CPU Fan TargetTemp. Value" item. If the current temperature of the fan reaches to the maximum threshold (the temperatures set in the "CPU Fan TargetTemp. Value" plus the tolerance values you set here), the fan will speed up for cooling down. On the contrary, if the current temperature reaches to the minimum threshold (the set temperatures minus the tolerance value), the fan will slow down to keep the temperature stable. Setting options: [1~15].

**CPU Step Smart Fan Low/ High Temp**
When the ***CPU Smart Fan*** set to the "*Step Smart Fan*", this item will appear. The mainboard provides another Smart Fan system which can control the fan speed automatically depending on the current temperature to keep it within a specific step. In these items you can set the low and high tempertures, and the values between are the range of the steps. Setting options: [1~255].

**CPU Fan Tolerance Value**
When the ***CPU Smart Fan*** set to the "*Step Smart Fan*", this item will appear. The Fan tolerance value will decide the intervals of the steps from low temperature to high temperature. The fan speed will increase at higher steps and decrease at lower steps according to the steps. Setting options: [1~15].

**Current Smart Fan Step**
This item shows how many steps between the low and high temperatures. Read only.

**Each Step Increase Fan Output**
This item shows the percentage for the CPU fan speed to increase or decrease between two steps. Read only.

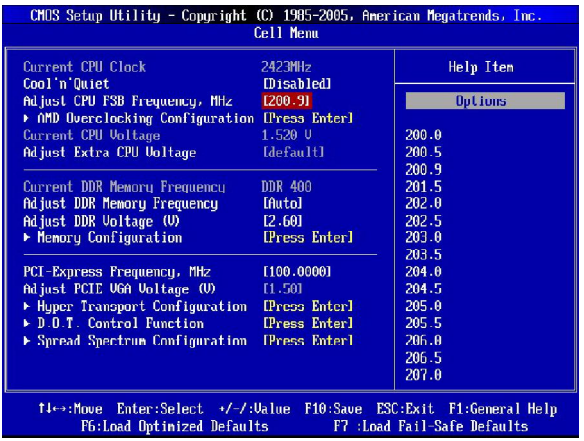
**NB Fan TargetTemp Value**
When the ***NB Smart Fan*** set to the "*Thermal Cruise*" this item will appear. The mainboard provides the Smart Fan system which can control the fan speed automatically depending on the current temperature to keep it with in a specific range. Setting options: [1~255].

**NB Fan Tolerance Value**
When the ***NB Smart Fan*** set to the "*Thermal Cruise*" this item will appear. You can select a fan tolerance value here for the specific range for the "NB Fan TargetTemp. Value" item. If the current temperature of the fan reaches to the maximum threshold (the temperatures set in the "NB Fan TargetTemp. Value" plus the tolerance values you set here), the fan will speed up for cooling down. On the contrary, if the current temperature reaches to the minimum threshold (the set temperatures minus the tolerance value), the fan will slow down to keep the temperature stable. Setting options: [1~15].

**CPU/NB Temperature, CPU/ NB Fan Speed, Vcore, +12.0V, +3.3V, +5.0V,**
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 includes some important settings of CPU, AGP, DRAM and overclocking functions.




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

**Current CPU Clock**
This item shows the current clocks of CPU. Read-only.

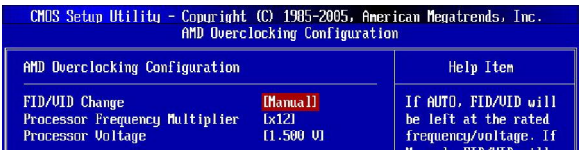
**MSI Reminds You...**
There is a safe key "Ins" in BIOS. In case the overclocking fails, you can press "Ins" key while system rebooting to restore to the BIOS defaults.

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

**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.*

**Adjust CPU FSB Frequency**
This item allows you to select the CPU Front Side Bus clock frequency (in MHz). Select the number between [200]~[450] for needed frequency.

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




**FID/VID Change**
Setting to Manual allows you to set the CPU ratio and voltage manually. Setting options: [Auto], [Manaul].

**Processor Frequency Multiplier**
This item allows you to set the CPU ratio.

**Processor Voltage**
This item allows you to set the CPU voltage.

**Current CPU Voltage**
This item shows the current voltage of CPU. Read-only.

**Adjust Extra CPU Voltage**
This feature allows you to trim the voltage of CPU. Setting options are: [50mv~750mv].

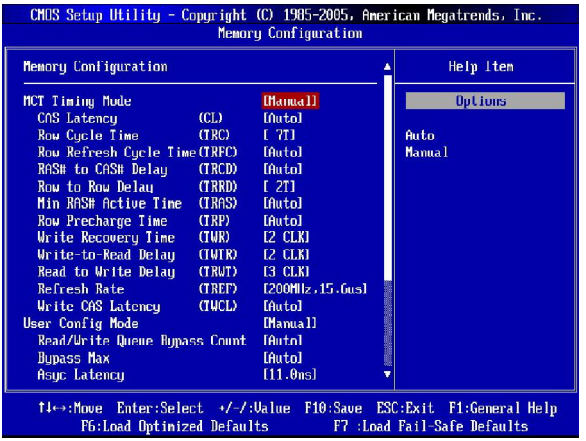
**Current DDR Memory Frequency**
This item shows the current clocks of CPU. Read-only.

**Adjust DDR Memory Frequency**
Setting to ***Auto***, the system will auto detect the memory clock. Setting to ***Manual***, the "Memory Clock Ratio" item will appear and allows you to select the memory ratio. Setting options: [Auto], [Manual].

**Memory Clock**
This item allows you to select the memory ratio. Setting options: [DRAM/FSB=1/2], [DRAM/FSB=2/3], [DRAM/FSB=5/6], [DRAM/FSB=1/1].

**Adjust DDR Voltage (V)**
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***. Setting options are: [2.6V~4.1V].

**MSI Reminds You...**
The BIOS will auto detect the mode you configure by hardware and provide the properly setting options for **Adjust DDR Voltage** field. The detail hardware settings please refer to the Chapter. 2.




**Memory Configuration**

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

**MCT 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. Setting options: [Auto], [Manual].

**CAS Latency**

When the ***MCT 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. Setting options: [Auto], [2.0], [2.5], [3.0].

**Row cycle time (TRC)**

When the ***MCT Timing Mode*** is set to [Manual], the field is adjustable. The row cycle time determines the minimum number of clock cycles a memory row takes to complete a full cycle, from row activation up to the precharging of the active row. Setting options: [Auto], [7T~21T].

**Row refresh Cycle time (TRFC)**

When the ***MCT Timing Mode*** is set to [Manual], the field is adjustable. Auto-refresh -active to RAS#-active or RAS# auto-refresh. Setting options: [Auto], [9T], [10T] ~ [24T].

**RAS# to CAS# delay (TRCD)**

When the ***MCT 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], [2CLK~6CLK].

**Row to Row delay (TRRD)**
When the ***MCT Timing Mode*** is set to [Manual], the field is adjustable. Specifies the active-to-active delay of different banks. Setting options: [Auto], [2T], [3T], [4T].

**Min RAS# Active Time (TRAS)**
When the ***MCT 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], [5CLK~15CLK].

**Row Precharge Time (TRP)**
When the ***MCT 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. Setting options: [Auto], [2CLK~7CLK].

**Write recovery time (TWR)**
When the ***MCT Timing Mode*** is set to [Manual], the field is adjustable. It specifies the amount of delay (in clock cycles) that must elapse after the completion of a valid write operation, before an active bank can be precharged. This delay is required to guarantee that data in the write buffers can be written to the memory cells before precharge occurs. Setting options: [Auto], [2CLK], [3CLK].

**Write to Read delay (TWTR)**
When the ***MCT Timing Mode*** is set to [Manual], the field is adjustable. This item controls the Write Data In to Read Command Delay memory timing. This constitutes the minimum number of clock cycles that must occur between the last valid write operation and the next read command to the same internal bank of the DDR device. Setting options: [Auto], [1CLK], [2CLK].

**Read to Write delay (TRWT)**
When the ***MCT Timing Mode*** is set to [Manual], the field is adjustable. This is not a DRAM-specified timing parameter, but must be considered due to routing latencies on the clock forwarded bus. It is counted from the first address bus slot that was not associated with part of the read burst. Setting options: [Auto], [1CLK~6CLK].

**Refresh period (TREF)**
When the ***MCT Timing Mode*** is set to [Manual], the field is adjustable. Specifies the refresh rate of the DIMM requiring the most frequent refresh. Setting options: [Auto], [100MHz/15.6us], [133MHz/15.6us], [166MHz/15.6us], [200MHz/

15.6us], [100MHz/7.824us], [133MHz/7.824us], [166MHz/7.824us], [200MHz/7.824us], [100MHz/3.944us], [133MHz/3.944us], [166MHz/3.944us], [200MHz/3.944us].

**Write CAS Latency (TWCL)**
When the ***MCT Timing Mode*** is set to [Manual], the field is adjustable. Setting options: [Auto], [1CLK], [2CLK].

**User Config Mode**
This field has the capacity to automatically detect all of the following 4 fields default value.. If you set this field to [Manual], the following fields will be selectable. The settings are: [Auto], [Manual].

**Read/Write Queue Bypass Cound**
When the ***User Config mode*** is set to [Manual], the field is adjustable. Setting options: [Auto], [02X], [04X], [08X], [16X].

**Bypass Max**
When the ***User Config mode*** is set to [Manual], the field is adjustable. Setting options: [Auto], [00X~07X].

**Asyc Latency**
When the ***User Config mode*** is set to [Manual], the field is adjustable. This field should be loaded with 4-bit value equal to th e maximum asynchronous latency in the DRAM read round-trip loop. Setting options: [0.0ns~15.0ns].

**Read Preamble**
When the ***User Config mode*** is set to [Manual], the field is adjustable. The time prior to the max-read DQS-return when the DQS receiver should be turned on. This is specified in units of 0.5ns. The controller needs to know when to enbale its DQS receiver in anticipation of the DRAM DQS driver truning on for a read. The controller will disable its DQS receiver until the read preamble time and then enable its DQS receiver while the DRAM asserts DQS. Setting options: [2ns], [2.5ns], [3ns], [3.5ns], [4ns], [4.5ns], [5ns], [5.5ns], [6ns], [6.5ns], [7ns], [7.5ns], [8ns], [8.5ns], [9ns], [9.5ns].

**Idle Cycle Limit**
This item allows you to select the idle cycle limitation. Idle cycle limit is the number of clock cycles that a page is allowed to stay open even if there is no access. The relevance of this setting is that in cases where intermittent accesses to the cache are made or else, the CPU does not issue any read requests, the controller is still able to go back to the same page even after some idle cycles. Whether setting the idle cycle timer shorter or longer results in more performance, depends on the application. Setting options: [Auto], [0 cycles], [4 cycles], [8 cycles], [16 cycles], [32 cycles], [64 cycles], [128 cycles], [256 cycles].

**Dynamic Idle Cycle Center**
This item allows you to enable or disable the Dynamic Idle Cycle Center. Setting options: [Disable], [Enabled], [Auto].

**CMD-ADDR Timing Mode**
When the ***User Config mode*** is set to [Manual], the field is adjustable. This field controls the SDRAM command rate. Selecting [1T] makes SDRAM signal controller to run at 1T (T=clock cycles) rate. Selecting [2T] makes SDRAM signal controller run at 2T rate. Setting options: [1T], [2T].

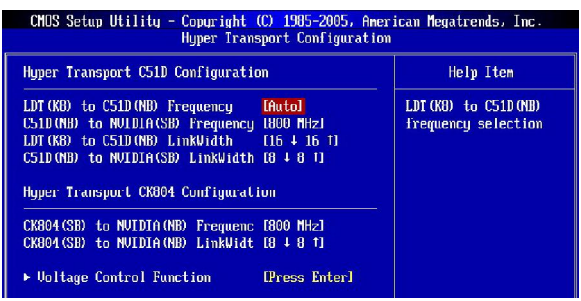
**Burst Length**
This setting allows you to set the size of Burst-Length for DRAM. Bursting feature is a technique that DRAM itself predicts the address of the next memory location to be accessed after the first address is accessed. To use the feature, you need to define the burst length, which is the actual length of burst plus the starting address and allows internal address counter to properly generate the next memory location. The bigger the size, the faster the DRAM performance. Setting options: [8 Beats], [4 Beats], [2 Beats].

**HardWare memory hole**
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].

**PCI-Express Frequency, MHz**
This item allows you to select the PCI Express frequency (in MHz) and overclock the processor by adjusting the PCI Express frequency to a higher frequency. Select the number between [100]~[148.4375] for needed frequency.

**Adjust PCIE VGA Voltage (V)**
This field allows you to select the voltage of PCI Express slot. Setting optons: [1.5~1.85v]

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



**Hyper Transport C51D Configuration**

**LDT (K8) to C51D (NB) Freq. Auto**
[Enabled] Auto Detect HT frequency.
[Disabled] Manual to setting HT frequency.

**LDT (K8) to C51D (NB) Frequency**
When the **LDT (K8) to C51D (NB) Freq. Auto** set to ***Disabled***, the item will appear. This item allows you to select the frequency from CPU to North Bridge. Setting options: [Auto], [200MHz], [400MHz], [600MHz], [800MHz], [1000MHz].

**C51D (NB) to NVIDIA (SB) Frequency**
This item allows you to select the frequency from North Bridge to South Bridge. Setting options: [200MHz], [400MHz], [600MHz], [800MHz], [1000MHz].

**LDT (K8) to C51D (NB) LinkWidth**
This item allows you to select the HT width from CPU to North Bridge. Setting options: [16 ↓ 16 ↑ ], [8 ↓ 8 ↑ ].

**C51D (NB) to NVIDIA (SB) LinkWidth**
This item allows you to select the HT width from North Bridge to South Bridge. Setting options: [16 ↓ 16 ↑ ], [8 ↓ 8 ↑ ],[4 ↓ 4 ↑ ].

**Hyper Transport CK804 Configuration**

**CK804(SB) to NVIDIA (NB) Frequency**
This item allows you to select the frequency from South Bridge to North Bridge. Setting options: [200MHz], [400MHz], [600MHz], [800MHz], [1000MHz].

**CK804 (SB) to NVIDIA (NB) LinkWidth**
This item allows you to select the HT width from South Bridge to North Bridge. Setting options: [16 ↓ 16 ↑ ], [8 ↓ 8 ↑ ],[4 ↓ 4 ↑ ].

**Voltage Control Function**
Press <Enter> to enter the sub-menu and the following screen appears.

**Adjust NB Voltage (v)**
This field allows you to select the voltage of North Bridge. Setting optons: [1. 20~1.50v]

**D.O.T Control Function**
Press <Enter> to enter the sub-menu and the following screen appears.



**CPU 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, also the default value of "Load High Performance Defaults", 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 10%.
[Commander] 6th level of overclocking, increasing the CPU frequency by 15%.

**NV4X Core clock Overclocking**

[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, also the default value of "Load High Performance Defaults", 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 10%.
[Commander] 6th level of overclocking, increasing the CPU frequency by 15%.




**MSI Reminds You...**

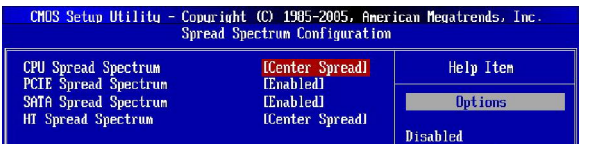
*Even though the Dynamic Overclocking Technology is more stable than manual overclocking, basically, it is still risky. We suggest user to make sure that your CPU can afford to overclocking regularly first. If you find the PC appears to be unstable or reboot incidentally, it's better to disable the Dynamic Overclocking or to lower the level of overclocking options.*

**NV4X Memory clock Overclocking**

[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, also the default value of "Load High Performance Defaults", 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 10%.
[Commander] 6th level of overclocking, increasing the CPU frequency by 15%.

**Spread Spectrum Configuration**

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




**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], [Down Spread], [Disabled].

**PCIE Spread Spectrum**

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

**SATA Spread Spectrum**

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

**HT Spread Spectrum**

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

**MSI Reminds You...**

*The settings shown in different color in **CPU Voltage**, **DDR voltage** **PCIE VGA** and **NB 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**, **DDR voltage** **PCIE VGA** and **NB Voltage** may result in the instability of the system; therefore, it is **NOT** recommended to change the default setting for long-term usage.*

# 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:




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

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




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

# BIOS Setting Password

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




Type the password, up to six characters in length, and press <Enter>. The password typed now will replace any previously set password from CMOS memory. You will be prompted to confirm the password. Retype the password and press <Enter>. You may also press <Esc> to abort the selection and not enter a password. To clear a set password, just press <Enter> when you are prompted to enter the password. A message will show up confirming the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup without entering any password.

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

# 4

# Introduction to DigiCell

DigiCell, the most useful and powerful utility that MSI has spent much research and efforts to develop, helps users to monitor and configure all the integrated peripherals of the system, such as audio program, power management, MP3 files management and communication / 802.11g WLAN settings. Moreover, with this unique utility, you will be able to activate the MSI well-known features, Live Update and Core Center, which makes it easier to update the BIOS/drivers online, and to monitor the system hardware status (CPU/Fan temperature and speed) or to overclock the CPU/ memory.

Once you have your DigiCell installed (locate the setup source file in the setup CD accompanying with your mainboard, path: **Utility --> MSI Utility --> MSI DigiCell**), it will have an icon in the system tray, a short cut icon on the desktop, and a short cut path in your “Start-up” menu. You may double-click on each icon to enable DigiCell.




short-cut icon in the system tray



short-cut path in the start-up menu
(path: Start-->Programs-->MSI-->DigiCell)

# Main

Before using this utility, it is required to have all the integrated peripherals/cards (LAN card, Wireless LAN card, MegaStick... etc.) and all the necessary drivers (onboard LAN driver, audio driver, CoreCenter, Live Update... etc.) installed correctly.

The icon representing each item will be lit up if it is inserted/installed correctly and properly. Otherwise, the icon will remain gray and user is not able to view the functionality/connection of that item.




## Introduction:

Click on each icon appearing above to enter the sub-menu to make further configuration.

***MSI***

Click on this button to link to MSI website: http://www.msi.com.tw.

***Quick Guide***

Click on this button and the quick guide of **DigiCell** will be displayed for you to review.

***H/W Diagnostic***

In this sub-menu, it provides the information of each DigiCell button for you to check if the representing peripherals/cards/drivers are correctly installed.

***Comm.***

In this sub-menu, you can see the configuration details for communication products, including the status, strength, speed and channel of the connection of the Ethernet LAN & Wireless LAN.

***Software Access Point***

In this sub-menu, you can change your connection mode to different ones, and configure the advanced settings for each mode, such as the authentication encryption... etc.

***Live Update***
You can take advantage of **Live Update** to detect and update BIOS and drivers online.

***Core Center***
You can take advantage of **Core Center** to monitor the health status of your system and to overclock under Windows OS if your system supports overclocking function.

***MEGA STICK***
If you have your MEGA STICK connected to your system, this icon will be lit up. Click this blue icon to turn DigiCell into a MP3 player, and then you can load media files from your MEGA STICK or the system, and edit the preferred playlist.

***Audio Speaker Setting***
In this sub-menu, you can configure and test the multi-channel audio function, speakers, sound effect and environment.

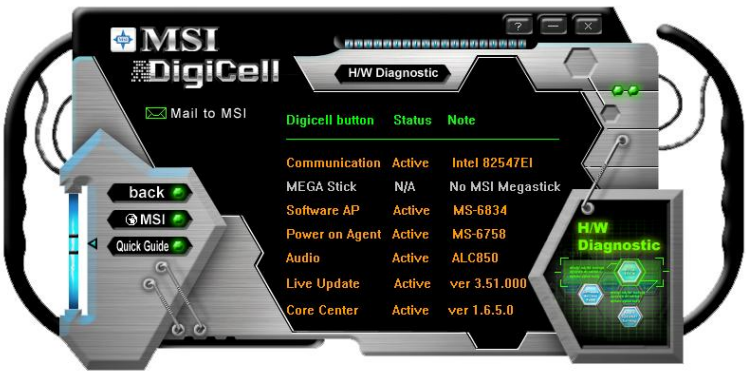
***Power on Agent***
In this sub-menu, you can configure date, time and auto-executed programs of the power-on, power-off and restarting features.




**MSI Reminds You...**
*Click on **back** button in every sub-menu and it will bring you back to the main menu.*

# H/W Diagnostic

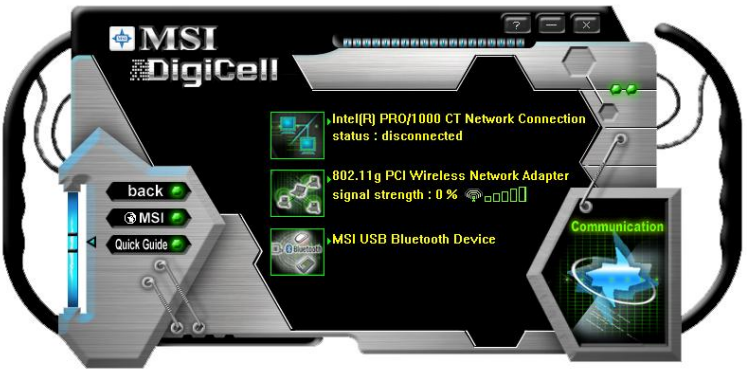
In the **H/W Diagnostic** sub-menu, you can see the information, status and note of each DigiCell. You may double check the connection and installation of the item marked as gray.




You may also click on the **Mail to MSI** button to send your questions or suggestions to MSI's technical support staff.

# Communication

In the **Communication** sub-menu, you can see the status of all the LAN / WLAN / Bluetooth on the screen if the hardware is installed. The first icon indicates the onboard LAN on your system, the second icon indicates the wireless LAN status, and the third one is the information about the bluetooth on your system. Click on each item for details.






This icon indicates the information and connection status of onboard LAN, which is read-only.



The second icon indicates the wireless connection. You may click this icon to configure the advanced settings in the **WLAN Card Mode** dialogue box (see the image on p.4-8). Please note that it is only available when the **Software Access Point** is set to **WLAN Card Mode**.



The third icon indicates the connection using bluetooth devices. If your system has connected to the bluetooth device, the icon will light up.

# Software Access Point

In the **Software Access Point** sub-menu, you can see the status of communicating on your system and choose the desired software access point mode by clicking on the desired icon, in which the default settings are configured for your usage. The default software access point mode is set to **WLAN Card Mode**. For more advanced security settings and channels switching, click on **"Setting"** button to enter its sub-menu.




## Terminology

Here are the introduction of WLAN / AP communication terminology.

***WEP Key***

In the wireless network environment, the administrator can set up password (Network Key) to protect the network from being attacked or unauthorized access. When building the network, you can set up 4 sets of WEP keys, which can be 5 characters (10 hex-adecimal digital) or 13 characters (26 hex-adecimal digital) and specify one of them to use.

***Ad-hoc Mode***

An Ad-hoc network is a local area network or other small network, especially one with wireless or temporary plug-in connections, in which some of the network devices are part of the network only for the duration of a communications session. Users in the network can share files, print to a shared printer, and access the Internet with a shared modem. In this kind of network, new devices can be quickly added; however, users can only communicate with other wireless LAN computers that are in this wireless LAN workgroup, and are within range.

***Infrastructure Mode***

The difference between Infrastructure network and Ad-hoc network is that the former one includes an Access Point. In an Infrastructure network, the Access Point can manage the bandwidth to maximize bandwidth utilization. Additionally, the Access Point enables users on a wireless LAN to access an existing wired network, allowing wireless users to take advantage of the wired networks resources, such as Internet, email, file transfer, and printer sharing. The scale and range of the Infrastructure networking are larger and wider than that of the Ad-hoc networking.

## Access Point Mode

Click on **"Setting"** button of the **Access Point Mode** and the following screen will display.




**IP Sharing**

Click on this icon to enable/disable the IP sharing. The default of this setting is disabled.

 Disabled.

 Enabled.

Enabling/disabling IP sharing depends on the different situation. For example:

1. If your family and you are getting on Internet at home with multi computers, and your ISP only provides one IP for you, you may need to enable **IP Sharing** function in order to use this one IP to get on Internet with multi computers simultaneously.
2. If you are getting on Internet in office, usually the LAN card will automatically get the IP this computer uses. In this case you don't have to enable this function.

**SSID**

Means Service Set Identifier, a ***unique*** name shared among all points in a wireless network. It must be ***identical*** for all points in the network. Then the card will be able to connect to an access point with the same SSID.

**Channel**

Specifies the operating radio frequency channel in **Infrastructure mode**, which should be set to an available one (ex: with less traffic to ensure the stable and better connection).

**Associated Client List**

This option is to display information of stations that are currently associated to your wireless gateway.

**Association Control**

This option allows you to control which PC can connect to the wireless LAN. If you

enable this feature, only PCs with MAC address located in Association Control List can connect to the wireless LAN.

**MAC Address**
MAC stands for Media Access Control. A MAC address is the hardware address of a device connected to a network.

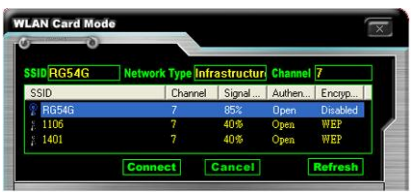
**Security**
This option allows you to enable/disable the authentication function.

**Authentication**
*Open*: Communicates the key across the network.
*Shared*: Devices must have identical WEP settings to communicate.

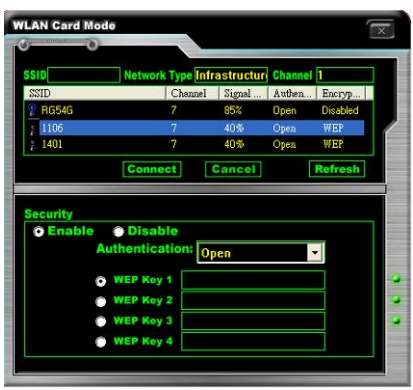
## WLAN Card Mode

Click on **"Setting"** button of the **WLAN Card Mode** for the WEP status of your APs.

If the AP you are selecting (the highlighted one) is not encrypted (***Disabled*** shown in the **Encryption** column), the screen will display as below. You can click "**Connect**" to make connection to that AP, click "**Cancel**" to close this dialogue box, or click **"Refresh"** button to update the available WLAN connections.




If the network you are selecting is encrypted (***WEP*** shown in the **Encryption** column), the screen will display as below. You need to enter the correct WEP key defined by AP in the specified **WEP Key 1~4** fields to make the connection.



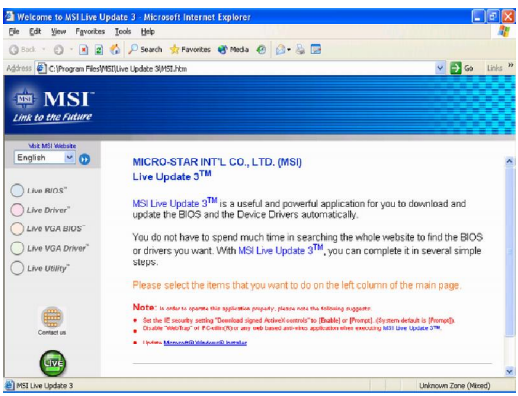
# Live Update

Click on the **Live Update** icon in the main menu and the **Live Update** program will be enabled.

The Live Update 3™ is a tool used to detect and update your BIOS/drivers/VGA BIOS/VGA Driver/OSD/Utility online so that you don't need to search for the correct BIOS/driver version throughout the whole Web site. To use the function, you need to install the "MSI Live Update 3" application. After the installation, the "MSI Live Update 3" icon (as shown on the right) will appear on the screen.




Double click the "MSI Live Update 3" icon, and the following screen will appear:




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

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

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

# MEGA STICK

In the **MEGA STICK** sub-menu, you can configure the settings of MSI MEGA STICK and the media files (*.m3u, *.mp3, *.wav, *.cda, *.wma) on your system.




## Basic Function

Here you can edit your own play list with the buttons **"load", "save", "delete", "shuffle", "repeat"** & **"print".**




**Load** To load media files or the playlist of mp3 files (*.m3u) on your system or on your MEGA STICK.

**Save** To save a loaded playlist of mp3 files (*.m3u) on your system or on your MEGA STICK.

**Delete** Click on the media files in the **Play List:** field and use **"Delete"** button to remove the media file from the play list. You may remove multi media files simultaneously by using "Ctrl" to select multi files.

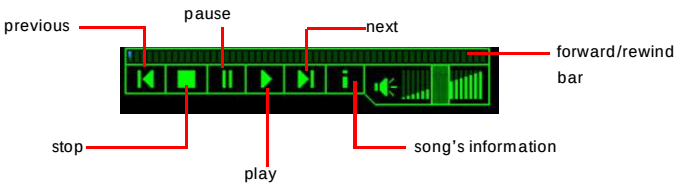
**Shuffle** To play the media file in the **Play List:** in a random order.

**Repeat** To repeat the selected files in the **Play List:**.

**Print** This button has 2 functions:

1. To print out the details of current play list through your printer with the following information:
   Song title --- Song length --- Singer name
2. To save the details of current play list and save the file in the plain text file format in the *Program files**MSI**DigiCell**MyMusic.txt* for your reference. The *MyMusic.txt* file is with the following information:
   Song title --- Song length --- Singer name

There is also a toolbar for you to execute some basic function, like play, stop, pause, previous/next song, song info and volume adjust. There is also a scroll bar on the top for you to forward/rewind.




Right-click on the MP3 file and choose **"Info"**, a **MP3 Info** dialogue will pop up to show the information of the file, including the title, artist, album, release year and others. You may also add your own comment in the **comment** field. Then click **"Save"** to save the change, click **"Cancel"** to discard the change, or click **"Remove"** to all this information.



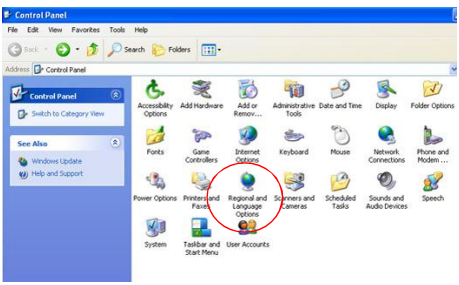



## Non-Unicode programs supported

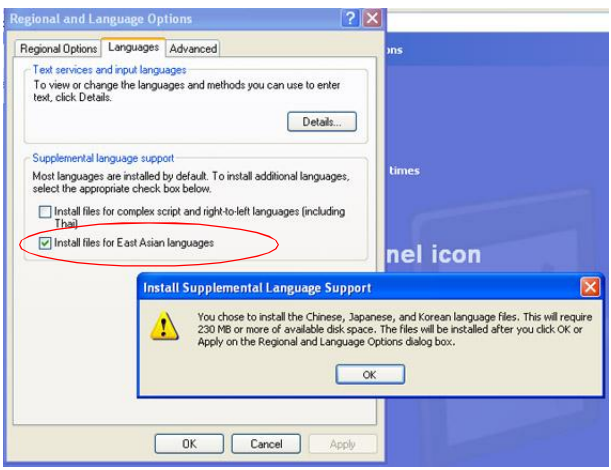
If you are using an operating system in European languages, and you'd like to play the media files in MEGA STICK with East-Asian languages (such as Chinese, Japanese... etc.), it is possible that the file names display incorrectly.

However, you can install the ***Supplemental Language Support*** provided by Microsoft to solve this problem. You need to have your Microsoft Setup CD prepared in the CD-ROM. The system will start to install the necessary components after the settings are configured here. Follow the steps described below.

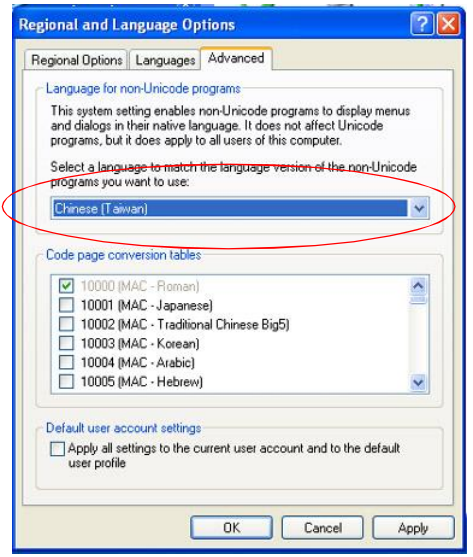
1. Go to [Control Panel] and choose [Regional and Languages Options].




2. Go to the [Languages] tab and enable the check box of [Install files for East Asian languages]. A dialogue box will pop up to remind you the above selection is chosen.



3. Then go to the [Advanced] tab and select ***the language you want to be supported*** (the language of the filename in the MegaStick) from the drop-down list in the [Language for non-Unicode programs], then click [Apply]. The system will install the necessary components from your Microsoft Setup CD immediately.



# Core Center (for AMD Processor)

Click on the **Core Center** icon in the main menu and the **Core Center** program will be enabled.

## Cool'n'Quiet

This utility provides a CPU temperature detection function called ***Cool'n'Quiet***. ***Cool'n'Quiet*** is a special feature designed only for AMD® Athlon64 processor, and with ***Cool'n'Quiet***, the system will be capable of detecting the temperature of the CPU according to the CPU's working loading. When the CPU temperature climbs up to a certain degree, the speed of the system cooling fan will be risen automatically, and on the other hand, the speed of the system cooling fan will slow down instantly when the CPU temperature descends to its normal degree.




Here the current system status (including Vcore, 3.3V, +5V and 12V) and the current PC hardware status (such as the CPU & system temperatures and all fans speeds) are shown on the left and right sides for you to monitor.

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.



## Left-side: Current system status

In the left sub-menu, you can configure the settings of FSB, CPU, DDR Voltage and PCI-E Voltage by clicking the radio button in front of each item and make it available (the radio button will be lighted 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 **"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 values for fan speeds are the minimum thresholds.

## Center-side: User mode/Auto mode

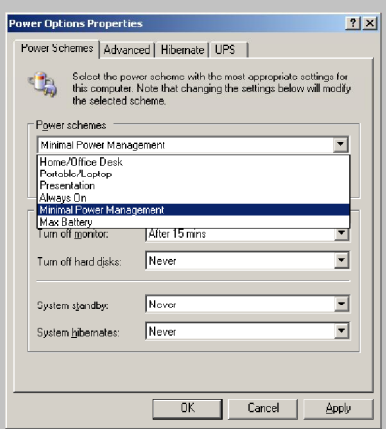
Here you may adjust the CPU fan speed. If you choose ***User mode***, you may adjust the CPU fan speed in 8 different modes, from **High Speed** to **Low speed**. If you choose ***Cool'n'Quiet***, the system will automatically configure an optimal setting for you.

**MSI Reminds You...**

*To ensure that Cool'n'Quiet function is activated and will be working properly, it is required to double confirm that:*

1. *Run BIOS Setup, and select **Cell Menu**. Under **Cell Menu**, find **Cool'n'Quiet**, and set this item to "Enable."*

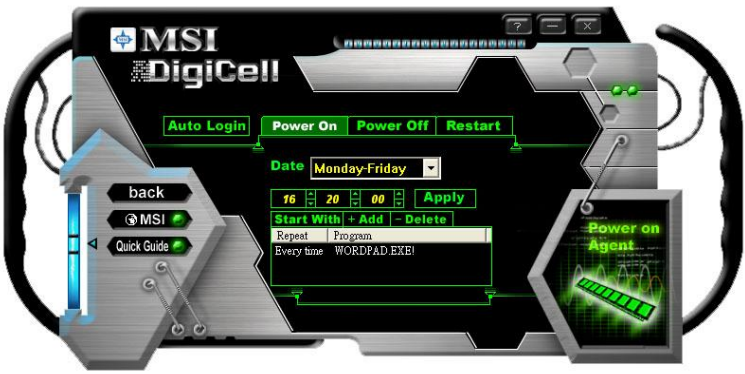
2. *Enter Windows, and select [Start]->[Settings]->[Control Pannel]->[Power Options]. Enter **Power Options Properties** tag, and select **Minimal Power Management** under **Power schemes**.*



# Power on Agent

In the **Power on Agent** sub-menu, you can configure setting of power-on, power-off and restarting status.

In the screen below, you can set the date, time, start-up programs respectively for power-on, power-off and restarting.




## Power On

Here are the available settings for **Power On** function:

**Date** Use the drop-down list to select the date for power-on.

**Time** Use the arrow keys to select the hour/minute/second for power-on, power-off and restarting. Then click **"Apply"** to save the changes. As you click **"Apply"**, the following dialogue will appear to show you the next power-on schedule, and the system will start to count down to restart. Click **"OK"** to restart the computer right away or click **"Later"** to restart your computer later.




**MSI Reminds You...**

*Please note that the new setting will not take effect until you restart your computer.*

## Power Off / Restart

You may configure the time (in the format hh:mm:ss) for the next power-off / restart.

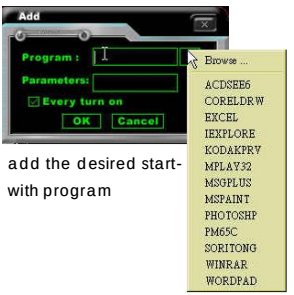
## Start With

Use the button **"+Add"** to add the start-up programs as DigiCell is activated next time. For example, you may like to have Outlook activated or a specified website linked when you get to the office every morning.

Step 1: Click on the **Program:** field and click **">>"** button to browse for the path of Outlook or Internet Explorer.

Step 2: Click on **"OK"** to apply the setting.

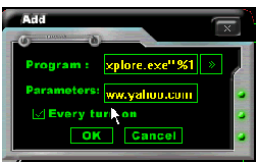
Step 3: For specified file or specified website, you may enter the file name with the complete path or the website link in the **Parameters:** field.




add the desired start-with program

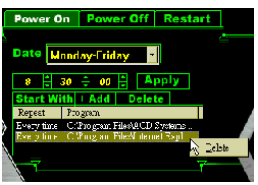



To activate Outlook as DigiCell is enabled next time




To activate a specified website as DigiCell is enabled next time

Of course you may use the button **"-Delete"** to remove the added programs, or you can right-click on the selected program and click **Delete**.




delete the added program

**MSI Reminds You...**

*You can also enable the **Every turn on** function, which will enable the specified program(s) and file(s) every time the Digi Cell utility runs.*

## Auto Login




Since the **Power On** function allows the system to power on automatically, you may have to enable this **Auto Login** function in the following situations:

1. If you are using a computer belonging to a domain in office, and you need to enter your user name & password everytime when you boot up your computer.
2. If there are multi users using the same computer and you'd like to power on the computer automatically with one specific user.

**Enable Auto Login**

Enable this setting if you want to use the **Auto Login** feature. It supports the following operating systems: Win9X, Windows ME, Windows 2000 & Windows XP.

**Default User Name**

It is only available for Windows 2000 & Windows XP.

-- If you are using a computer belonging to a domain in office, please enter your login user name in this field.

-- If you are using a computer with multi users (for Windows XP operating system), please enter the user name you'd like to auto power-on in this field.

**Default Password**

It is only available for Windows 2000 & Windows XP.

-- If you are using a computer belonging to a domain in office, please enter your login password in this field.

-- If you are using a computer with multi-users (for Windows XP operating system), please enter the password for the user name you'd like to auto power-on in this field.



# Introduction to Creative Sound Blaster

The mainboard is equipped with Creative CA0106 chip. Creative CA0106 supports up to 8-channel & SPDIF audio effect and 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.

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

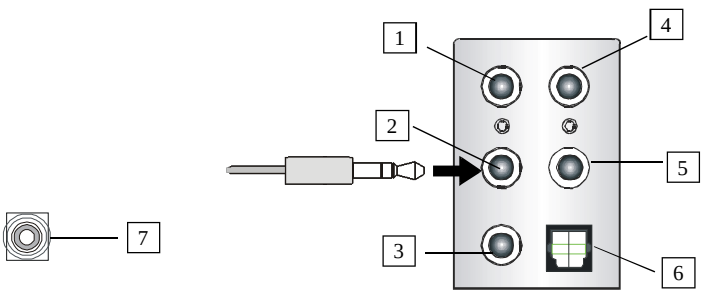
**Connecting the Speakers**

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.

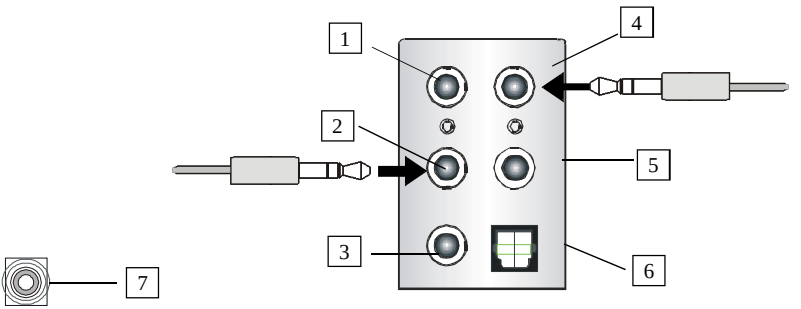
**Back Panel**




1 Line In/ Side Surround Out *(Side channels, but not function on this mode)*
2 Line Out *(Front channels)*
3 MIC
4 Line Out *(Rear channels, but no functioning in this mode)*
5 Line Out *(Center and Subwoofer channel, but no functioning in this mode)*
6 *S/PDIF Out-Optical*
7 *S/PDIF Out-Coaxial*

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

**Back Panel**

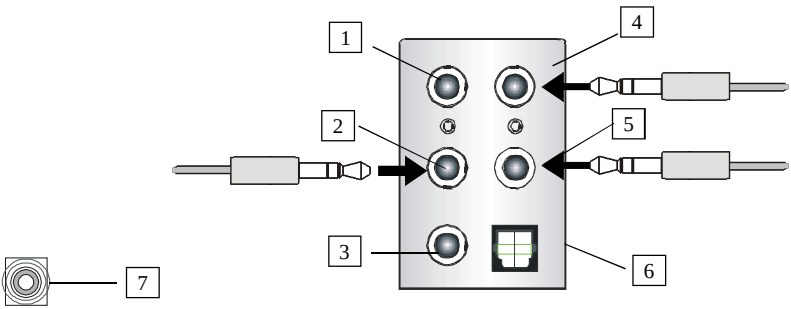



Description:
Connect two speakers to back panel's Line Out connector and two speakers to the real-channel Line Out connector.

**4-Channel Analog Audio Output**

1. Line In/ Side Surround Out *(Side channels, but not function on this mode)*
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. *S/PDIF Out-Optical*
7. *S/PDIF Out-Coaxial*

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

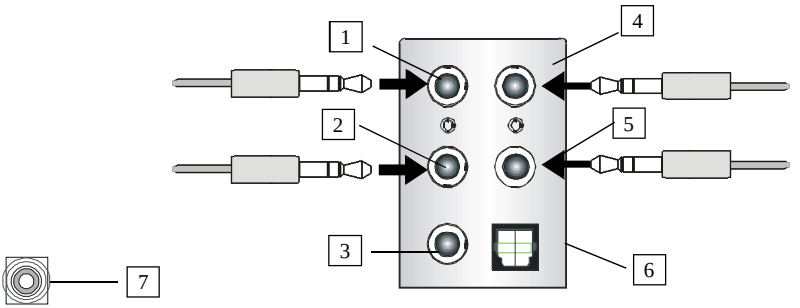



Description:
Connect two speakers to back panel's Line Out connector, two speakers to the rear-channel and two speakers to the center/subwoofer-channel Line Out connectors.

**6-Channel Analog Audio Output**

1. Line In/ Side Surround Out *(Side channels, but not function on this mode)*
2. Line Out *(Front channels)*
3. MIC
4. Line Out *(Rear channels)*
5. Line Out *(Center and Subwoofer channel)*
6. *S/PDIF Out-Optical*
7. *S/PDIF Out-Coaxial*

**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 In/ Side Surround Out *(Side channels)*
2. Line Out *(Front channels)*
3. MIC
4. Line Out *(Rear channels)*
5. Line Out *(Center and Subwoofer channels)*
6. *S/PDIF Out-Optical*
7. *S/PDIF Out-Coaxial*

# Installing the Creative Audio Driver

You need to install the driver for Creative CA0106 to function properly before you can get access to 2-, 4-, 6- or 8- channel and SPDIF audio operations. Follow the procedures described below to install the drivers for different operating systems.

## Installation for Windows 2000/XP

For Windows® 2000, you must install Windows® 2000 Service Pack4 or later before installing the driver. And for Windows® XP, you must install Windows® XP Service Pack1 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 Creative audio driver CD into the CD-ROM drive. The setup screen will automatically appear.
2. Click **Next** to enter the next page.

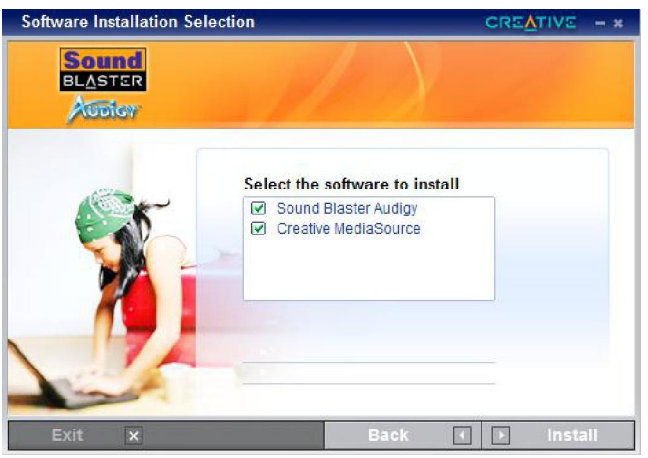



**MSI Reminds You...**
*The screens shown in this chapter may be slightly different from the latest software utility and shall be held for reference only.*

***3.*** Select the language that you needed from the scroll list .



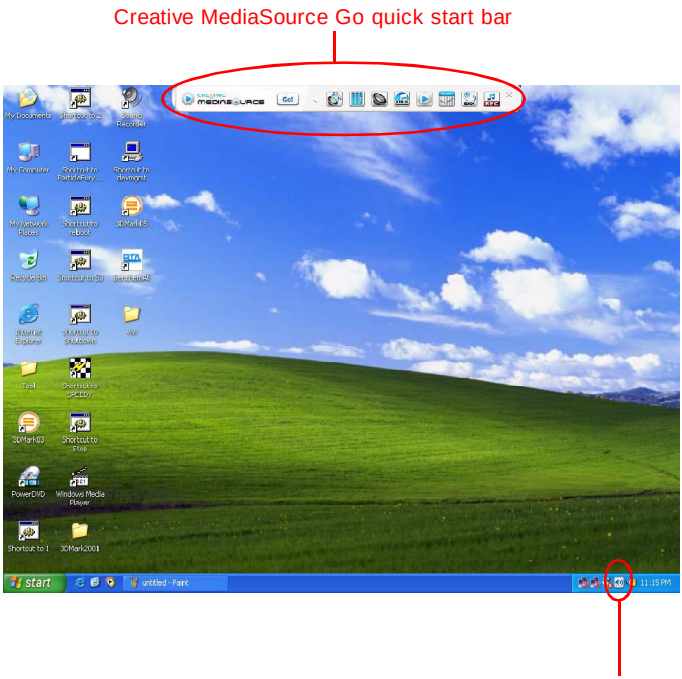

***4.*** On the next page, click **Install** to start the installation and follow the setup intructions to complete the installation.




***5.*** Finally, you have to **restart** the system on the last step .

# Software Configuration

After installing the creative audio driver, you are able to use the 2-, 4-, 6- or 8-channel and the SPDIF audio feature now. Click the creative volume control audio icon from the system tray at the lower-right corner of the screen to activate the Creative Audio Configuration. Or you can move the mouse to the top of screen and a **Creative MediaSource Go** quickstart bar will float on the desktop, simply click on each icon button to enter the configuration screen .

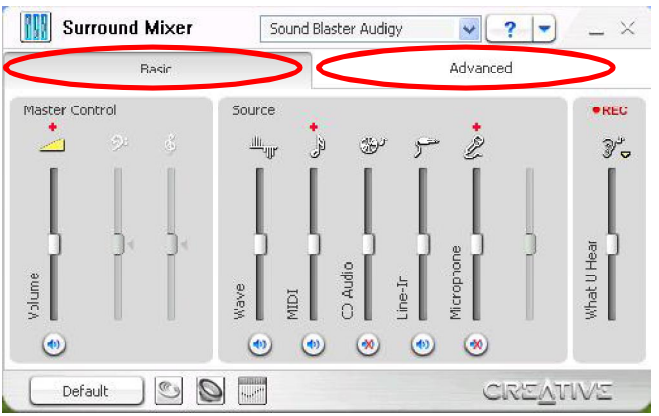


## SURROUND MIXER

Click on the surround mixer icon to enter the configuration screen.




Here you can to create the perfect listening environment. You can adjust volume levels, select input sources and even balance your speakers.




Use Creative Surround Mixer to select the device you wish to listen to or record from. It operates in two possible modes. Click the Basic Mode or Advanced Mode button to switch between the two modes:

In Basic mode, you can:

- mix sounds from various audio input sources when playing or recording.
- control volume.

In Advanced mode, you can:

- control balance and vary the loudness ratio between front/rear speakers (fader).
- control the relative loudness levels between Front Center, Rear Center and Subwoofer loudspeakers (if any).

For more information and usage details on Creative Surround Mixer, refer to its online Help.

**MSI Reminds You...**

*You can simply click on the **Default** button to load the audio volume defaults for the speakers you connected.*

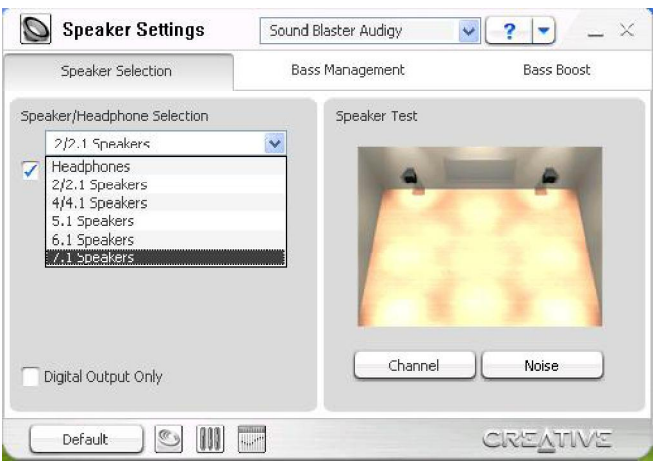
## SPEAKER SETTINGS

Click on the speaker settings icon to enter its configuration screen.




Here you can adjust your speaker configuration from one place. You can use it to select your type of speaker system, and to adjust the volume and cutoff frequency for your subwoofer.

This is the main application to use for the following tasks:




- Designating the number and configuration of speakers to use => select the speakers type that you conneted.
- Testing your speakers => click on the Channel or Noise button to test the speakers.
- Activating or deactivating Digital Output => check the Digital Output Only item to enable the Digital Output only.
- Managing bass output by selecting subwoofer crossover frequency and volume.

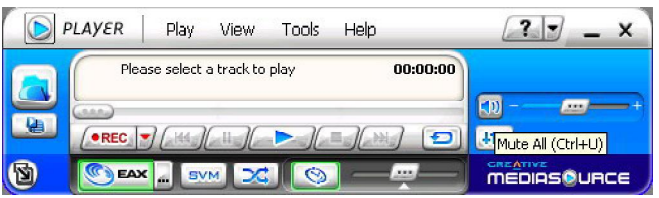
For more information and usage details on Creative Speaker Settings, refer to its online Help.

## MEDIA SOURCE PLAYER

Click on the player icon to enter its configuration screen.




MediaSource Player is the digital music center for playing, creating, organizing and transferring digital music. This is your ultimate all-in-one digital entertainment software.




With MediaSource Player, you can:

- experience immersive listening with EAX effects.
- clean up and convert your vinyl records and cassette tapes to digital formats with the integrated recorder.
- rip CDs and create high quality compressed digital audio files (up to 320 Kbps for MP3 & 160 Kbps for WMA).
- burn personalized MP3 and audio CDs with a CD-writer, and print your own CD covers.
- organize your digital music collection with a powerful, easy to use music library.
- search for tracks with an advanced Find feature that searches as you type.
- transfer tracks and files seamlessly to and from your digital audio player with AudioSync and SmartFit.
- automatically generate playlists from your music library, based on your preferences, with Smart Playlist.
- rate each track (up to 5 stars) to automatically generate playlists of songs you like/dislike, with Smart Playlist.
- automatically crossfade the end of a track with the start of the next track during playback. MP3, WMA and WAV file formats are supported.

## EAX CONSOLE

Click on the EAX console icon to enter its configuration screen.

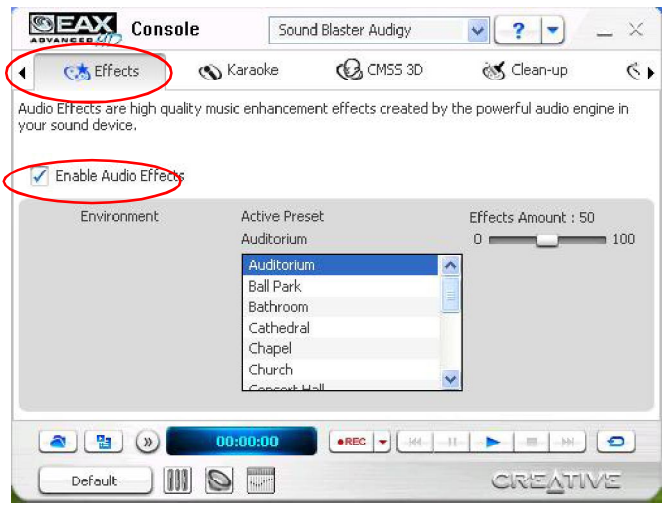



Here you can to configure the Sound Blaster Audigy processor's effects engine. These audio effects take your computer beyond home-theater quality, immersing you in sound so vivid, your imagination can almost "see" it.

Creative EAX Console consists of five sections: **Effects**, **Karaoke**, **CMSS 3D**, **Clean-up**, and **Time Scaling**.

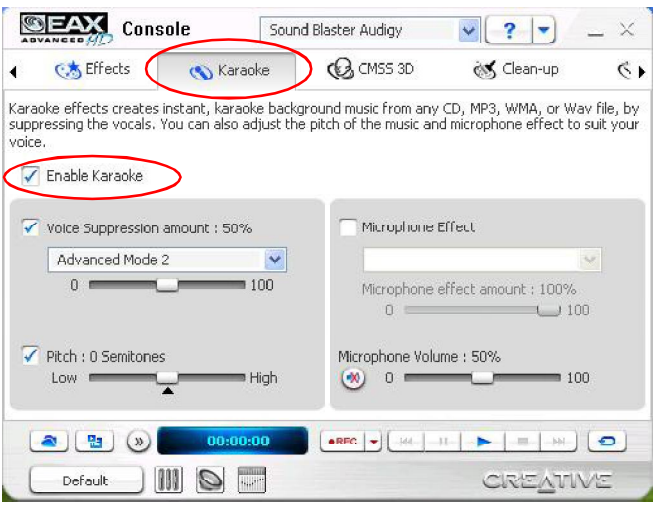
**Audio Effects: Environmental Sound Processing**

In Audio Effects, you have to check the **Enable Audio Effects** item to enable its configuration mean. Then you can choose how you want to enhance all kinds of ordinary two-channel sounds.



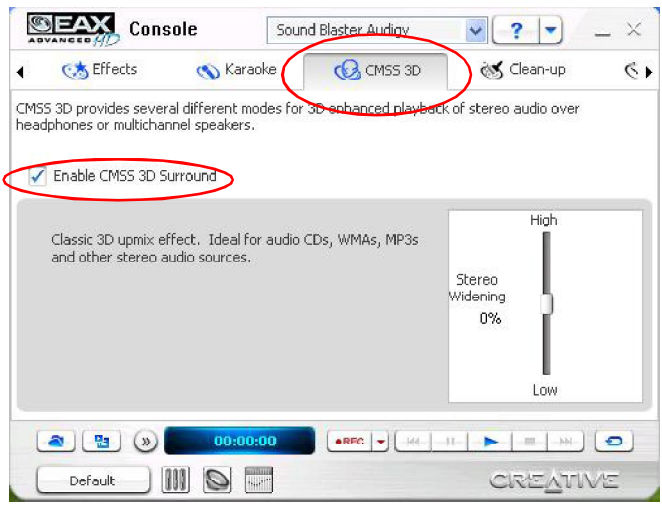
**Karaoke: Creating instant karaoke music**

First, you have to check the **Enable Karaoke** item to enable its configuraion maen. Then you can create instant karaoke background music from any CD, MP3, WMA, or WAV file by suppressing the vocals. You can also adjust the pitch of the music and microphone effect to suit your voice.



### CMSS 3D: Simulating Surround Sound

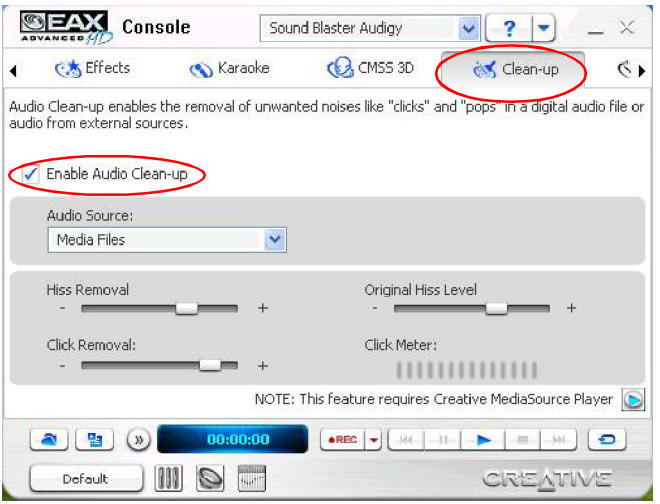
Creative MultiSpeaker Surround (CMSS) 3D makes ordinary two-channel (Left and Right Stereo) sound seem to surround you, even through only two speakers. For users with 5.1, 6.1, 7.1 multichannel speaker systems, CMSS can also simulate surround sound from ordinary stereo. This is useful for watching DVDs and VCDs, which contain only stereo soundtracks, or listening to CDs with two-channel audio. To enable the CMSS 3D configuration mean by check the **Enable CMSS 3D** item. Then you can select CMSS for multichannel audio enhancement on 4/4.1, 5.1, 6.1 or 7.1 speaker systems.




**MSI Reminds You...**
*For a 5.1-speaker system, audio for your subwoofer is processed by the speaker system.*

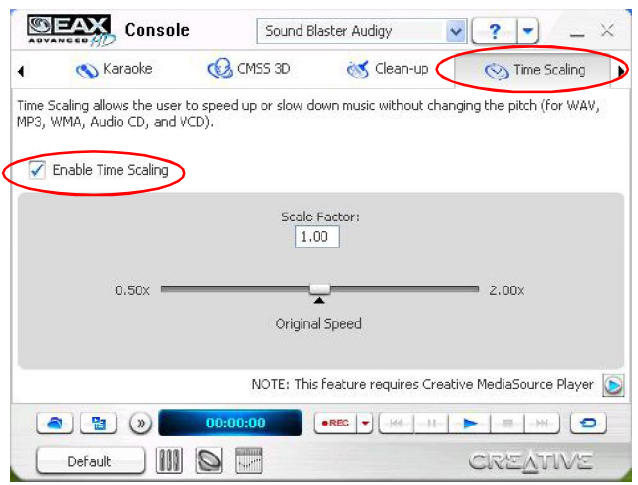
### Audio Clean-up: Removing noise and distortion

First, you have to check the **Enabled Audio Clean-up** item to enable its configuration mean. Audio Clean-up allows you to process prerecorded as well as real-time audio, in order to remove noise, click sounds and other artifacts. For example, when recording music from old vinyl records, "click" and "pop" sounds can be removed with the Clean-up feature. The Click Meter informs you whenever the noise clean-up feature is activated during recording and also how many clicks are removed.




**Time Scaling: Varying the speed of playback**

Karaoke fans and musicians may sometimes wish to slow a song down (or speed it up) to catch the lyrics or play along with the music. However, varying the speed usually also varies the pitch of the song. With the Time Scaling feature, Sound Blaster Live! 24-bit users can maintain the pitch of a song while varying the playback speed.



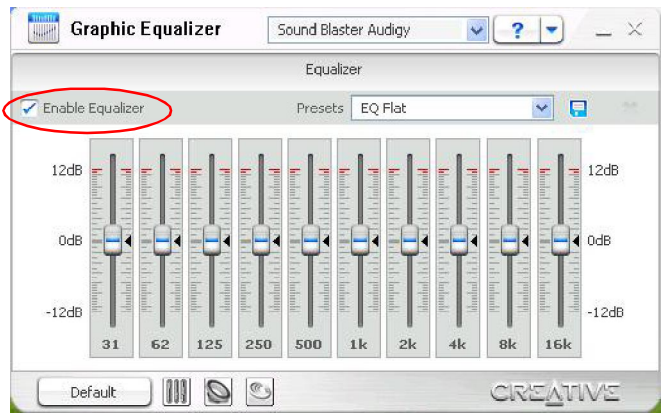

For more information and usage details on EAX ADVANCED HD, refer to the Creative EAX online Help.

## GRAPHIC EQUALIZER

Click on the player icon to enter its configuration screen.




Creative Graphic Equalizer (EQ) is designed to improve and fine-tune the audio quality of your playback. You have to check the **Enabled Equalizer** item to enable the configuraion mean. Just select any one of the factory presets, or adjust the boost or cut amount (up to 12 dB) for 10 preselected frequency bands. You can also save the settings as a custom preset once you are satisfied with the adjustments.




For more information and usage details on Creative Graphic Equalizer, refer to its online Help.

**MSI Reminds You...**
*To enter online Help for each configuration mean by click on the ? icon.*



# 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
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.
RAID 5: RAID 5 defines techniques for parity data.
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 |
| **RAID 5** | Critical data and reasonable level of performance. | Fault tolerance and better utilization of disk space. | Decreased write performance due to parity calculations. Requires at least three drives. | 3+ | 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 |

# 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. (To enable the ***SATA1/ SATA2 Primary/ Secondary Channel*** in **nVidia RAID Setup** of **Integrated Peripherals** in BIOS.)
2. Specify the RAID level, either Mirroring (RAID 1), Striping (RAID 0), Striping and Mirroring (RAID 0+1), RAID 5 or 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.6-9 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. (To enable the ***SATA1/ SATA2 Primary/ Secondary Channel*** in **nVidia RAID Setup** of **Integrated Peripherals** in BIOS.)
2. Specify the RAID level, either Mirroring (RAID 1), Striping (RAID 0), Striping and Mirroring (RAID 0+1), RAID 5 or 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.6-7 for details.)
4. Initialize the NVRAID Array Disks.

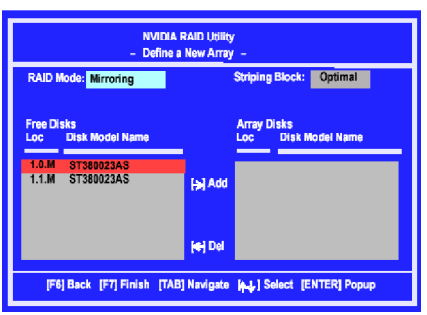
## Setting Up the NVRAID BIOS

Be sure to enable the ***SATA1/ SATA2 Primary/ Secondary Channel*** in **nVidia RAID Setup** of **Integrated Peripherals** in BIOS 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***.



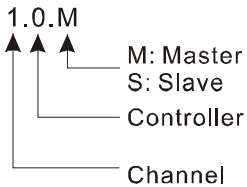
**Understanding the "Define a New Array" Window**

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 2, Controller 0, and the drive is set to Master. The following is a list of all possible combinations:

**Serial ATA**

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

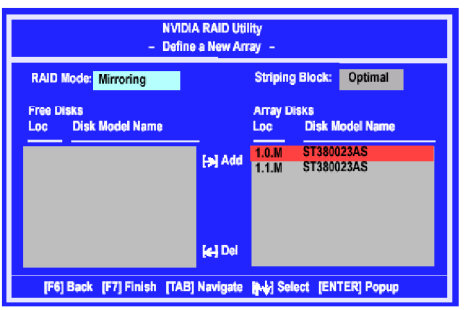
**Using the Define a New Array Window**
If necessary, press the tab key to move from field to field until the appropriate field is highlighted.

**• 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], [RAID5], [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,

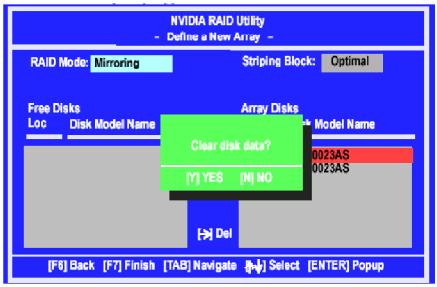
1. Tab to the **Free Disks** section. The first disk in the list is selected.
2. Move it from the Free Disks block to the Array Disks block by pressing the right arrow key (-->). The first disk in the list is moved, and the next disk in the list is selected and ready to be moved.
3. Continue pressing the right-arrow key (<-- ) until all the disks that you want to use as RAID array disks appear in the **Array Disks** block.



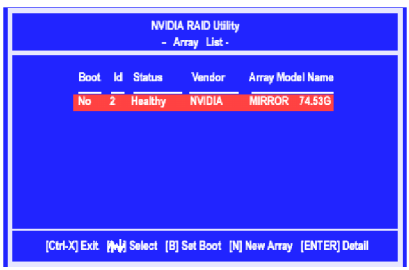

It shows that two disks have been assigned as RAID1 array disks in the figure above.

**Completing the RAID BIOS Setup**

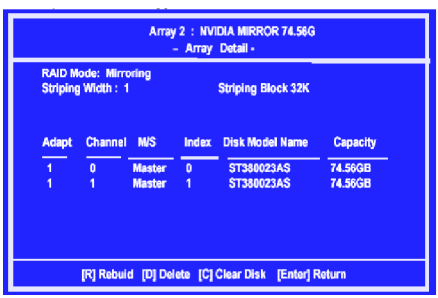
1. After assigning your RAID array disks, press **F7.** The Clear disk data prompt appears.




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.



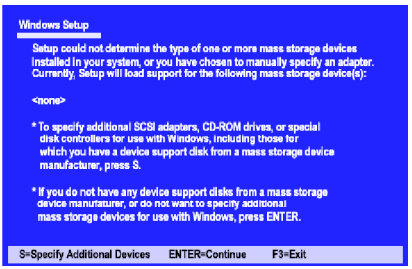

3. Use the arrow keys to select the array that you want to set up, then press **Enter.** The **Array Detail** window appears.




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 p6-9.

## 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:

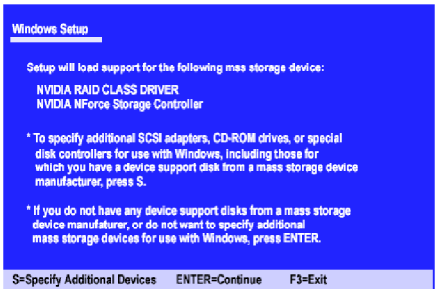



**MSI Reminds You...**

*Please follow the instruction below to make an nVIDIA Serial ATA RAID driver for yourself.*

1. *Insert the MSI CD into the CD-ROM drive.*
2. *Click the "Browse CD" on the Setup screen.*
3. *Copy all the contents in the* ***:\\nVidia \System \C51+CK804 \IDE \Win XP or Win 2K \SATARAID*** *to a formatted floppy disk.*
4. *The driver disk for nVIDIA RAID controller 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. After Windows XP is completely installed, it is recommended that you install the the RAID management tool.

**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.*

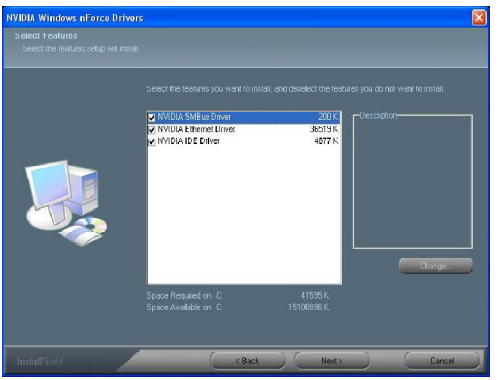
# NVIDIA RAID Utility Installation

## 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 NVIDIA nForce Drivers installation 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.

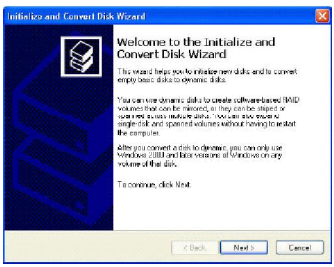
**MSI Reminds You...**
***You must install the NVIDIA IDE driver in order to enable NVIDIA RAID.*** *If you do not install the NVIDIA IDE driver, NVIDIA RAID will not be enabled.*

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.

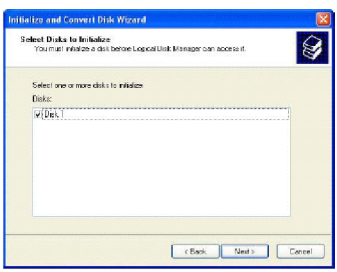
## Initializing and Using the Disk Array

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

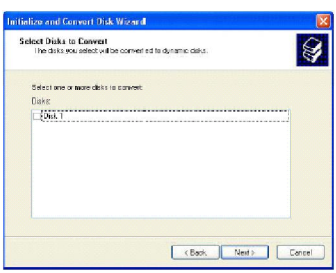
1. Launch Computer Management by clicking “Start” --> “Settings” --> “Control Panel” then open the “Administrative Tools” folder and double click on “Computer Management”.
2. Click “Disk Management” (under the “Storage” section). The Initialize and Convert Disk Wizards appears.



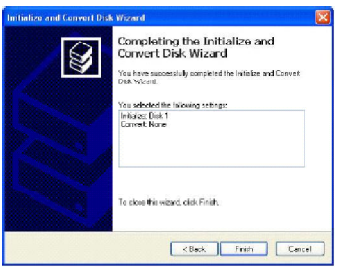

3. Click **Next**. The Select Disks to Initialize window appears. The disks listed depend on how many arrays you have configured.



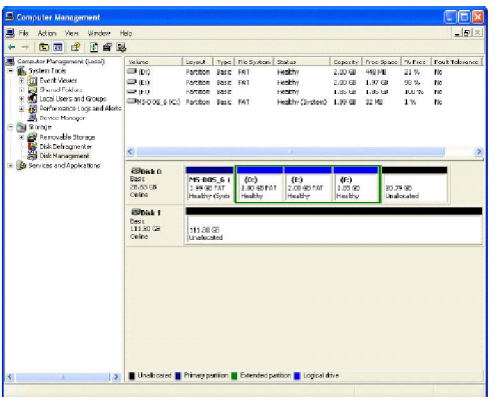

4. Click **Next**. The Select Disks to Convert window appears.



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.

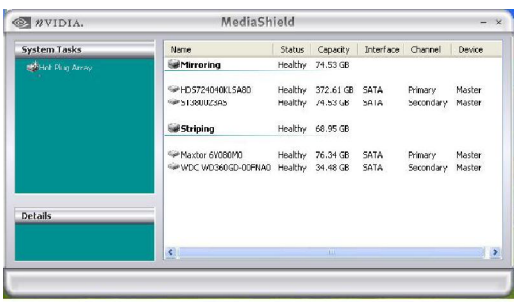
# RAID Drives Management

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
- **Creating RAID Arrays**
- **Deleting a RAID Array**
- **Morphing From One RAID Array to Another**
- **Hot Plug Array**
- **Initializing a RAID Array**
  - Erase the data on the array by writing all zeros to the sectors of each hard disk.
- **Rebuilding a RAID Mirrored Array**
  - Rebuild a broken mirrored array
  - Watch the progress of rebuilding an array
  - Only applies to RAID 1, RAID 0+1, and RAID 5 arrays
- **Synchronizing a RAID Array**
  - Rebuild the redundancy in RAID 1 or RAID 0+1 arrays (copy the data to the redundant disk—the same operation as rebuilding)
  - Rebuild the parity in RAID 5 arrays

## 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\C51+CK804\IDE\Win2k or XP\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.*

## Setting Up a Spare RAID Disk

You can designate a hard drive to be used as a spare drive for a RAID 1, RAID 0+1 or RAID 5 array. 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**

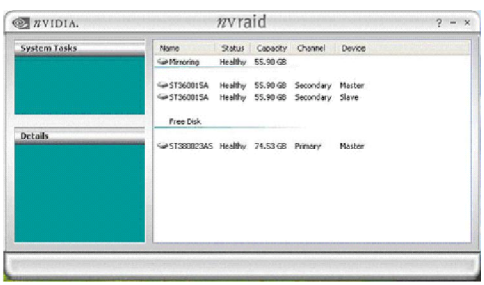
A dedicated free disk is a disk that is assigned to a RAID 1, RAID 0+1 or RAID 5 array and that disk is used by that array only when needed, for example during a system crash where a RAID mirrored drive is broken. The dedicated disk can be used only by the array that it is assigned to and not by any other array, unlike a free disk which can be used by any available RAID 1, RAID 0+1 or RAID 5 array.

Note: You must have at least two RAID arrays to use this feature.

### 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.

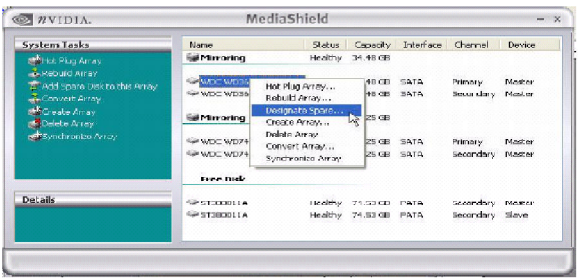


**Assigning a Dedicated Disk**
To mark a disk as dedicated, or reserve it for use by a specific array,

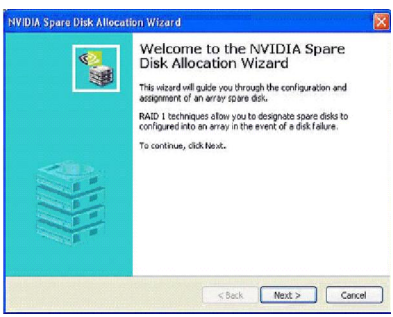
**Step 1: Mark the Disk as a Free Disk**
1. Enter the system BIOS setup and make sure that the drive that you want to mark as free is RAID enabled.
2. Boot into Windows and run the NVRAIDMAN program.
If the disk is not part of any RAID array, then it will appear under the Free Disk section of the RAID GUI.

**Step 2: Dedicate the Free Disk to an Array**
While running NVRAIDMAN, dedicate the free disk to an array by doing the following:

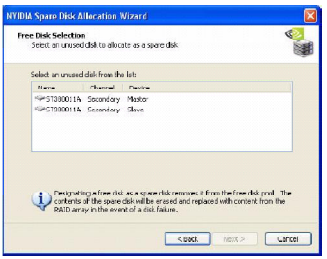
1. Right click one of the two Mirrored arrays as shown below.




2. Select **Designate Spare** from the menu to launch the Spare Disk Allocation Wizard.

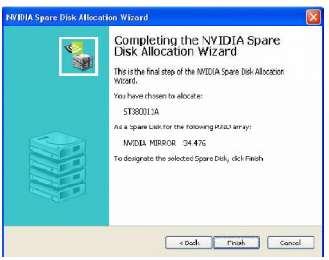


3. Click **Next**.
The RAID Array Selection page appears.

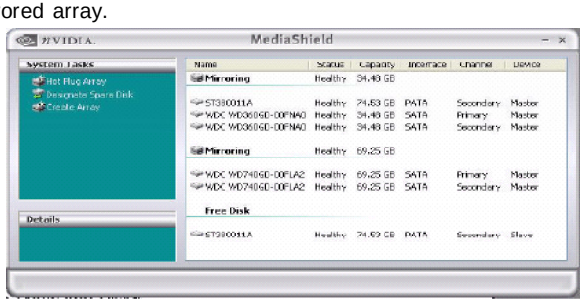



4. From the Free Disk Selection page, select one of the two free disks available. This would be the disk that will be designated to the mirror array.

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

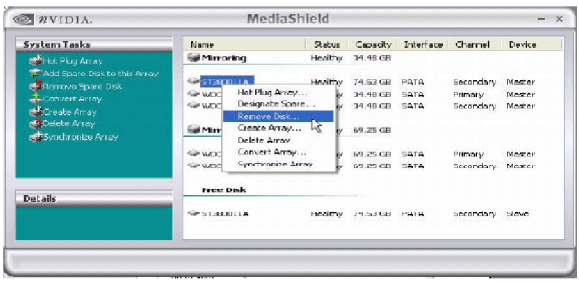



6. Click **Finish**.
As shown in figure below, the ST380011A drive is now a dedicated free disk in the mirrored array. If a system crash occurs that causes any of the two WD360GD drives to fail, the ST380011A hard drive will take over and be used in the newly formed mirrored array.



**Removing a Dedicated Disk**

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 “Remove Disk...” to remove it. In the previous example, simply right click on the ST380011A drive and select “Remove Disk...”. as shown in the screen shot below:



## Morphing From One RAID Array to Another

In a traditional RAID environment, when a user wants to change the current state of a disk or a current array to a new RAID configuration, the process of reconfiguring the new array involves multiple steps. The user must back up the data, delete the array, re-boot the PC, and then reconfigure the new array.
NVIDIA RAID allows the end user to change the current state of the disk or array to another with a one-step process called .Morphing.. This section describes the NVIDIA Morphing process and explains how to use Morphing to convert from one RAID array type to another.

### General Morphing Principles

NVIDIA RAID includes extensive support for morphing, a process of converting from one RAID mode to another RAID mode.

### General Requirements and Limitations

• The new array capacity must be equal to or greater than the previous array.
For example, it is possible to morph from a RAID 1 array to a RAID 0 array as long as the RAID 0 array is the same size as (or larger than) the RAID 1 array.
• You can't morph
- To or from a JBOD (Spanning) array
- From RAID 1 to RAID 1
- From RAID 0+1 to RAID 1
- From RAID 5 to 1

### Specific Morphing Requirements

The following table lists the disk requirements for a new RAID array for various morphing combinations.

| From | To | New Array Disk Requirements |
|---|---|---|
| **RAID 0** | **RAID 0** | m > n<br>Number of disks in the new array must be greater than the original array. |
| | **RAID 1** | m =2, n =1<br>RAID 1 array must include two disks, converted from a one disk RAID 0 array. |
| | **RAID 0+1** | m >= 2 x n<br>Number of RAID 0+1 disks must be equal to or greater than twice the number of RAID 0 disks. |
| | **RAID5** | m >= n+1 |
| **RAID 1** | **RAID 0** | No additional restrictions. |
| | **RAID 1** | **** Not a valid combination **** |
| | **RAID 0+1** | No additional restrictions. |
| | **RAID 5** | m >= 3 |

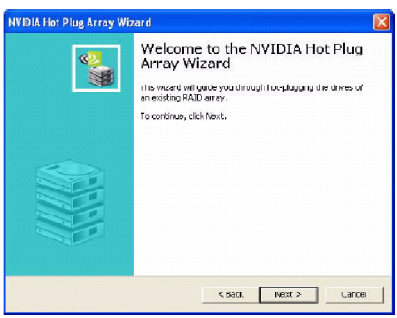
| From | To | New Array Disk Requirements |
|---|---|---|
| RAID 0+1 | RAID 0 | m >= n2<br>Number of RAID 0 disks must be equal to or greater than half the number of RAID 0+1 disks. |
| | RAID 1 | ** Not a valid combination ** |
| | RAID 0+1 | ** Not a valid combination ** |
| | RAID 5 | m >= (n/2 + 1) |
| RAID 5 | RAID 0 | m >= n - 1 |
| | RAID 1 | ** Not a valid combination ** |
| | RAID 0+1 | m >= 2 x (n -1) ; where m is an even number of disks. |
| | RAID 5 | m >= n |

## Hot Plug Array

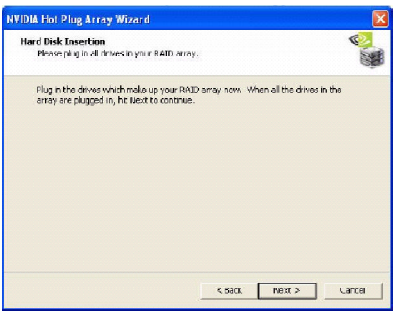
With respect to RAID, hot plugging is the ability to add a disk to a system safely and without causing problems for the RAID software. For example, when a drive in a mirrored array fails, the user can launch the Hot Plug Array Wizard which instructs the user as to when a drive can be safely added to the system. As soon as the drive is added, the user can then finish running the RAID wizard and the drive becomes usable by the system. Hot Plug Array allows the user to add or remove an entire array without degrading the array in the process.

NVRAIDMAN can be used to hot plug a RAID disk. To hot plug a disk, simply do the following:

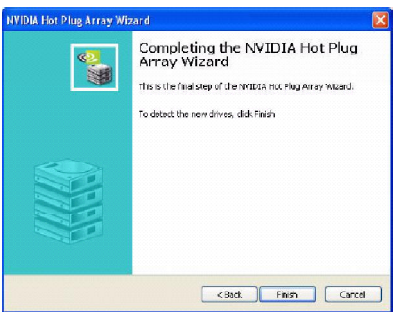
**1** Launch NVRAIDMAN and click on “Hot Plug Array” and the following screen shot will appear:



**2** Click **Nex**t and the following screen shot will appear:




**3** Connect the RAID disk that you want to use with any given RAID array.
**4** Click **Next** and the following screen shot will appear:

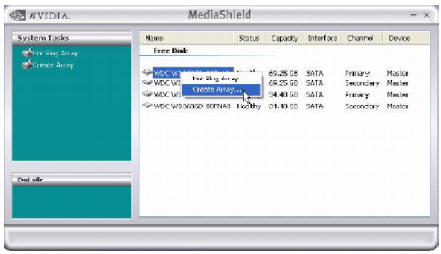



**5** Click **Finish**.

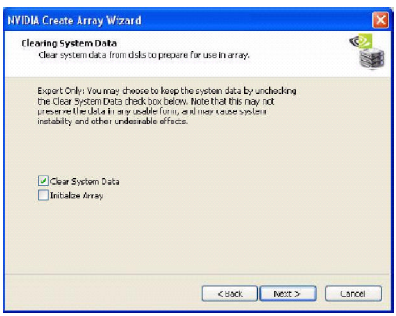
## Initializing a RAID Array

Initializing a RAID array erases all the data that is stored on that array, and writes all zeros to the disks. Initialization of newly configured RAID arrays is recommended to ensure consistency and reliable performance on any supported fault tolerant array such asRAID 5, RAID 0, and RAID 0+1. Use this feature only if you are absolutely sure that you want to wipe out all the data on *that array*.
Initialization of a fault tolerant array can only be done when the array is being created. To initialize an array, perform the following steps:
**Note:** In this example, a mirror array is initialized.

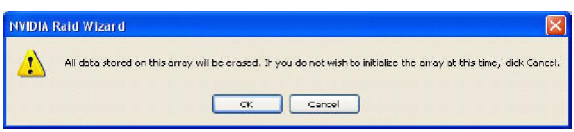
**1** From the NVRAIDMAN window, right click on any available free disk and select **Create Array** as show in Figure below.



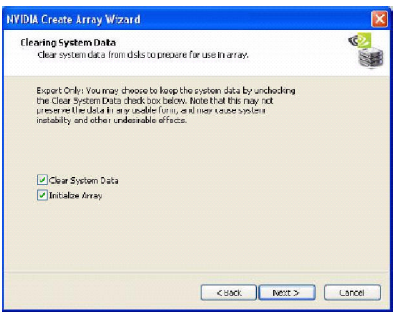

**2** The Create Array Wizard opens. Follow the Wizard to create a Mirror array.
**3** At the Create Array Wizard Welcome screen, click **Next**.
**4** At the RAID Array Selection page, make sure that RAID Mode is set to "**Mirroring**" and Stripe Size is set to its default value of 64K, then click **Next**.
**5** At the Free Disk Selection page, select the two drives that you want to Mirror and click **Next**.
**6** Click **Next** again and the following screen shot will appear:



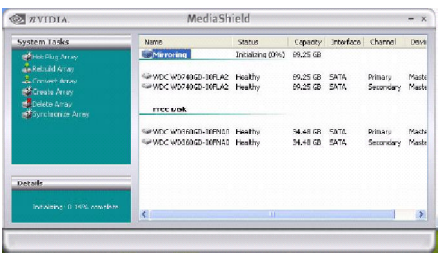

**7** Check "Intialize Array" and then click **Next**. The Initialization Warning dialog appears.



8 Click **OK**. The Clearing System Data screen appears again with the Initialize Array check box checked as shown below.




**9** Click **Next**, then click **Finish** at the Completing the NVIDIA Create Array Wizard screen. The NVRAIDMAN windows shows the created RAID array as shown below.

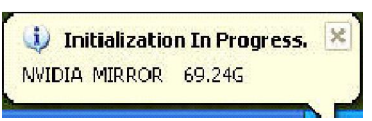



**The Initialization Process**

As you can see from the screen shot above, the initialization process has started and it will be completed in a short period of time. As soon as the Initialization process starts, a popup window similar to the following will appear:




followed by the following pop-up window:

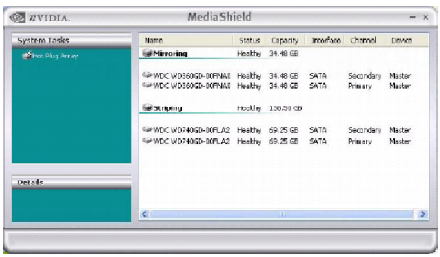


## Rebuilding a RAID Array

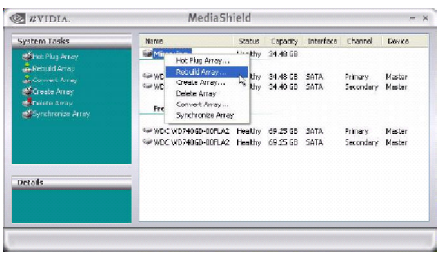
Rebuilding is the process of restoring data to a hard drive from other drives in the array. This applies only to fault tolerant arrays such as RAID 1, RAID 0+1, as well as a RAID 5. For example, assuming you have a three disk RAID 5 array, and one of the drives fail, then you need the lost data on the newly added drive.

### Rebuilding Instructions

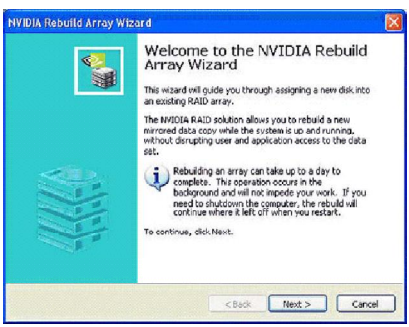
After creating a mirrored array, you can rebuild the array using the following steps:
**1** Go to Windows and run the NVIDIA RAID Management utility.
The picture below shows an example of a system with one mirrored array and two free disks.



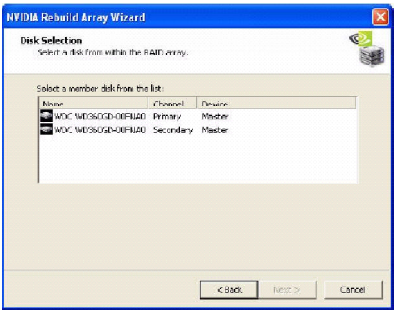

2. Right-click on Mirroring. The popup menu appears.



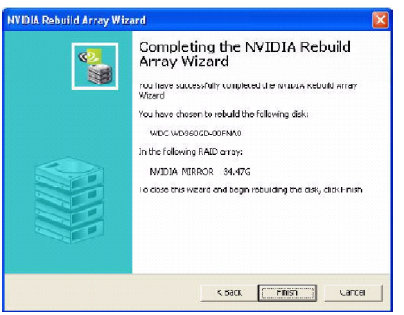

3. From the popup menu, click **Rebuild Array**. The NVIDIA Rebuild Array Wizard appears.



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.



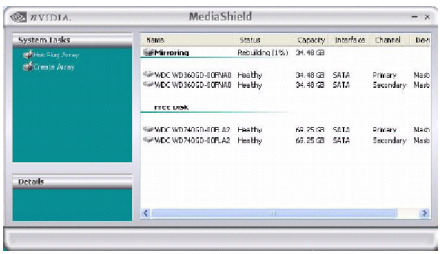

6. Click **Finish**. The array rebuilding starts after a few seconds, and a small pop-up message appears towards the bottom right corner of the screen as shown in the figure below.




When the rebuilding process is finished you will see the pop up box shown in 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***

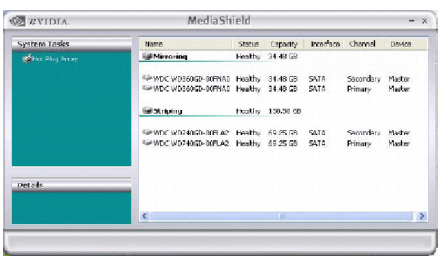
The rebuilding process is very slow (it can take up to a day) and occurs in the background so as not to affect the performance of the system.

• ***Rebuilding Applies Only to RAID 1/ RAID 0+1 or RAID 5 Arrays***

Rebuilding an array works only when using RAID 1 , RAID 0+1, or RAID 5. Rebuilding does not apply to RAID 0 and JBOD arrays.

• ***Rebuilding applies to a degraded fault tolerant array***

You can rebuild a degraded mirrored array using any available Free Disk or Dedicated Disk. For example, Figure below shows a mirrored array using two 34.48 GB drives 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 Array” on p.6-22, except when prompted to select a disk, choose one of the two available free disks.

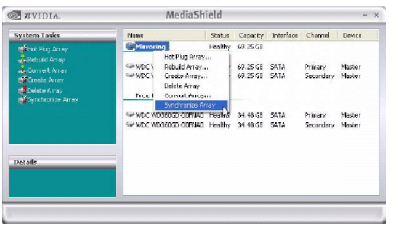
## Synchronizing a RAID Array

Synchronizing an array will force a rebuild of redundancy or parity. The operation is applicable to any fault tolerant array such as RAID 1, 0+1 and RAID 5.

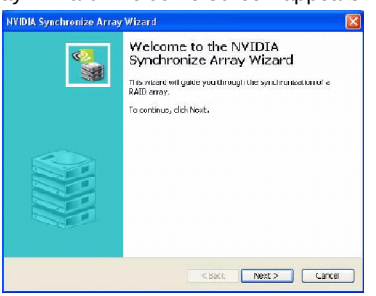
- For RAID1 and RAID 0+1, “sync” results in copying the data to the redundancy disk,
- For RAID 5, “sync” results in rebuilding the parity

To sync an array, do the following (This example assumes you have already created a fault tolerant array such as RAID 1):

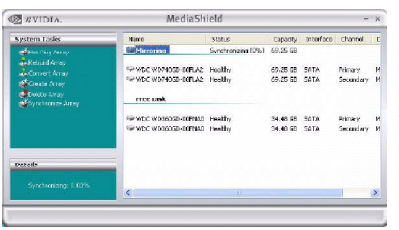
1 Right click on “Mirroring” and select **Synchronize Array** as shown in Figure below.




1 The Synchronize Array Wizard Welcome screen appears.




2 Click on **Next** and then click **Finish** at the Wizard Completion screen. The NVRAIDMAN window indicates that the array is synchronizing, as shown in Figure below.




As you can see from the screen shot above, the synchronization process has started and it will be completed in a short period of time.

## Usind Disk Alert (for RAID 1)

The RAID manager application includes a disk alert feature that provides a graphical indication of the status of the hard disks in the system.
When the RAID manager application detects a failure condition of an attached drive, a pop-up box appears in the clock area of the Windows system tray. Click the pop-up box to view the manufacturer-provide bitmap image of the system motherboard. The image shows the hard drive connector ports and provides a visual indication of the location and status of the drives as follows:

• ***Red rectangle:*** A red rectangle will flash around the port connector that is attached to the failed drive.

• ***Green rectangle:*** Ports that have a drive attached, and are in a healthy state, are indicated with a green rectangle around the port connector.

• ***Yellow rectangle:*** Ports that have a drive attached, are members of a failed RAID array, but are not the cause of the failure have a yellow rectangle around the port connector.

Unconnected ports have no visual indication.

7

# Silicon Image SATARAID Introduction

Silicon Image's SATARAID software provides Serial ATA RAID 0 (Striping) , RAID 1 (Mirroring) and concatenation functionality to enhance the industry's leading PCI-to-SATA host controller products. Two major challenges facing the storage industry today are keeping pace with the increasing performance demands of computer systems by improving disk I/O throughput and providing data accessibility in the face of hard disk failures while utilizing full disk capacity. With Silicon Image Serial ATA host controller and SATARAID, both of these problems are solved. SATARAID software provides a Graphical User Interface (GUI) for easy-to-use configurations of the RAID Groups.

**MSI Reminds You...**
*All the information/volumes listed in your system might differ from the illustrations in this appendix.*

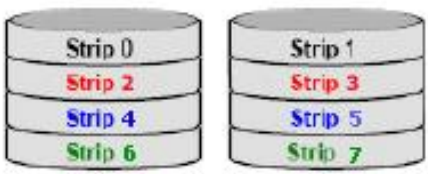
# Introduction

## RAID - Redundant Array of Independent Disks

RAID technology manages multiple disk drives to enhance I/O performance and provide redundancy in order to withstand the failure of any individual member, without loss of data. SATA RAID provides two RAID Set types, Striping (RAID 0) and Mirroring (RAID 1).

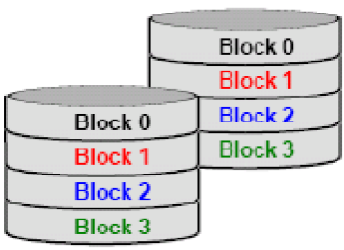
## RAID 0 (Striping)

Striping is a performance-oriented, non-redundant data mapping technique. While Striping is discussed as a RAID Set type, it actually does not provide fault tolerance. Striping arrays use multiple disks to form a larger virtual disk.




## RAID 1 (Mirroring)

Disk mirroring creates an identical twin for a selected disk by having the data simultaneously written to two disks. This redundancy provides instantaneous protection from a single disk failure. If a read failure occurs on one drive, the system reads the data from the other drive.

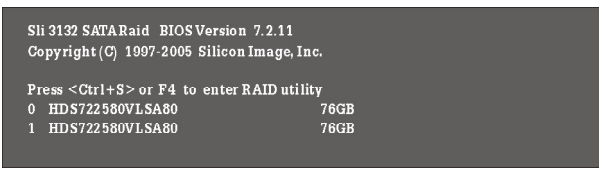



## Concatenation

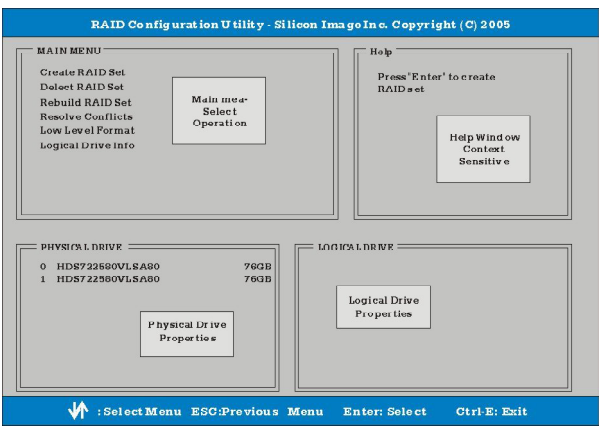
Concatenation provides a method for combining drives of different sizes into one large disk

## Creating and Deleting RAID sets with BIOS Utility

Creating and deleting RAID sets must be performed in the BIOS for operating systems other than Windows 2000 and XP.For 2000 and XP, RAID sets can be created and managed by either the BIOS utility or the SATARAID GUI.
Be sure to enable the ***Silicon RAID Controller*** of **Integrated Peripherals** in BIOS before configuring the silicon BIOS. After that press F10 to save the configuration and exit. During boot up, a screen similar to that below will appear for about 5 seconds. Press CTRL+S or the F4 key to enter the BIOS RAID utility.




The RAID Utility menu screen will be displayed. A brief description of each section is presented on the next page.




### Main Menu

The Main Menu in the upper left corner is used to choose the operation to be performed. The selections are:
Create RAID set
Delete RAID set
Rebuild RAID 1 set
Resolve Conflicts
Low Level Format
Logical Drive Info

***Create RAID set*** is used to create a new legacy RAID Set or for allocating legacy spare drives.
***Delete RAID set*** is used to delete a legacy RAID Set or to deallocate a legacy spare drive.
***Rebuild RAID 1 Set*** is used to initiate the rebuild of a RAID 1 set after, for example, a drive in the Group has been replaced.
***Resolve Conflicts*** is used to automatically find the member drives of a RAID set which has been disrupted (physical drives
swapped around, for example) and restore the Set to proper operation.
***Low Level Format*** allows a single drive to have its data completely wiped out. Drives assigned to Sets or allocated as spares
cannot be low level formatted.
***Logical Drive Info*** shows the current configuration of each RAID set, allocated spare, and unallocated physical drive attached
to the SATA host adapter.
These operations are detailed in the pages that follow.

**Help Window**

This window displays context-sensitive help and status messages.

**Physical Drive Information**

This window displays the model number and capacities of the drives physically attached to the SATA host adapter.

**Logical Drive Information**

This window displays all logical drives connected to the controller. The upper part lists RAID sets and JBOD drives reported to the system BIOS. The lower part lists spare drives, reserved drives, conflict drives, and invalid drives not reported to the system BIOS.

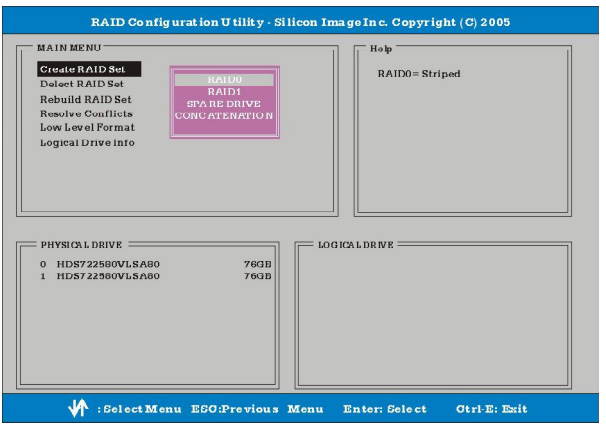
**Command Line**

The bottom line of the display lists the currently active command keys:
Up and Down arrows select the menu item or action
ESC takes the user to the previous menu
Enter selects the highlighted choice
Ctrl-E exits the utility
Other keys may be active depending upon the currently selected action.

## Creating RAID Groups

As previously discussed, the Silicon Image SATA host adapter supports RAID 0, 1, and Concatenation configurations. The selection of the RAID level to be used should be based upon factors including performance, data security, and number of drives available. It is best to carefully consider the long-term role of the system and plan the data storage strategy appropriately.Silicon Image has made the creation of RAID sets very simple. They can be created either automatically or to allow the greatest flexibility, manually.

1. Select “Create RAID set”
2. Choose a RAID 0 Striped, a RAID 1 Mirrored, or a Concatenation combination set.



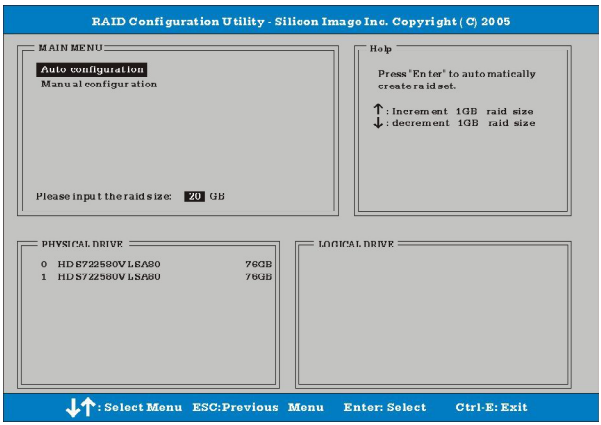

3. Select “Automatically” or “Manually configuration” of the RAID Set.



4. If manual configuration is selected, the chunk size of RAID Sets can be selected.

5. If auto configuration is selected, BIOS will select RAID member drives automatically.

6. Select RAID set size with ↑ and ↓ keys.




7. After the RAID set size is set, the message “Are You Sure?” will display before completing the configuration. Answer “N” to abort the creation of the new RAID set, or “Y” to proceed with the RAID set creation.

8. RAID sets can be created in both BIOS and in the SATARaid GUI. If you have excess capacity left on your hard drives after creating a RAID set in the BIOS, you can later go to the SATARaid GUI to create additional logical drives that fully utilize the capacity on all your hard drives.

## Creating Spare Drive

If there is a RAID 1 set, spare driver can be created. The spare drive can be allocated to the RAID 1 set in the event of a failure of one of the drives in the RAID 1 set.

1. To create a spare drive for RAID 1 set, Select “Create RAID set”
2. Select “Spare Drive” and press Enter.
3. Select spare drive from the physical drive list and press Enter.
4. Select spare drive size with ↑ and ↓ keys.
5. After the spare drive size is set, the message “Are You Sure?” will display before completing the configuration. Answer “N” to abort the creation of the spare drive, or “Y” to proceed with the spare drive creation.

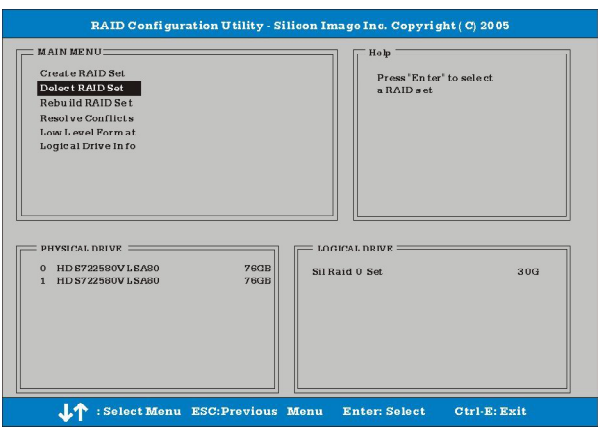
## Creating Concatenation

Since BIOS no longer reports non-RAID drives to the system BIOS, if a non-RAID boot drive or data drive is desired, a Concatenation can be created so BIOS will report it to the system BIOS.

1. To create a Concatenation, Select ”Create RAID set”
2. Select “Concatenation” and press Enter.
3. Select Concatenation drive from the physical drive list and press Enter.
4. Select Concatenation size with ↑ and ↓ keys.
5. After the Concatenation size is set, the message “Are You Sure?” will display before completing the configuration. Answer “N” to abort the creation of the Concatenation, or “Y” to proceed with the Concatenation creation.

## Deleting RAID Groups, Spare Drive, and Concatenation

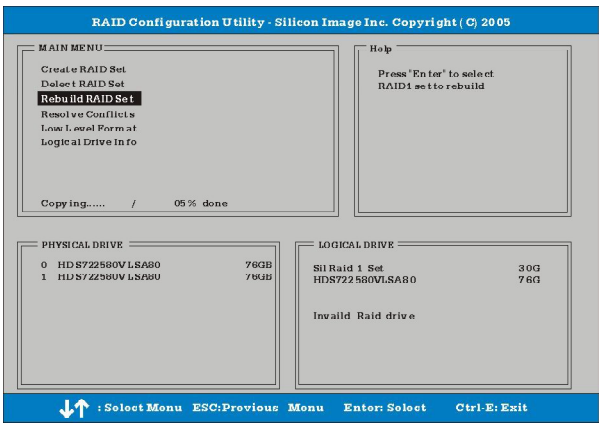
1. To remove one or more RAID sets, spare drives, and Concatenation, select “Delete RAID set”
2. Select the desired item to delete from the logical drive list and press Enter.
3. Press “Y” when asked, “Are You Sure?”
4. The drives will be returned to the selection of logical drives from which a new RAID set can be created.



## Rebuild RAID 1 Set

This menu selection is used to initiate the copying of data from an existing drive to a replacement drive that has been installed in a RAID 1 set after the failure of one of the members.

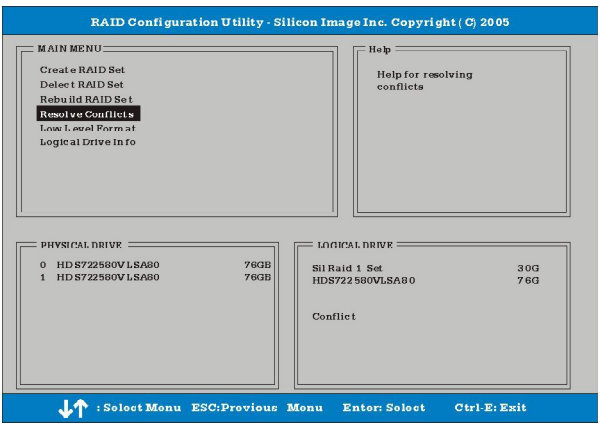
1. Select “Rebuild RAID 1 set”
2. Select the desired set and press Enter.
3. Press “Y” when asked, “Are You Sure?”
4. The set will be rebuilt. The status of the rebuild is displayed in the MAIN MENU window.




## Resolving Conflicts

When a RAID set is created, the metadata written to the disk includes drive connection information including the channel on the host adapter to which it is connected. If after a disk failure the replacement disk was previously part of a RAID set or used in another system, it may have conflicting metadata, specifically in reference to the drive connection information. If so, this will prohibit the RAID set from being either created or rebuilt. In order for the RAID set to function properly, this old metadata must be first overwritten with the new metadata. To correct this, select “Resolve Conflict” and the correct metadata, including the correct drive connection information; will automatically be written to the replacement disk.

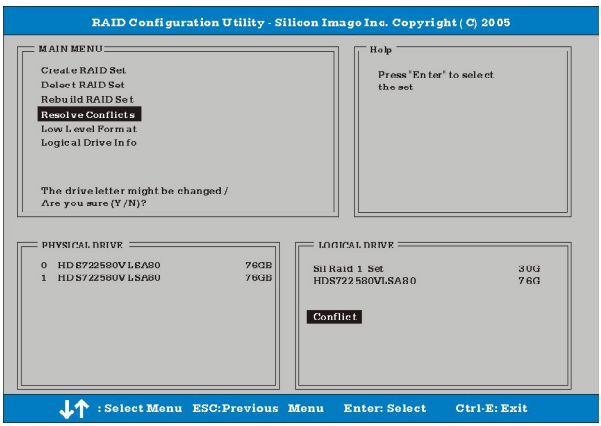
1. Select “Resolve Conflicts” and press Enter.




2. Select the “Conflict” entry in the Logical Drive Status window and press Enter.



3. Note that some conflict resolutions may result in the drive letter assignment changing; for example the RAID set may have been drive D: but after the conflict resolution, it may become drive E. Be aware of this when performing a conflict resolution. To maintain the same drive lettering, the SATA cables connected to the drives may need to be swapped, or in the case of a SATA-based removable drive unit, the order of the drives within the chassis made need to be changed.
Press 'Y' to accept the change and resolve the conflict.



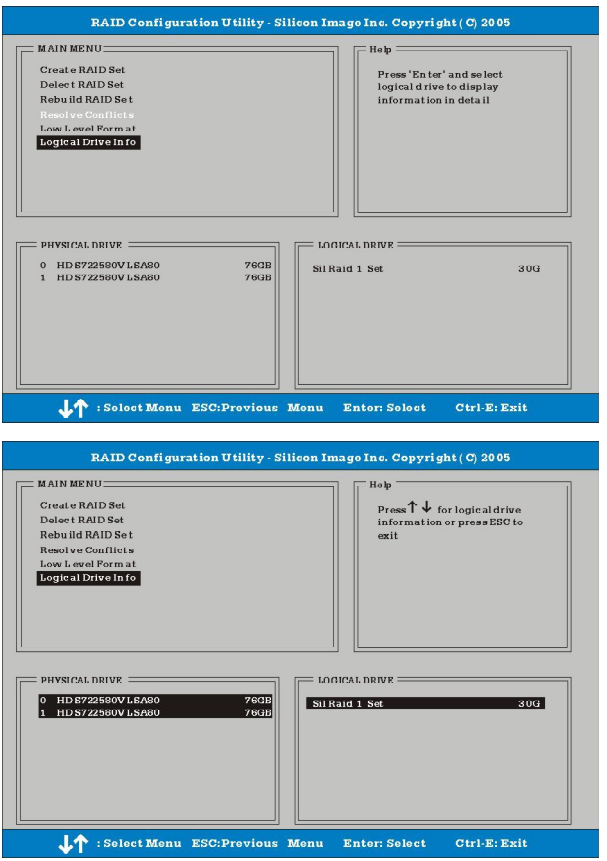

4. The conflict will be resolved. The RAID Set will appear in the Logical Drive window.

## Low Level Formatting

The Low Level Format menu selection allows the complete erasure of data on a hard drive. This is not an action, which typically needs to be performed as formatting the drive under Windows is usually sufficient to prepare the drive for use.

## Logical Drive Information

This menu item allows the display of the assignment of physical drives within a logical set (RAID set, RAID 1 spare, or unassigned). It is a display-only function. Use the up and down arrow keys to scroll between the drives in the Logical Drive Properties window. Press the ESC key when done viewing logical drive information.

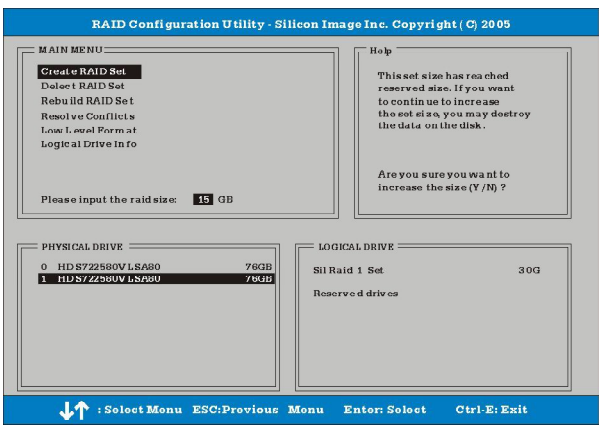


## Reserved Drive and Setting Size for RAID Set, Spare Drive, or Concatenation

Once a physical drive has been used to create a RAID set, spare drive, or Concatenation by BIOS utility, BIOS saves user selected set or drive size in the reserved area of the physical drive. There is no way to remove the reserved area information even after the user deletes the set or drive. For this reason, after a set or drive is deleted, BIOS recognizes the physical drive as a reserved logical drive and it will not report the drive to the system BIOS.

When user selects to create a RAID set, spare drive, or Concatenation, he or she has to select size for the set or drive. BIOS will set a default size for it and user can use the ↑ and ↓ keys to change the size. If the physical drive has never been used to create a set or drive by the BIOS before, the full size of the physical drive will be set as default size. Otherwise, BIOS will set default size to the size it saved in the reserved area of the physical drive before.

If the user wants to increase the default size, BIOS will display a warning message in the help window and for user's response
before changing the default size.



# Installing the RAID Driver (For bootable RAID array)

## Install Driver in Windows XP / 2000

† **New Windows XP / 2000 Installation**

The following details the installation of the drivers while installing Windows XP / 2000.

1. Start the installation:
   Boot from the CD-ROM. Press F6 when the message "Press F6 if you need to install third party SCSI or RAID driver" appears.
2. When the Windows XP/2000 Setup window is generated, press <S> key to specify an Additional Device(s).
3. Insert the driver diskette ***Silicon Image RAID Driver For Win2K/XP*** driver into drive A: and press <Enter>.




**MSI Reminds You...**

*The Silicon Image Sil 3132 SATARAID Driver Installation Disk should be accompanied in the mainboard package. You may make the Serial ATA RAID driver by yourself by following the instruction below.*

1. *Insert the MSI CD into the CD-ROM drive.*
2. *Click the "Browse CD" botton on the Setup Screen.*
3. *Copy all the contents in the* ***\\nVidia \IDE \Silicon_Image \Sil3132 \RAID \Floppy*** *to a formatted floppy disk. (For bootable non-RAID device, the copy path is* ***\\nVidia \IDE \Silicon_Image \Sil3132 \SATA****)*
4. *The driver disk for* ***Silicon Image Sil 3132 SATARAID (SATALINK) Controller*** *is done.*

4. Choose the driver ***Silicon Image Sil 3132 SATARAID Controller*** that appears on Windows XP/2000 Setup screen, and press the <Enter> key.
5. Press <Enter> to continue with installation or if you need to specify any additional devices to be installed, do so at this time. Once all devices are specified, press <Enter> to continue with installation.
6. From the Windows XP/2000 Setup screen, press the <Enter> key. Setup will now load all device files and then continue the Windows XP/2000 installation.

† **Installing OS on RAID Drive**

1. After setup examines your disks, it will copy files to Windows installation folders and restart the system.
2. The setup program will continue and finish the installation after restarting.
3. Wait until Windows XP/2000 finishes installing devices, regional settings, networking settings, components, and final set of tasks, then reboot the system if necessary.

† **Confirming Windows XP/2000 Driver Installation**

1. From Windows XP/2000, open the **Control Panel** from **My Computer** followed by the System icon.
2. Choose the **Hardware** tab, then click the **Device Manager** tab.
3. Click the "**+**" in front of the **SCSI and RAID Controllers** hardware type. The driver should appear.

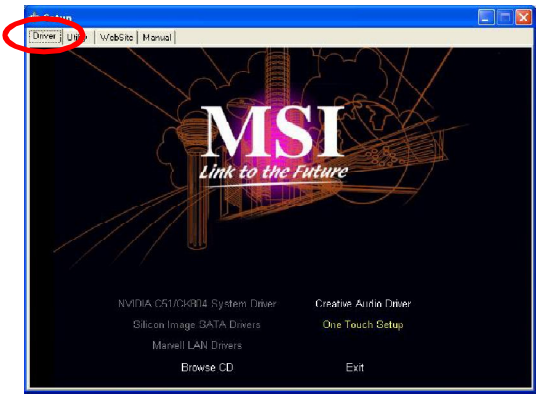


# *Installation of nVidia System Driver*

MSI provides a setup CD along with your mainboard, which contains the required drivers for your system, and many other useful and powerful utility to bring you the best experience for your office professional working and for your home leisure entertainment.

# NVIDIA System Driver Installation

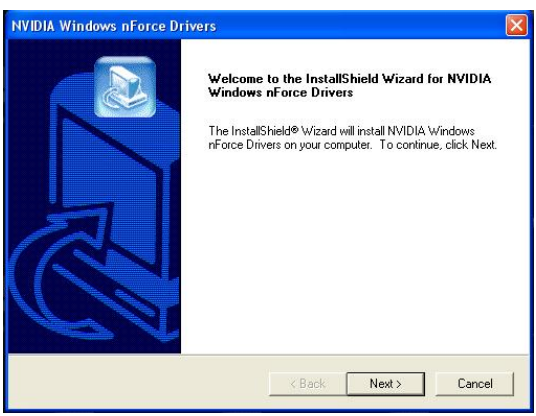
Click on the **Driver** tab and the screen below will display.



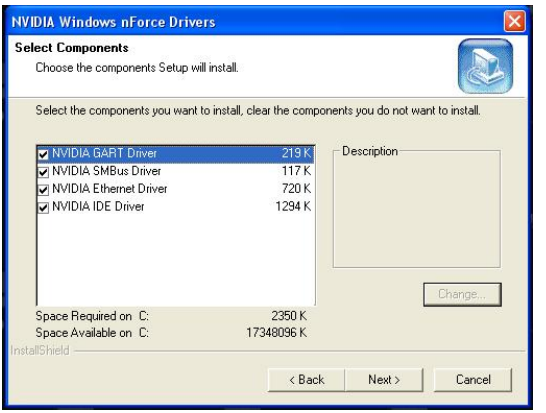

## NVIDIA System Driver

This driver is only available for Windows 2000 and Windows XP operating system. Please follow the following step to install the driver correctly.

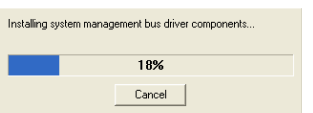
1. Click on the **NVIDIA System Driver** button to install the NVIDIA System Drivers for your Windows OS. Then the welcome dialogue will display. Click **Next** to continue.



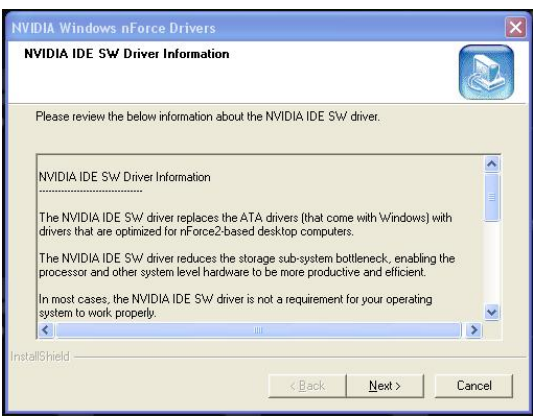
2. Then the following screen displays the available components to install. All the components shown here will be selected to be installed by default. Then click **Next**.



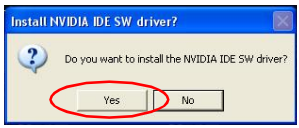

3. The system will start installing the selected driver components automatically.




4. Then the following screen displays the information for the NVIDIA IDE SW Driver installation. Click **Next** to continue.



5. Then the following screen displays the installation of NVIDIA IDE SW Driver. Click **Yes** to continue.




**MSI Reminds You...**

The installation of NVIDIA Firewall and ForceWare Network Access Manager. It is a software firewall to protect the softwares from hacking. However, it is strongly suggested that you do not install this component. *Please follow the instruction below to make a software firewall CD 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. *In the* ***\\nVidia\Firewall*** *, double clicking the "NAMSetup" file to install the software.*
4. *The driver disk for software firewall CD is done.*

6. The following screen indicates that the installation is complete. Click **Yes** to restart your computer or click **No** to restart it later.

