MSI
MICRO-STAR INTERNATIONAL

P45 Diamond series

MS-7516 (v1.X) Mainboard

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Revision History

Revision	Revision History	Date
V1.0	First release for P45 Diamond	March 2008

Technical Support

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

- Visit the MSI website for FAQ, technical guide, BIOS updates, driver updates, and other information: *http://global.msi.com.tw/index.php?func=service*
- Contact our technical staff at: *http://ocss.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.

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

廢電池請回收

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

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

$C\!\!\!\in$ **N1996**

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 instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio 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.

† 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-7516**

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

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WEEE (Waste Electrical and Electronic Equipment) 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 período 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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Chapter 1
Getting Started

Thank you for choosing the P45 Diamond Series (MS-7516 v1.X) ATX mainboard. The P45 Diamond Series mainboards are based on **Intel® P45 & ICH10R** chipsets for optimal system efficiency. Designed to fit the advanced **Intel® Core™2 Extreme/Quad/Duo, Pentinum® Dual-Core** and **Celeron® LGA775** processor, the P45 Diamond Series deliver a high performance and professional desktop platform solution.

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Mainboard Specifications

Processor Support

- Supports Intel® Core™ 2 Extreme/Quad/Duo/Pentium/Celeron Dual Core/Celeron processors.
- Supports Intel® Yorkfield, Wolfdale, Kentsfield, Conroe processors in the LGA775 package.
  (For the latest information about CPU, please visit http://global. msi.com.tw/index.php?func=cpuform)

Supported FSB

- 1600*(OC)/ 1333/ 1066/ 800 MHz
  * (For the latest information about CPU, please visit http://global. msi.com.tw/index.php?func=cpuform)

Chipset

- North Bridge: Intel® P45 chipset
- South Bridge: Intel® ICH10R chipset

Memory Support

- DDR3 1600*(OC)/1333/1066/800 SDRAM (8GB Max)
  (To support 8GB Max, please check the criteria of Intel website.)
- 4 DDR3 DIMMs (240pin / 1.5V)
- * (For more information on compatible components, please visit http://global.msi.com.tw/index.php?func=testreport)

LAN

- Supports PCIE LAN 10/100/1000 Fast Ethernet by Realtek 8111C

IDE

- 1 IDE port by Jmicron 363
- Supports Ultra DMA 66/100/133 mode
- Supports PIO, Bus Master operation mode

SATA

- 6 SATAII ports by Intel ICH10R
- 2 SATA II port by Jmicron 363
- 2 eSATA ports by Jmicron 363
- Supports storage and data transfers at up to 3Gb/s

RAID

- Supports Intel Martix Storage Technology (AHCI + RAID 0/1/5/10) by ICH10R
- Supports RAID 0, RAID 1 and JBOD by Jmicron 363

1394

- Supports 1394 by VIA 6308

FDD

- 1 floppy port
- Supports 1 FDD with 360KB, 720KB, 1.2MB, 1.44MB and 2.88MB

Connectors

● **Back panel**
- 1 PS/2 mouse port
- 1 PS/2 keyboard port
- 2 eSATA ports (support Command Based Port Multipliers)
- 8 USB 2.0 Ports
- 2 LAN jack
- 1 1394 port
- 1 Clear CMOS button

● **On-Board Pinheaders / Connectors**
- 2 USB 2.0 pinheaders
- 1 1394 pinheader
- 1 chasis intrusion connector
- 2 H/W OC pinheaders (optional)
- 1 serial pinheader
- 1 JIS connector (optional)
- 1 TPM connector
- 1 GreenPower Genie connector
- Reset button
- Power button

Thermal accessories

- Chipset water block

Slots

- 2 PCI Express x16 slots compatible with PCIE 2.0 spec
  a. for CrossFire mode, please install both graphics cards on both
     PCIE x16 slots
  b. to use 2 PCIE x16 slots, the PCIE x 16 lanes will auto arrange
     from x16/ x0 to x8/ x8
- 2 PCI Express x 1 slots
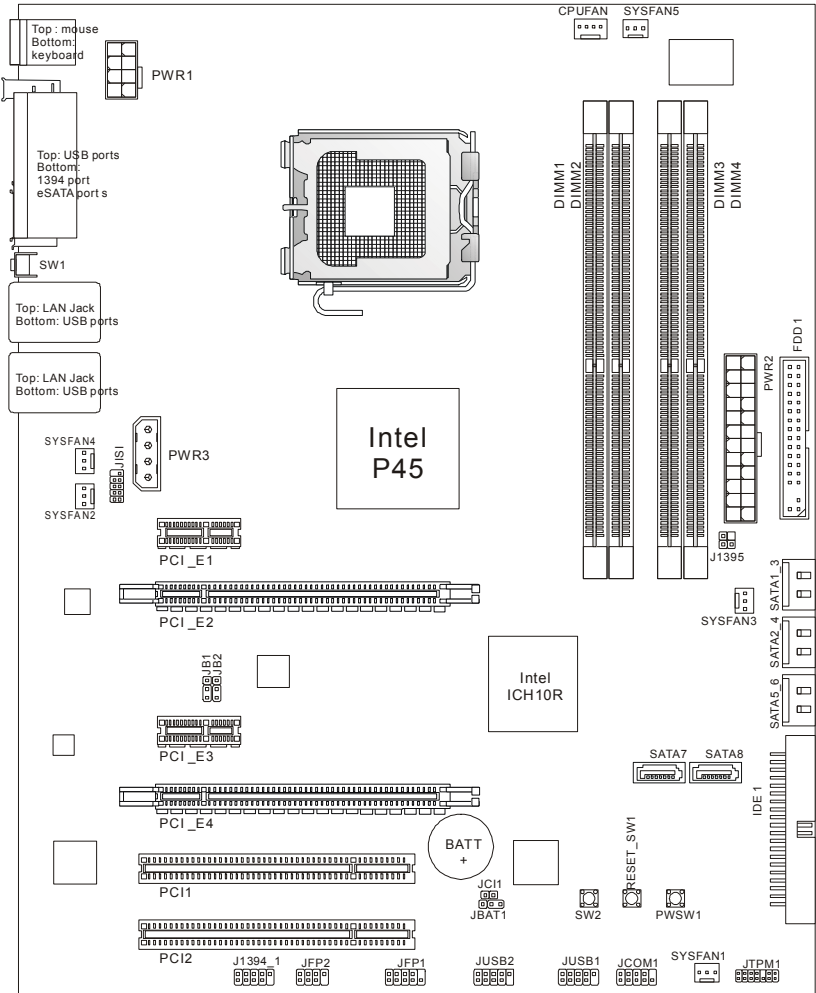- 2 PCI slots

Form Factor

- ATX (30.5cm X 24.5cm)

Mounting
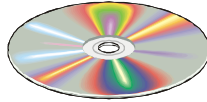
- 9 mounting holes

Mainboard Layout

Top : mouse
Bottom: keyboard

PWR1

Top: USB ports
Bottom: 1394 port
eSATA port s

SW1

Top: LAN Jack
Bottom: USB ports

Top: LAN Jack
Bottom: USB ports

CPUFAN SYSFAN5

DIMM1 DIMM2   DIMM3 DIMM4

FDD 1

PWR2

SYSFAN4

JISI

PWR3

SYSFAN2

Intel
P45

PCI _E1

J1395

PCI _E2

SYSFAN3

SATA1_3

SATA2_4

J.B1 J.B2

Intel
ICH10R

SATA5_6

PCI _E3

SATA7   SATA8

PCI _E4

IDE 1

BATT
+

RESET_SW1

PCI1

JCI1

JBAT1   SW2   PWSW1

PCI2   J1394_1   JFP2   JFP1   JUSB2   JUSB1   JCOM1   SYSFAN1   JTPM1

**P45 Diamond Series
(MS-7516 v1.X) ATX Mainboard**

Packing Checklist

MSI motherboard

MSI Driver/Utility CD

Back IO Shield

Power Cable

SATA Cable

IDE Cable

Floppy Cable

external SATA Cable
(Optional)

1394+USB Bracket
(Optional)

User's Guide
and Quick Guide

CrossFire
Video Link Cable

SATA to ESATA Bracket
(Optional)

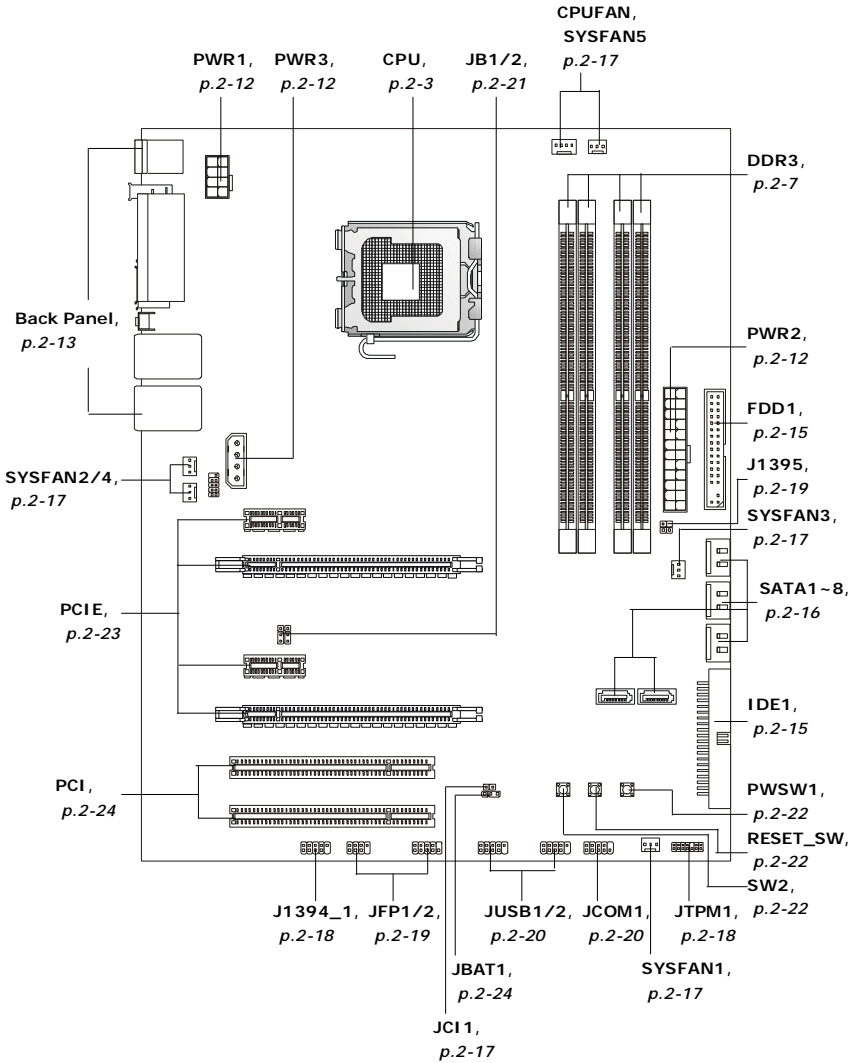* The pictures are for reference only and may vary from the packing contents of the product you purchased.

SATA HDD Power Cable
(For SATA to ESATA
Bracket) (Optional)

6/8mm Adapter x 2

6/10mm Adapter x 2

6mm Clamp x 4

8mm Clamp x 2

10mm Clamp x 2

C Type Tubing Clip x 2

Tube x 2
(5mm internal diameter,
8mm outter diameter)

GreenPower Genie Set
(1 GreenPower genie &
1 power cable &
1 (2x2 pin) cable)

X-Fi Xtreme Audio Card
Set (Card and Driver CD)

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

Chapter 2
Hardware Setup

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

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

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Quick Components Guide

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CPU (Central Processing Unit)

When you are installing the CPU, **make sure to install the cooler to prevent overheating.** If you do not have the CPU cooler, consult your dealer before turning on the computer.

For the latest information about CPU, please visit *http://global.msi.com.tw/index.php? func=cpuform*

Important

Overheating
Overheating will seriously damage the CPU and system. Always make sure the cooling fan can work properly to protect the CPU from overheating. Make sure that you apply an even layer of thermal paste (or thermal tape) between the CPU and the heatsink to enhance heat dissipation.

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

Overclocking
*This mainboard 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.***

Introduction to LGA 775 CPU

The pin-pad side of LGA 775 CPU.
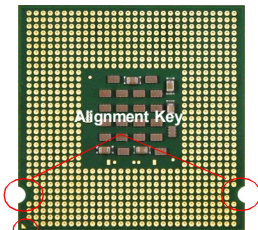
The surface of LGA 775 CPU. Remember to apply some thermal paste on it for better heat dispersion.

Alignment Key

Alignment Key

Yellow triangle is the Pin 1 indicator
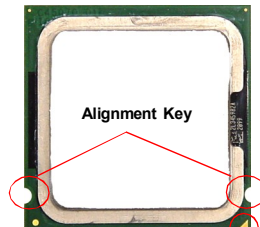
Yellow triangle is the Pin 1 indicator

CPU & Cooler Installation

When you are installing the CPU, **make sure the CPU has a cooler attached on the top to prevent overheating.** Meanwhile, do not forget to apply some thermal paste on CPU before installing the heat sink/cooler fan for better heat dispersion. Follow the steps below to install the CPU & cooler correctly. Wrong installation will cause the damage of your CPU & mainboard.

1. The CPU socket has a plastic cap on it to protect the contact from damage. Before you install the CPU, always cover it to protect the socket pin.

2. Remove the cap from lever hinge side (as the arrow shows).
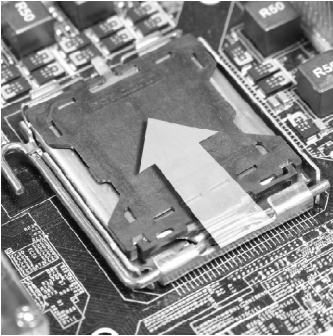
3. The pins of socket reveal.

4. Open the load lever.
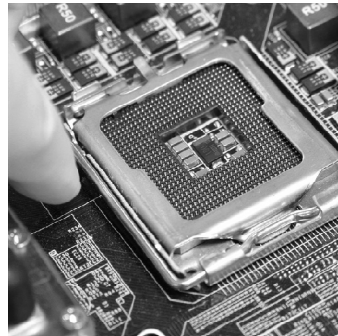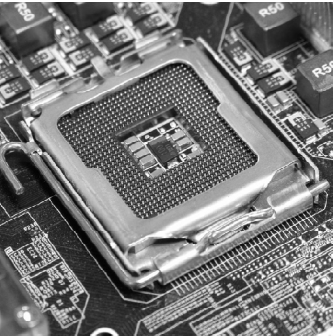
Important

1. Confirm if your CPU cooler is firmly installed before turning on your system.
2. Do not touch the CPU socket pins to avoid damaging.
*3. The availability of the CPU land side cover depends on your CPU packing.*

5. Lift the load lever up and open the load plate.
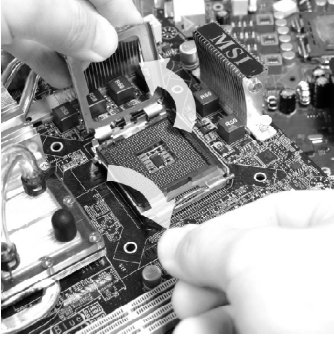
6. After confirming the CPU direction for correct mating, put down the CPU in the socket housing frame. Be sure to grasp on the edge of the CPU base. Note that the alignment keys are matched.

alignment
key
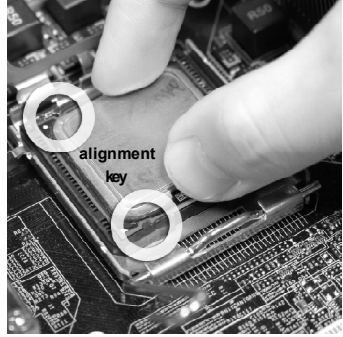
7. Visually inspect if the CPU is seated well into the socket. If not, take out the CPU with pure vertical motion and reinstall.
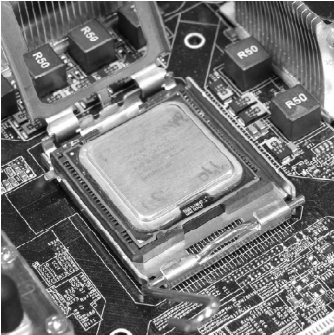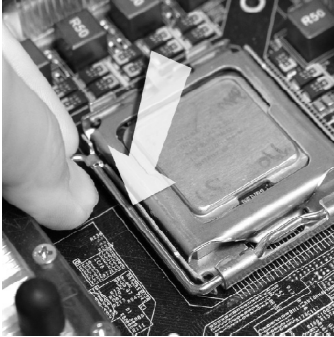
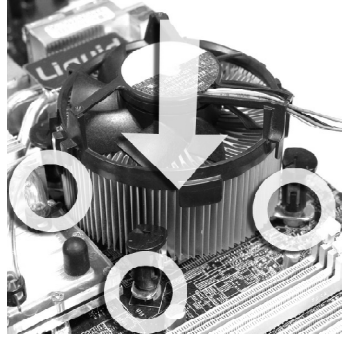8. Cover the load plate onto the package.
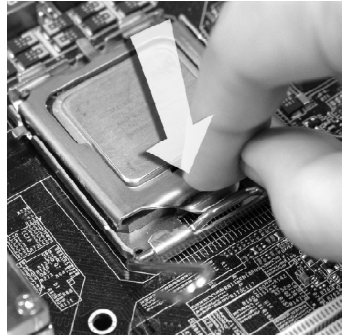
9. Press down the load lever lightly onto the load plate, and then secure the lever with the hook under retention tab.


10. Align the holes on the mainboard with the heatsink. Push down the cooler until its four clips get wedged into the holes of the mainboard.

11. Press the four hooks down to fasten the cooler. Then rotate the locking switch (refer to the correct direction marked on it) to lock the hooks.
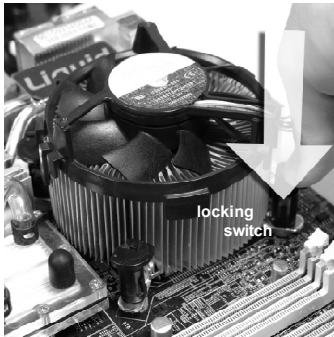
12. Turn over the mainboard to confirm that the clip-ends are correctly inserted.

Mainboard

Hook
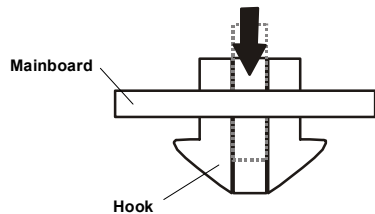
Important

1. Read the CPU status in BIOS (Chapter 3).
2. Whenever CPU is not installed, always protect your CPU socket pin with the plastic cap covered (shown in Figure 1) to avoid damaging.
3. Mainboard photos shown in this section are for demonstration of the CPU/ cooler installation only. The appearance of your mainboard may vary depending on the model you purchase.
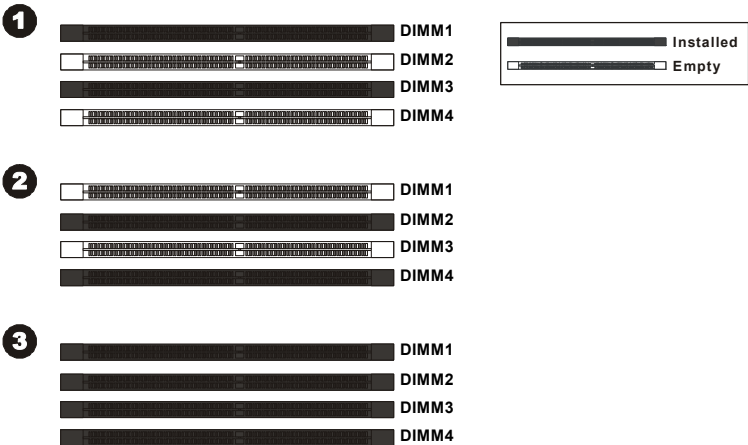
Memory

These DIMM slots are used for installing memory modules.
For more information on compatible components, please visit *http://global.msi.com. tw/index.php?func=testreport*

DDR3
240-pin, 1.5V

72x2=144 pin   48x2=96 pin
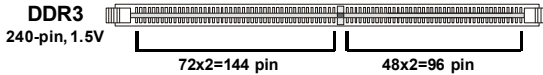
Dual-Channel mode Population Rule

In Dual-Channel mode, the memory modules can transmit and receive data with two data bus lines simultaneously. Enabling Dual-Channel mode can enhance the system performance. Please refer to the following illustrations for population rules under Dual-Channel mode.

1

DIMM1
DIMM2
DIMM3
DIMM4

Installed
Empty

2

DIMM1
DIMM2
DIMM3
DIMM4

3

DIMM1
DIMM2
DIMM3
DIMM4

Installing Memory Modules

1. The memory module has only one notch on the center and will only fit in the right orientation.

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

Important

You can barely see the golden finger if the memory module is properly inserted in the DIMM slot.

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

Volt   Notch
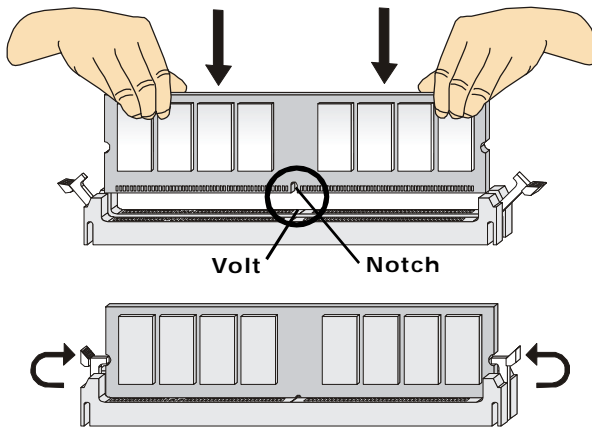
Important

- *DDR3 memory modules are not interchangeable with DDR/DDR2 and the DDR3 standard is not backwards compatible. You should always install DDR3 memory modules in the DDR3 DIMM slots.*
- *In Dual-Channel mode, make sure that you install memory modules of **the same type and density** in different channel DIMM slots.*
- *To enable successful system boot-up, always insert the memory modules into the **DIMM1 first.***

We recommend that you to use the available DDR3 memory modules as below.

DDR3 800

Module		Size
Nanya	NT512C64B88A0NY-AD (Nanya NT5CB64M8AN-AD)	512MB
Qimonda	IMSH51U03A1F1C-08E (Qimonda IDSH51-03A1F1C-08E)	512MB
Hynix	HYMT112U64ZNF8-S6 (Hynix HY5TQ1G831ZNFP-S6)	1GB
Nanya	NT1GC64B8HA0NY-AD (Nanya NT5CB64M8AN-AD)	1GB
Hynix	HYMT125U64ZNF8-S6 (Hynix HY5TQ1G831ZNFP-S6)	2GB

DDR3 1066

Module		Size
A-DATA	EL6YG1908 (ELPIDA J5308BASE-AC-E)	512MB
AENEON	AEH660UD00-10FA98X (AENEON AEH93R10FA)	512MB
Elpida	EBJ51UD8BAFA-AC-E (Elpida J5308BASE-AC-E)	512MB
GelL	G31GB1066C6PDCA (with heatsinks)	512MB
Kingston	KVR1066D3N7/512 (ELPIDA J5308BASE-AE-E)	512MB
Micron	MT4JTF6464AY-1G1BZES (Micron Z9HXV)	512MB
Qimonda	IMSH51U03A1F1C-10F (Qimonda IDSH51-03A1F1C-10F)	512MB
Qimonda	IMSH51U03A1F1C-10G (Qimonda IDSH51-03A1F1C-10G)	512MB
A-DATA	SC6YG1A08 (Samsung K4B1G0846C-ZCF8)	1GB
AENEON	AEH760UD00-10FA98X (AENEON AEH93R10FA)	1GB

DDR3 1066

Module		Size
Elpida	EBJ11UD8BAFA-AC-E (Elpida J5308BASE-AC-E)	1GB
Hynix	HYMT112U64ZNF8-G7 (Hynix HY5TQ1G831ZNF-G7)	1GB
Qimonda	IMSH1GU13A1F1C-10F (Qimonda IDSH51-03A1F1C-10F)	1GB
Qimonda	IMSH1GU13A1F1C-10G (Qimonda IDSH51-03A1F1C-10G)	1GB
Apacer	78.01GC4.331 (Qimonda IDSH51-03A1F1C-10F)	1GB
CORSAIR	CM3X1024-1066C7 (with heatsinks)	1GB
Crucial	CT12864BA1067.8SFD (Micron D9JNL)	1GB
KingMax	FLED45F-A8EB7 [EEES] (Elpida J5308BASE-AE-E)	1GB
Kingston	KVR1066D3N7/1G (Elpida J5308BASE-DG-E)	1GB
SuperTalent	W1066UA1GS (Samsung K4B1G0846C-ZCF8)	1GB
Buffalo	D3/1066-2G (Micron D9GTR)	2GB
Crucial	CT25664BA1067.16SFD (Micron D9JNL)	2GB
SuperTalent	W1066UB2GS (Samsung K4B1G0846C-ZCF8)	2GB

DDR3 1333

Module		Size
Kingston	KVR1333D3N8/512 (Qimonda IDSH51-03A1F1C-13G)	512MB
Qimonda	IMSH51U03A1F1C-13H (Qimonda IDSH51-03A1F1C-13H)	512MB
TwinMOS	8H-CBJAEDAAUAT (ELPIDA J5308BASE-DG-E)	512MB
Kingston	KVR1333D3N8/1G (Qimonda IDSH51-03A1F1C-13G)	1GB
Qimonda	IMSH1GU13A1F1C-13H (Qimonda IDSH51-03A1F1C-13H)	1GB
SEC	M378B5673CZ0-CH9 (SEC K4B1G0846C-ZCH9)	2GB
Qimonda	IMNH51U03A1F1C-13G (with heatsinks)	512MB
KingMax	FLFD45F-B8EE9 [EAES] (Elpida J1108BASE-DJ-E)	1GB
Qimonda	IMNH1GU13A1F1C-13G (with heatsinks)	1GB
SuperTalent	W1333UB1GQ (Qimonda IDSH51-03A1F1C-13H)	1GB

Power Supply

ATX 24-Pin Power Connector: PWR2

This connector allows you to connect an ATX 24-pin power supply. To connect the ATX 24-pin 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.

You may use the 20-pin ATX power supply as you like. If you'd like to use the 20-pin ATX power supply, please plug your power supply along with pin 1 & pin 13 (refer to the image at the right hand).

pin 13
pin 12

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	Res
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND

PWR2
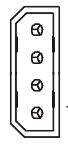
ATX 12V and 5V/12V Power Connectors: PWR1 / PWR3

The JPW1 12V power connector is used to provide power to the CPU. And the JPW2 5V/12V power connector is used to provide power to the PCIEX16 graphics card.

Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V
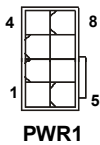
PWR1

Pin Definition

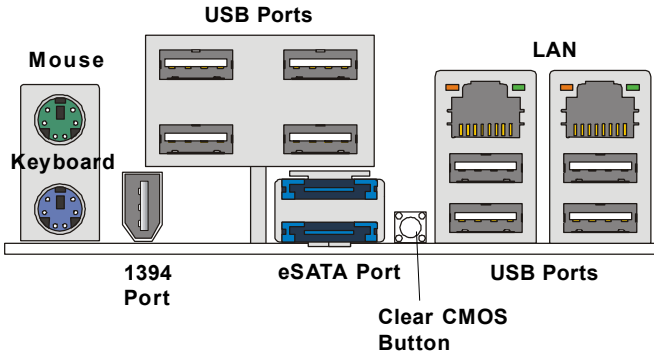| PIN	SIGNAL
1	5V
2	GND
3	GND
4	12V

PWR3

Important

1. Make sure that all the connectors are connected to proper ATX power supplies to ensure stable operation of the mainboard.
2. Power supply of 450 watts (and above) is highly recommended for system stability.

Back Panel

USB Ports

Mouse

LAN

Keyboard

1394
Port

eSATA Port

USB Ports

Clear CMOS
Button

▶ **Mouse/Keyboard**
The standard PS/2® mouse/keyboard DIN connector is for a PS/2® mouse/keyboard.

▶ **1394 Port**
The IEEE1394 port on the back panel provides connection to IEEE1394 devices.

▶ **USB Port**
The USB (Universal Serial Bus) port is for attaching USB devices such as keyboard, mouse, or other USB-compatible devices.

▶ **eSATA Port**
The eSATA port is for attaching the eSATA external hard drive.

▶ **LAN**
The standard RJ-45 LAN jack is for connection to the Local Area Network (LAN). You can connect a network cable to it.

Yellow ———— Green / Orange
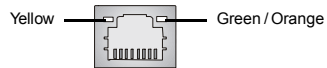
LED	Color	LED State	Condition
Left	Yellow	Off	LAN link is not established.
		On (steady state)	LAN link is established.
		On (brighter & pulsing)	The computer is communicating with another computer on the LAN.
Right	Green	Off	10 Mbit/sec data rate is selected.
		On	100 Mbit/sec data rate is selected.
	Orange	On	1000 Mbit/sec data rate is selected.

2-13

► Clear CMOS Button
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 button to clear data. Press the button to clear the data.
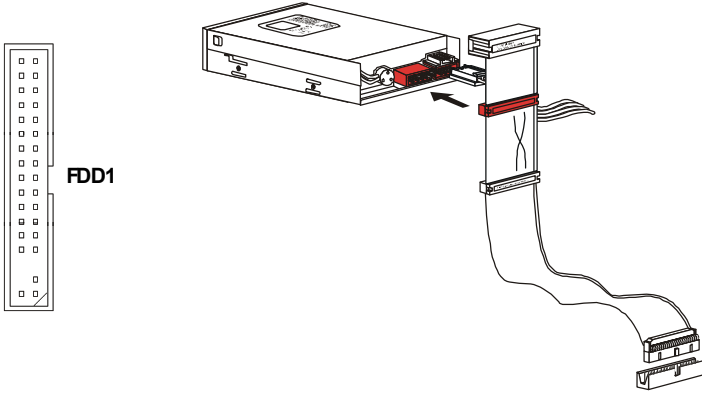
Important

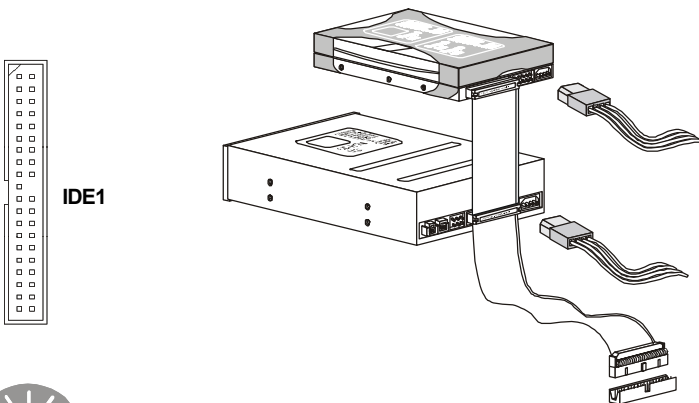*Make sure that you power off the system before clearing CMOS data.*

Connectors

Floppy Disk Drive Connector: FDD1

This connector supports 360KB, 720KB, 1.2MB, 1.44MB or 2.88MB floppy disk drive.

FDD1

IDE Connector: IDE1

This connector supports IDE hard disk drives, optical disk drives and other IDE devices.


IDE1

Important

If you install two IDE devices on the same cable, you must configure the drives separately to master / slave mode by setting jumpers. Refer to IDE device's documentation supplied by the vendors for jumper setting instructions.

Serial ATA Connector: SATA1 ~ SATA8

This connector is a high-speed Serial ATA interface port. Each connector can connect to one Serial ATA device.

SATA3   SATA1

SATA4   SATA2

SATA6   SATA5
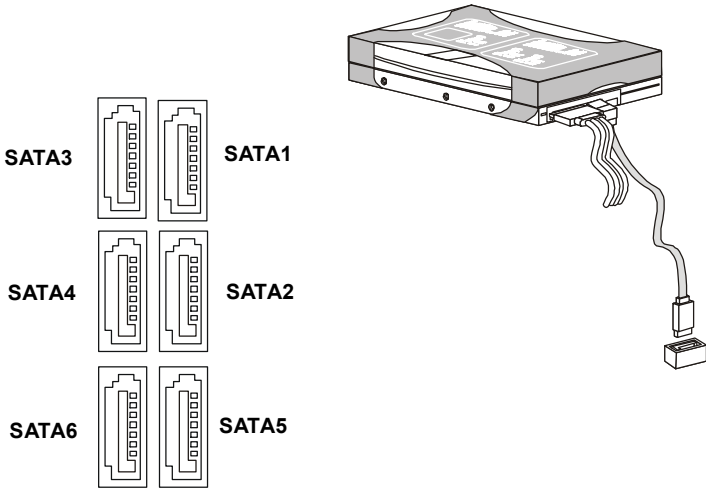
SATA1~6 supported by ICH10R
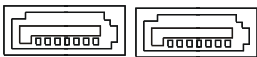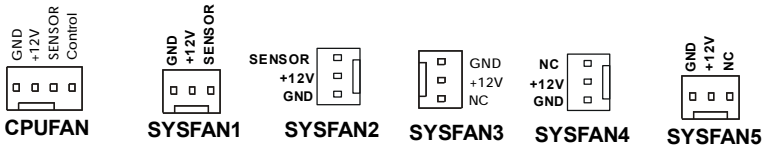
SATA7   SATA8
supported by Jmicron 363

Important

Please do not fold the Serial ATA cable into 90-degree angle. Otherwise, data loss may occur during transmission.

Fan Power Connectors: CPUFAN, SYSFAN1~5

The fan power connectors support system cooling fan with +12V. When connecting the wire to the connectors, always note that the red wire is the positive and should be connected to the +12V; the black wire is Ground and should be connected to GND. If the mainboard has a System Hardware Monitor chipset on-board, you must use a specially designed fan with speed sensor to take advantage of the CPU fan control.

| CPUFAN | SYSFAN1 | SYSFAN2 | SYSFAN3 | SYSFAN4 | SYSFAN5 |

GND / +12V / SENSOR / Control — **CPUFAN**

GND / +12V / SENSOR — **SYSFAN1**

SENSOR / +12V / GND — **SYSFAN2**

GND / +12V / NC — **SYSFAN3**

NC / +12V / GND — **SYSFAN4**

GND / +12V / NC — **SYSFAN5**

> **Important**
>
> 1. *Please refer to the recommended CPU fans at processor's official website or consult the vendors for proper CPU cooling fan.*
> 2. *CPUFAN / SYSFAN1 / SYSFAN2 supports fan control. You can adjust fan speed in **H/W Monitor** menu of BIOS and install **Dual Core Center** utility that will automatically control the CPU fan speed according to the actual CPU temperature.*
> 3. *Fan cooler set with 3 or 4 pins power connector are both available for CPUFAN.*

Chassis Intrusion Connector: JCI1

This connector connects to the chassis intrusion switch cable. If the chassis is opened, the chassis intrusion mechanism will be activated. The system will record this status and show a warning message on the screen. To clear the warning, you must enter the BIOS utility and clear the record.
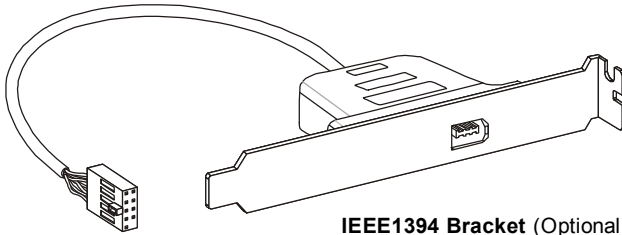
GND / CINTRU

1 ☐ ☐ 2

JCI1

IEEE1394 Connector: J1394_1

This connector allows you to connect the IEEE1394 device via an optional IEEE1394 bracket.
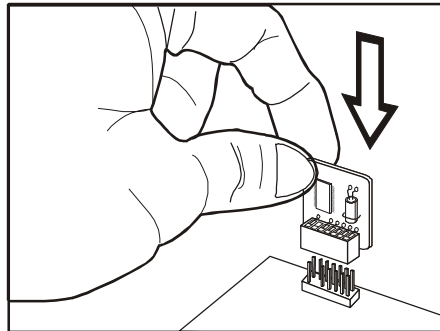
Pin Definition

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

J1394_1

IEEE1394 Bracket (Optional)

TPM Module Connector: JTPM1

This connector connects to a TPM (Trusted Platform Module) module (optional). Please refer to the TPM security platform manual for more details and usages.

JTPM 1

Pin	Signal	Description	Pin	Signal	Description
1	LCLK	LPC clock	2	3V_STB	3V standby power
3	LRST#	LPC reset	4	VCC3	3.3V power
5	LAD0	LPC address & data pin0	6	SIRQ	Serial IRQ
7	LAD1	LPC address & data pin1	8	VCC5	5V power
9	LAD2	LPC address & data pin2	10	KEY	No pin
11	LAD3	LPC address & data pin3	12	GND	Ground
13	LFRAME#	LPC Frame	14	GND	Ground

Front Panel Connectors: JFP1, JFP2

These connectors are for electrical connection to the front panel switches and LEDs. The JFP1 is compliant with Intel® Front Panel I/O Connectivity Design Guide.
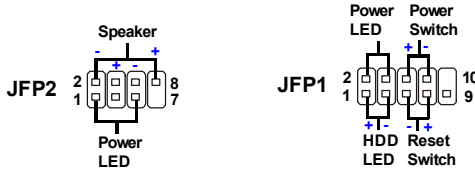
JFP1 Pin Definition

PIN	SIGNAL	DESCRIPTION
1	HD_LED +	Hard disk LED pull-up
2	FP PWR/SLP	MSG LED pull-up
3	HD_LED -	Hard disk active LED
4	FP PWR/SLP	MSG LED pull-up
5	RST_SW -	Reset Switch low reference pull-down to GND
6	PWR_SW +	Power Switch high reference pull-up
7	RST_SW +	Reset Switch high reference pull-up
8	PWR_SW -	Power Switch low reference pull-down to GND
9	RSVD_DNU	Reserved. Do not use.

JFP2 Pin Definition

PIN	SIGNAL	DESCRIPTION
1	GND	Ground
2	SPK-	Speaker-
3	SLED	Suspend LED
4	BUZ+	Buzzer+
5	PLED	Power LED
6	BUZ-	Buzzer-
7	NC	No connection
8	SPK+	Speaker+

GreenPower Genie Connector: J1395

This connector connects to GreenPower Genie (optional). Please refer to the GreenPower Genie manual for more details and usages.


J1395

Front USB Connector: JUSB1/2

These connectors, compliant with Intel® I/O Connectivity Design Guide, is ideal for connecting high-speed USB interface peripherals such as **USB HDD**, **digital cameras**, **MP3 players**, **printers**, **modems and the like**.

Pin Definition

JUSB1/2

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

USB 2.0 Bracket
(Optional)
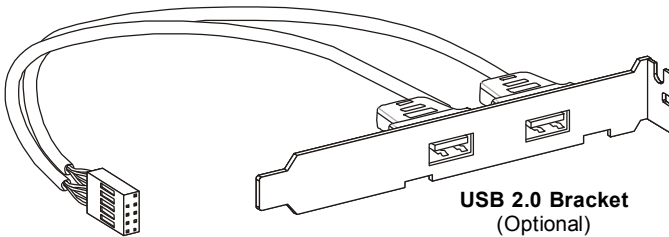
Important

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

Serial Port Connector: JCOM 1

This connector is a 16550A high speed communication port that sends/receives 16 bytes FIFOs. You can attach a serial device.

Pin Definition

JCOM1

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

Jumper

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

Hardware Overclock FSB Jumpers: JB1, JB2 (optional)

You can overclock the FSB to increase the processor frequency by changing the jumpers JB1 and JB2. Follow the instructions below to set the FSB.

JB1 JB2

Default	200 -> 266 MHz	200 -> 333 MHz	266 -> 333 MHz	200 -> 400 MHz
				266 -> 400 MHz
				333 -> 400 MHz
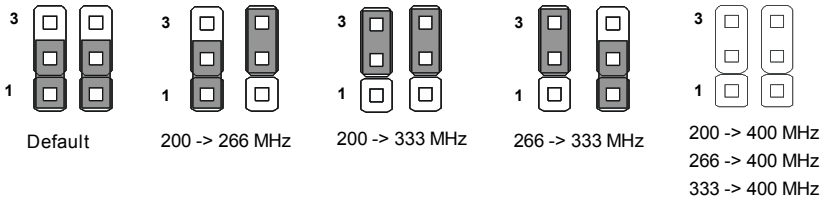
Important

1. Make sure that you power off the system before changing the jumpers
2. Overclocking may cause system instability or crash during boot, then please set to the default jumper setting.

Clear CMOS Jumper: JBAT1

There is a CMOS RAM onboard that has a power supply from an external battery to keep the data of system configuration. With the CMOS RAM, the system can automatically boot OS every time it is turned on. If you want to clear the system configuration, set the jumper to clear data.

JBAT1

Keep Data   Clear Data

Important

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

Button

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

Power Button: PWSW1

This power button is used to turn-on or turn-off the system. Press the button to turn-on or turn-off the system.

PWSW1

Reset Button: RESET_SW1

This reset button is used to reset the system. Press the button to reset the system.

RESET_SW1

Button: SW2

This button is reserved.

SW2

Slots

PCI (Peripheral Component Interconnect) Express Slot

The PCI Express slot supports the PCI Express interface expansion card.
The PCI Express 2.0x 16 supports up to 8.0 GB/s transfer rate.
The PCI Express x1 supports up to 250 MB/s transfer rate.
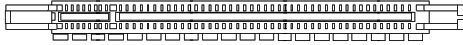
**PCI Express x16 Slots support up to
PCI Express 2.0x16 speed (PCI_E2 & PCI_E4)**
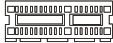
**White PCI Express x 1 Slot supports
PCI Express x1 speed (PCI_E1 & PCI_E3)**

Important

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

PCI (Peripheral Component Interconnect) Slot

The PCI slot supports LAN card, SCSI card, USB card, and other add-on cards that comply with PCI specifications.
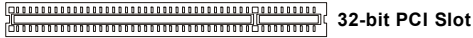
32-bit PCI Slot

Important

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

PCI Interrupt Request Routing

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

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

ATi CrossFire (Multi-GPU) Technology

ATi CrossFire (Multi-GPU) technology is an exciting new technology developed by ATI that allows the power of multiple Graphics. CrossFire requires a CrossFire Edition graphics card and a compatible standard Radeon (CrossFire Ready) graphics card from the same series. To utilize this technology, always install the CrossFire Edition graphics card in the **First** PCIE 2.0 x16 (PCI_E2) slot and install the CrossFire Ready graphics card in the **Second** PCIE 2.0 x16 (PCI_E4) slot. The mainboard can auto detect the CrossFire mode by software, therefore you don't have to enable the CrossFire in BIOS by yourself. Following the process below to complete CrossFire:

1. Install the CrossFire *Edition* graphics card in the **First** PCIE 2.0 x16 (PCI_E2) slot and install the CrossFire *Ready* graphics card in the **Second** PCIE 2.0 x16 (PCI_E4) slot.

2. With two cards installed, an CrossFire Video Link cable is required to connect the golden fingers on the top 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 CrossFire Edition graphics card will work. Hence, you only need to connect a monitor to the CrossFire Edition graphics card.
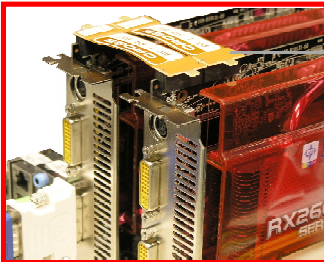
CrossFire Video Link cable

Important

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** graphics cards for CrossFire mode, make sure that:*
   a. these two graphics cards are of the same brand and specifications;
   b. these two cards are installed on both PCIE x16 slots.
3. *Make sure that you connect an adequate power supply to the power connector on the graphics card to ensure stable operation of the graphics card.*
4. *Only Windows® XP with Service Pack 2 (SP2)& Windows® XP Profes -sional x64 Edition & Windows® Vista support the CrossFire function.*

3. When all of the hardware and software has been properly set up and installed, reboot the system. After entering the O.S., click the "Catalyst™ Control Center" icon   on the desktop. There is a setting in the Catalyst™ Control Center that needs to be enabled for CrossFire™ to operate. The following aspect appears in Catalyst™ Control Center:
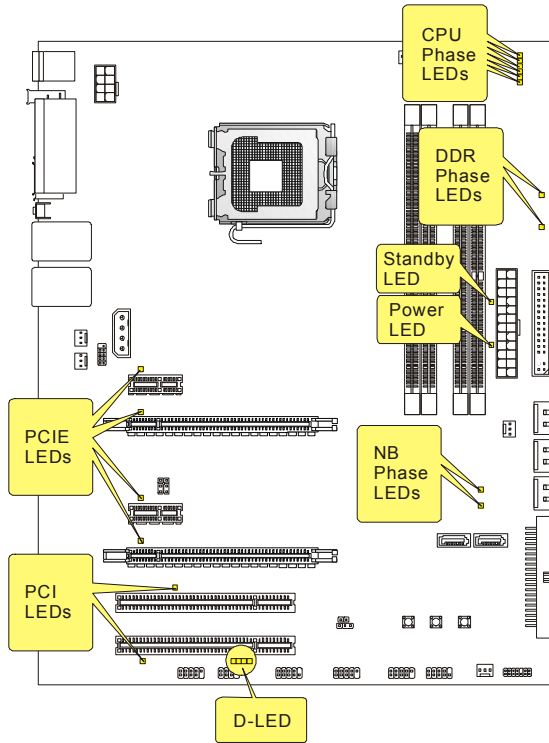
Select the Advanced View from the view drop menu.
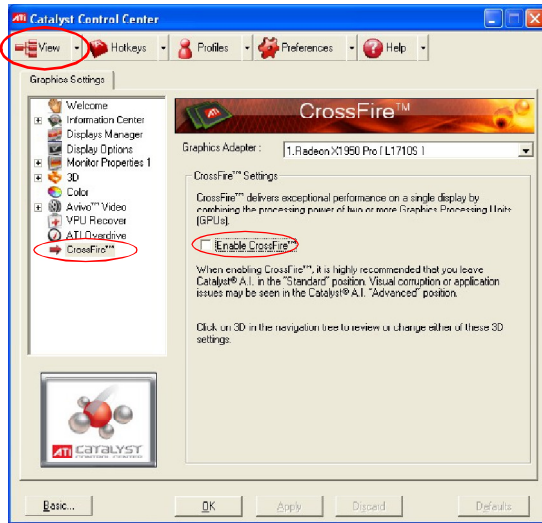
Important

A CrossFire™ system has four possible display modes:
• SuperTiling
• Scissor Mode
• Alternate Frame Rendering
• Super Anti-aliasing.
for more details, please consult the graphics card manual from the manufacturer.

LED Status Indicators

Name	Status
CPU Phase LEDs	6/ 5/ 4/ 3/ 2/ 1 of the LEDs will light blue when CPU is in 6/ 5/ 4/ 3/ 2/ 1 phase power mode.
NB Phase LEDs	2/ 1 of the LEDs will light blue when NB is in 2/ 1 phase power mode.
DDR Phase LEDs	2/ 1 of the LEDs will light blue when the memory is in 2/ 1 phase power mode.
PCIELEDs	Lights blue when the PICE Slot is functional.
PCILEDs	Lights blue when the PICE Slot is functional.
Power LED	Lights green when the system is in power-on(S0/S1) status.
Standby LED	Lights orange when the system is in standby (S3/S4/S5) status.

D-LED

These four LED groups allow users to identify system problems through 16 various combinations of LED signals.

These LEDs will light **Red** color.

These LEDs will light **Green** color.
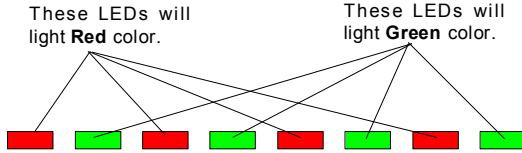
	Green light		Red light		Off

LED Signal	Description	LED Signal	Description
	System Power ON The D-LED will hang here if the processor is damaged or not installed properly.		Initializing Video Interface This will start detecting CPU clock, checking type of video onboard. Then, detect and initialize the video adapter.
	Early Chipset Initialization		BIOS Sign On This will start showing information about logo, processor brand name, etc...
	Memory Detection Test Testing onboard memory size. The D-LED will hang if the memory module is damaged or not installed properly.		Testing Base and Extended Memory Testing base memory from 240K to 640K and extended memory above 1MB using various patterns.
	Decompressing BIOS image to RAM for fast booting.		Assign Resources to all ISA.
	Initializing Keyboard Controller.		Initializing Hard Drive Controller This will initialize IDE drive and controller.
	Testing VGA BIOS This will start writing VGA sign-on message to the screen.		Initializing Floppy Drive Controller This will initialize Floppy Drive and controller.
	Processor Initialization This will show information regarding the processor (like brand name, system bus, etc...)		BootAttempt This will set low stack and boot via INT 19h.
	Testing RTC (Real Time Clock)		Operating System Booting

Water cooling accessories installation

This section describes from installing tubeing on the north bridge water block to the adapters. A complete water-cooling system consists of waterblock, tubing, pump, radiator and reservoir. To complete the water-cooling system safely you have to purchase separate pumps, radiators and reservoirs etc.. Please read carefully the installation manual provided by the water-cooling manufacturer.
Follow the steps below to install the accessories.

Before you start, you need to prepare a pair of pliers.

1. Slide the C type tubing clip in to the groove of the heat sink and the angle as shown below figure. When the clip slide into the hole position, turn it to 90 degrees. Use the same way to install another clip, as shown in the figure below after the completion.
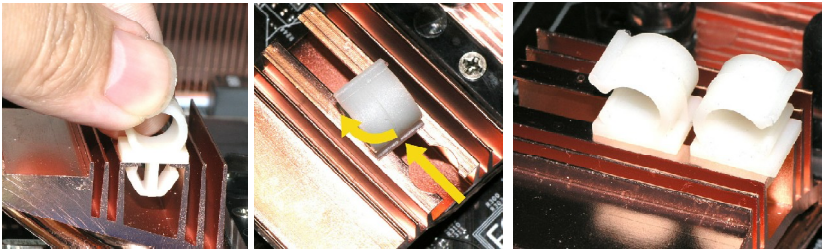
2. Use pliers to remove the two rubber caps from the north bride waterblock.
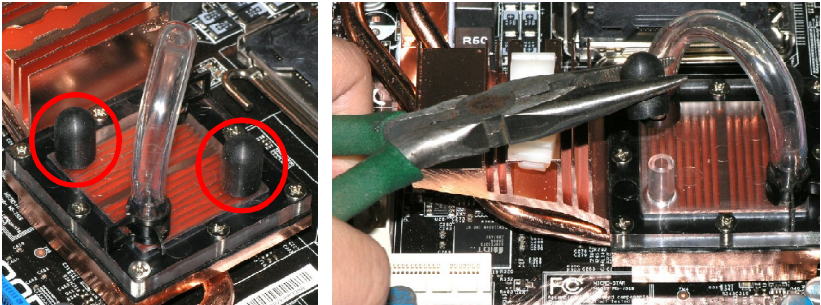
3. Slip the 6mm clamp over the tubing.
4. Attach the tubing to the water block and use pliers to cinch the 6mm clamps over the tubing and waterblock
5. Clip the tubing as shown in the figure below.
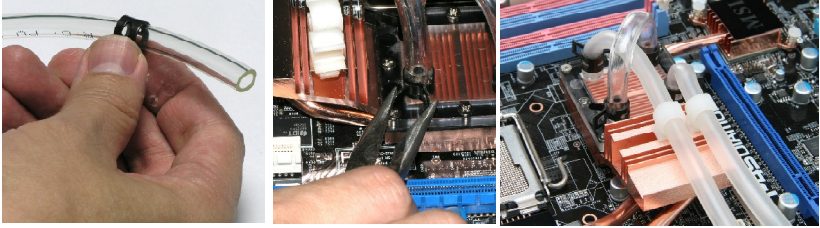
6. Put the tubing through the bracket holes.
7. Slip the 6mm clamp over the tubing before inserting the adapter fitting into the tubing.
8. Inserting the adapter into the turing.
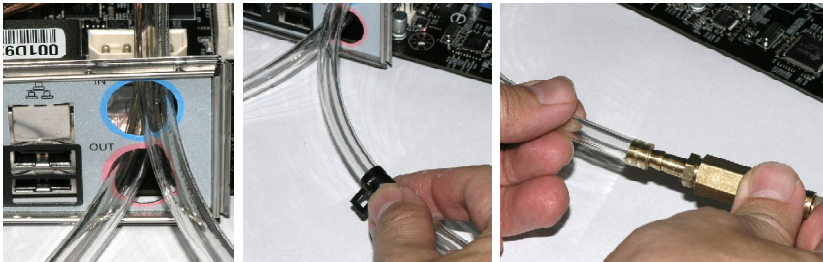
9. Use pliers to cinch the 6mm clamp over the tubing and adapter fitting.
10. Use the same way to install another adapter, as shown in the figure below after the completion.
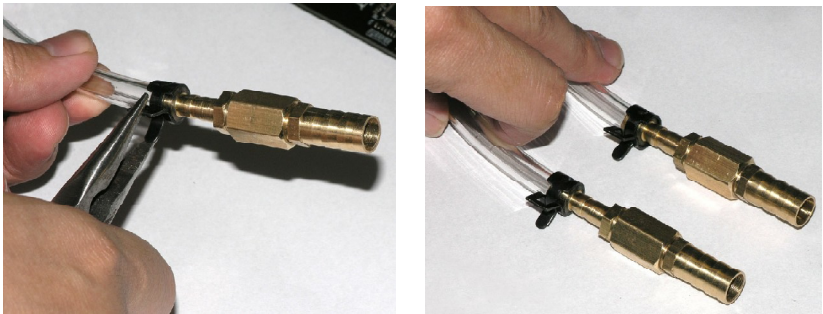
Important

Leak Test
Water will cause serious damage to the mainboard and peripherals.
Before you turn the computer on, we suggest that you do leak test for 24 hours and make sure no leaks are occurring.

Choose Tubing
It is not necessary to use the provided tubing to setup up your water cooling system. You can choose suitable 5mm inner diameter / 8mm outter diameter tubing to connect from north bridge waterblock to your other water cooling components. If you purchase a new tubing, make sure :
1. The waterblock fits in the tubing and has no leakage phenomenon.
2. There is not a kink anywhere in the tubing. If the provided C type tubing clip cause kink, you may choose not to clip the tubing in it.

Choose Pump
In order to make the flow smooth in your water-cooling system, we recommend choosing a pump with rated voltage12V D.C., flow rate 1200ml/min and water head 1.1 m-H_2O.

Chapter 3
BIOS Setup

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

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

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

MSI
MICRO-STAR INTERNATIONAL

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.

> **Important**
>
> 1. *The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.*
>
> 2. *Upon boot-up, the 1st line appearing after the memory count is the BIOS version. It is usually in the format:*
>
>   *A7516IMS V1.0 030808 where:*
>
>   *1st digit refers to BIOS maker as A = AMI, W = AWARD, and P = PHOENIX.*
>   *2nd - 5th digit refers to the model number.*
>   *6th digit refers to the chipset as I = Intel, N = nVidia, and V = VIA.*
>   *7th - 8th digit refers to the customer as MS = all standard customers.*
>   *V1.1 refers to the BIOS version.*
>   *030808 refers to the date this BIOS was released.*

Control Keys

<↑>	Move to the previous item
<↓>	Move to the next item
<←>	Move to the item in the left hand
<→>	Move to the item in the right hand
<Enter>	Select the item
<Esc>	Jumps to the Exit menu or returns to the main menu from a submenu
<+/PU>	Increase the numeric value or make changes
<-/PD>	Decrease the numeric value or make changes
<F6>	Load 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 arrow 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 can be launched from this field. A sub-menu contains additional options for a field parameter. You can use arrow keys (↑↓) to highlight the field and press <Enter> to call up the sub-menu. Then you can

▶ Primary IDE Master
▶ Primary IDE Slave
▶ Secondary IDE Master
▶ Secondary IDE Slave

use the control keys to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the <Esc >.

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

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.

    ▶ Standard CMOS Features          ▶ Cell Menu

    ▶ Advanced BIOS Features          ▶ User Settings

    ▶ Integrated Peripherals          Load Fail-Safe Defaults

    ▶ Power Management Setup          Load Optimized Defaults

    ▶ H/W Monitor                     Save & Exit Setup

    ▶ Green Power                     Exit Without Saving

     BIOS Setting Password


   ↑↓←→:Move  Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
      F5:Memory-Z     F8:Fail-Safe Defaults    F6:Optimized Defaults

                     Set System/DRAM Timing ...

        v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.
```

▶ **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.

▶ **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.

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

▶ **Green Power**
Use this menu to specify the power phase.

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

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

3-4

▶ **User Settings**
Use this menu to save or load settings.

▶ **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 specifi- cally for optimal performance of the mainboard.

▶ **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.

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                        Standard CMOS Features

 Date (MM:DD:YY) :          [Wed 07/02/2008]        Help Item
 Time (HH:MM:SS) :          [00:47:59]
                                                Use [ENTER], [TAB]
  ▶ SATA1                    [Not Detected]     or [SHIFT TAB] to
  ▶ SATA2                    [Not Detected]     select a field.
  ▶ SATA3                    [HDS728080PLA38]
  ▶ SATA4                    [Not Detected]     Use [+] or [-] to
  ▶ SATA5                    [Not Detected]     configure system Date.
  ▶ SATA6                    [Not Detected]
  ▶ IDE Primary Master       [Not Detected]
  ▶ IDE Primary Slave        [Not Detected]
  ▶ SATA7                    [Not Detected]
  ▶ SATA8                    [Not Detected]
  ▶ E-SATA1                  [Not Detected]
  ▶ E-SATA2                  [Not Detected]

 Floppy Drive A             [1.44 MB]
 Hold on                    [All Error]


  ↑↓←→:Move  Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
         F5:Memory-Z   F8:Fail-Safe Defaults   F6:Optimized Defaults
```

▶ 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>.

▶ SATA1~8, IDE Primary Master/Slave, E-SATA1/2
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 SATA connector.

► **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.

► **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.

Important

IDE Primary Master/ Slave, Serial-ATA 1/2/3/4/5/6/7/8 Channel & E-SATA1/2 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.].

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

▶ **System Information**

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

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                          System Information

Intel(R) Core(TM)2 Quad  CPU   Q9450  @ 2.66GHz        Help Item
CPUID/MicroCode  0676/0B
CPU Frequency    2.00GHz (333x6)
BIOS Version     V1.0B7 03032008
Physical Memory  1024MB
Cache Size       12288 KB




↑↓←→:Move  Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
            F8:Fail-Safe Defaults    F6:Optimized Defaults
```

This sub-menu shows the CPU information, BIOS version and memory status of your system (read only).

Advanced BIOS Features

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                        Advanced BIOS Features

  Full Screen Logo Display    [Enabled]          Help Item
  Quick Booting               [Enabled]
  Boot up Num-Lock LED        [On]         Disabled: Displays
  IOAPIC Function             [Enabled]    normal POST messages.
  MPS Table Version           [1.4]        Enabled: Displays OEM
  Password Check              [BIOS]       Logo instead of POST
  Primary Graphic's Adapter   [PCIE]       messages.
  PCI Latency Timer           [64]
▶ CPU Feature                 [Press Enter]
▶ Chipset Feature             [Press Enter]
▶ Boot Sequence               [Press Enter]
▶ Trusted Computing           [Press Enter]



    ↑↓←→:Move  Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
              F8:Fail-Safe Defaults   F6:Optimized Defaults
```

▶ Full Screen LOGO Display

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

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

▶ Quick Booting

Setting the item to [Enabled] allows the system to boot within 10 seconds since it will skip some check items.

▶ Boot Up Num-Lock LED

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

▶ 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.

▶ 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.

▶ Password Check

You need to enter the password as you boot up or enter COMS SETUP.
If you want to delete the password settings, you need to reset the password in SETUP and press <Enter> to make the password place empty.

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► **Primary Graphic's Adapter**
This setting specifies which graphic card is your primary graphics adapter.

► **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.

► **CPU Feature**
Press <Enter> to enter the sub-menu and the following screen appears:

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                           CPU Feature

Execute Bit Support          [Enabled]          Help Item
C1E Support                  [Disabled]
Set Limit CPUID MaxVal to 3  [Disabled]      When disabled, force
```

► **Execute Bit Support**
Intel's Execute Disable Bit functionality can prevent certain classes of malicious "buffer overflow" attacks when combined with a supporting operating system. This functionality allows the processor to classify areas in memory by where application code can execute and where it cannot. When a malicious worm attempts to insert code in the buffer, the processor disables code execution, preventing damage or worm propagation.

► **C1E Support**
To enable this item to red the CPU power consumption while idle. Not all porcessors support Enhanced Halt tate (C1E).

► **Set Limit CPUID MaxVal to 3**
The Max CPUID Value Limit is designed to limit the listed speed of the processor to older operating systems.

► **Chipset Feature**
Press <Enter> to enter the sub-menu and the following screen appears:

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                           Chipset Feature

HPET                         [Disabled]          Help Item
```

► **HPET**
The HPET (High Precision Event Timers) is a component that is part of the chipset. You can to enable it, and will provide you with the means to get to it via the various ACPI methods.

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

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                          Boot Sequence

1st Boot Device          [1st FLOPPY DRI]         Help Item
2nd Boot Device          [SATA:3M-HDS728]
3rd Boot Device          [USB:USB Flash ]     Specifies the boot
4th Boot Device          [CD/DVD:PS-HL-D]     sequence from the
Boot From Other Device   [Yes]                available devices.
```

▶ 1st/ 2nd/ 3rd/ 4th Boot Device
The items allow you to set the first/ second/ third/ fourth boot device 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 boot device.

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

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                         Trusted Computing

TCG/TPM SUPPORT               [No]              Help Item
```

▶ TCG/TPM SUPPORT
This setting allows you to enable/disable the TCG/TPM.

Integrated Peripherals
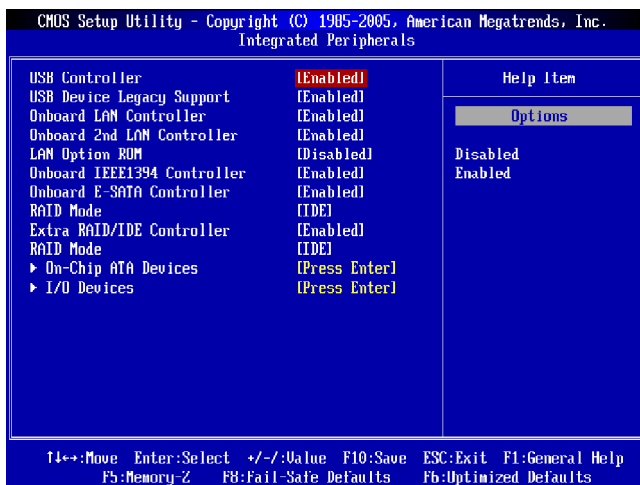
▶ **USB Controller**
This setting allows you to enable/disable the onboard USB controller.

▶ **USB Device Legacy Support**
Select [Enabled] if you need to use a USB-interfaced device in the operating system.

▶ **Onboard LAN Controller**
This item is used to enable/disable the onboard LAN controller.

▶ **Onboard 2nd LAN Controller**
This item is used to enable/disable the onboard 2nd LAN controller.

▶ **LAN Option ROM**
This item is used to decide whether to invoke the Boot ROM of the 2nd LAN controller.

▶ **Onboard IEEE1394 Controller**
This item allows you to enable/disable the onboard IEEE1394 controller.

▶ **Onboard E-SATA Controller**
This item allows you to enable/disable the onboard E-SATA controller.

▶ **RAID Mode**
This item allows you to enable/ disable the RAID function. Select [RAID] will enable RAID.

▶ **Extra RAID/IDE Controller**
This item allows you to enable/disable the extra RAID/IDE controller.

► RAID Mode
This item allows you to enable/ disable the extra SATA RAID function. Select [RAID]
will enable RAID.

► On-Chip ATA Devices
Press <Enter> to enter the sub-menu and the following screen appears:

```
 CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                         On-Chip ATA Devices

  PCI IDE BusMaster          [Disabled]          Help Item
  On-Chip SATA Controller    [Enabled]
  RAID Mode                  [IDE]           ENABLED: BIOS uses
```

► PCI IDE BusMaster
This item allows you to enable/ disable BIOS to used PCI busmastering for
reading/ writing to IDE drives.

► Oc-Chip SATA Controller
These items allow users to enable or disable the SATA controller.

► RAID Mode
This item is used to enable/disable the RAID function for SATA devices.

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

```
 CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                              I/O Devices

  COM Port 1                 [3F8/IRQ4]          Help Item
```

► COM Port 1
Select an address and corresponding interrupt for the first serial port.

Power Management Setup

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                        Power Management Setup

 ACPI Function              [Enabled]            Help Item
 ACPI Standby State         [S1]
 Power Button Function      [Power Off]      Enable / Disable
 Restore On AC Power Loss   [Off]            ACPI support for
 ▶ Wake Up Event Setup      [Press Enter]    Operating System.

                                             ENABLE: If OS
                                             supports ACPI.

                                             DISABLE: If OS
                                             does not support
                                             ACPI.



 ↑↓→←:Move  Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
            F8:Fail-Safe Defaults    F6:Optimized Defaults
```

Important

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 2000/ XP, select [Enabled].

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

[S1]   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]   The S3 sleep mode is a lower power state where the in formation of system configuration and open applications/files is saved to main memory that remains powered while most other hardware components turn off to save energy. The information stored in memory will be used to restore the system when a "wake up" event occurs.

▶ **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. 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.
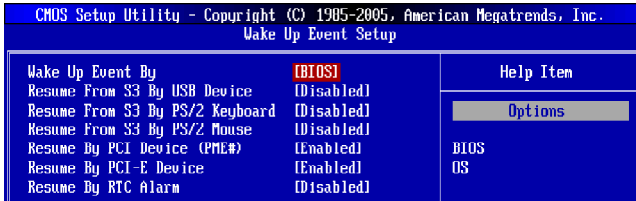
▶ **Resume From S3 By USB Device**

The item allows the activity of the USB device to wake up the system from S3 (Suspend to RAM) sleep state.

▶ **Resume From S3 By PS/2 Keyboard**

This setting determines whether the system will be awakened from what power saving modes when input signal of the PS/2 keyboard is detected.

▶ **Resume From S3 By PS/2 Mouse**

This setting determines whether the system will be awakened from what power saving modes when input signal of the PS/2 mouse is detected.

▶ **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).

▶ **Resume by PCI-E Device**

When set to [Enabled], the feature allows your system to be awakened from the power saving modes through any event on PCIE device.

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

H/W Monitor


```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                              H/W Monitor

Chassis Intrusion           [Reset]              Help Item
CPU Smart FAN Target         [40°C]
CPU Min. FAN Speed(%)        [62.5]       The option means fan
SYS FAN 1 Control            [100%]       voltage percentage.
SYS FAN 2 Control            [100%]


              ----- PC Health Status -----

CPU Temperature              39°C/102°F
System Temperature           28°C/82°F
CPU FAN Speed                0 RPM
SYS FAN 1 Speed              0 RPM
SYS FAN 2 Speed              0 RPM
CPU Vcore                    1.176 V
3.3V                         3.904 V
5V                           5.885 V
12V                          12.040 V


  ↑↓←→:Move  Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
                F8:Fail-Safe Defaults    F6:Optimized Defaults
```

► 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.

► CPU Smart FAN Target
The mainboard provides the Smart Fan function which can control the CPU fan speed automatically depending on the current temperature to keep it with in a specific range. You can select a fan target value here. If the current CPU fan temperature reaches to the target value, the smart fan function will be activated. It provides several sections to speed up for cooling down automaticlly.

► CPU Min.FAN speed(%)
This item allows users to select how percentage of minimum speed limit for the CPU fan.

►SYS FAN1 / 2 Control
This item is used to specify the percentage of SYSFAN1/ 2 speed.

---- PC Health Status ----
 ► CPU/ System Temperature, CPU FAN/ SYS FAN1/ SYS FAN2 Speed, CPU Vcore, 3.3V, 5V, 12V
 These items display the current status of all of the monitored hardware devices/ components such as CPU voltage, temperatures and all fans' speeds.

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Green Power

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                              Green Power

 Energy Save                      [Disabled]              Help Item
 CPU Phase Control                [Disabled]
 DDR Phase Control                [Disabled]              Options
 MCH Phase Control                [Disabled]
          ----- GreenPower Genie -----               Disabled
                                                     Enabled
 I3.3V                             4.666 A
 I5V                               3.362 A
 I12V                              2.942 A
 ICore                           29.298 A
 I12V                              2.019 A
 Pout                            16.212 W
 Efficiency                      77.921 %




 ↑↓↔:Move  Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
          F5:Memory-Z    F8:Fail-Safe Defaults   F6:Optimized Defaults
```

► **Energy Save**
When set to [Enabled], the system will **NOT** supply power to the empty **PCIE** slots, **PCI** slots, **SATA** ports etc. for saving power.

► **CPU/ DDR/ MCH Phase Control**
When set to [Auto], the hardware will auto adjust the CPU/ DDR/ MCH power phase according to the loading of CPU / DDR / MCH to reach the best power saving function.

BIOS Setting Password

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

Enter New Password

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.

Cell Menu
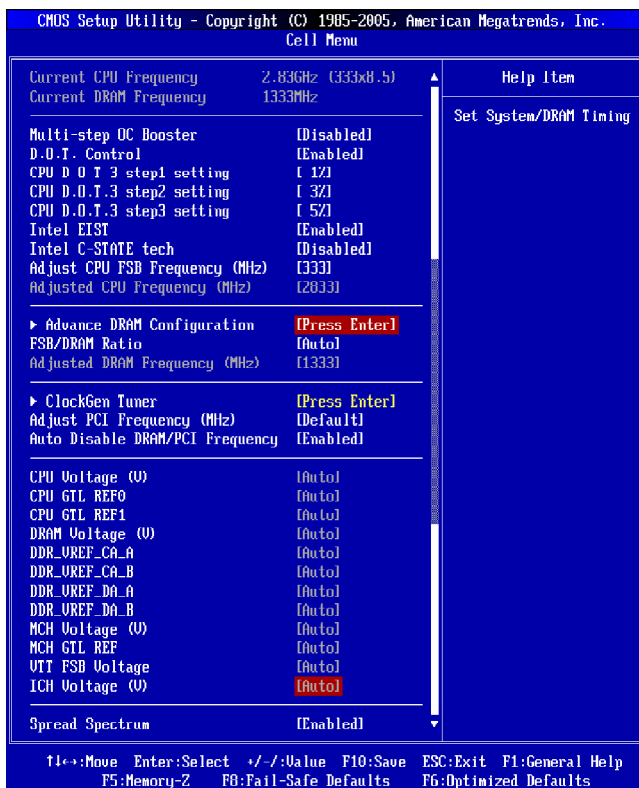
Important

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

▶ **Current CPU / DRAM Frequency**
These items show the current clocks of CPU and Memory speed. Read-only.

▶ **Multi-step OC Booster**
This item is used to avoid overclocking failure to initialize the operating system or boot. This technology uses lower frequency through the operating system initialization. When the initialization completed and the system loading reduced, this function will increase frequency back to correct Frequency. It helps to increase the success rate when extreme overclocking.

Disabled	Disable this item, apply OC settings during POST.
Mode 1	Low frequency through the operating system initialization.
Mode 2	Medium frequency through the operating system initialization.

▶ **D.O.T Control**
This item allows users to select either/both of CPU and PCIE to be controlled under D. O.T. The D.O.T. (Dynamic Overclocking Technology) is an automatic overclocking function, included in the MSI™'s newly developed Dual CoreCell™ Technology. It is designed to detect the load balance of CPU while running programs, and to adjust the best frequency automatically. When the motherboard detects system is running programs, it will speed up automatically to make the program run smoothly and faster. When the system 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.

▶ **CPU D.O.T3 step1/2/3 setting**
Due to D.O.T can detect the CPU loading and increase the frequency with 3 overclocking steps. These items allow users to select the speed up range of each step.

Important

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 / memory modules can afford to overclocking regularly first. If you find the PC appears to be unstable or reboot incidentally, it's better to disable the Dynamic Overclocking or to lower the level of overclocking options. By the way, if you need to conduct overclocking manually, you also need to disable the Dynamic OverClocking first.

▶ **Intel EIST**
The Enhanced Intel SpeedStep technology allows you to set the performance level of the microprocessor whether the computer is running on battery or AC power. This field will appear after you installed the CPU which support speedstep technology.

▶ **Intel C-STATE tech**
C-state is a power management state that significantly reduces the power of the processor during idle. This field will appear after you installed the CPU which support c-state technology.

▶ **Adjust CPU FSB Frequency (MHz)**
It is used to adjust CPU FSB frequency.

3-21

► **Adjusted CPU FSB Frequency (MHz)**
It shows the adjusted CPU frequency (FSB x Ratio). Read-only.

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

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                        Advance DRAM Configuration

  ▶ MEMORY-Z                     [Press Enter]        Help Item
    CAS Latency(CL)              [Auto]
    tRCD                         [Auto]          Memory SPD Configurati
    tRP                          [Auto]
    tRAS                         [Auto]
    1N/2N Memory Timing          [Auto]
    Advanced Memory Setting      [Auto]
```

► **MEMORY-Z**
Press <Enter> to enter the sub-menu and the following screen appears.

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                              MEMORY-Z

  ▶ DIMM1 Memory SPD Information   [Press Enter]       Help Item
  ▶ DIMM2 Memory SPD Information   [Press Enter]
  ▶ DIMM3 Memory SPD Information   [Press Enter]   Memory SPD Configurati
  ▶ DIMM4 Memory SPD Information   [Press Enter]
```

► **DIMM1/2/3/4 Memory SPD Information**
Press <Enter> to enter the sub-menu and the following screen appears.

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                       DIMM1 Memory SPD Information

  DIMM1 Memory SPD Information                       Help Item
  Memory Type:  DDR3 SDRAM
  Max Bandwidth:DDR3-1332(666Mhz)
  Manufacture:  OCZ
  Part Number:  OCZ3P1600EB1G
  Serial Number:00
  SDRAM Cycle Time:1.500ns(1CLK)
  DRAM TCL:     10.500ns(7CLK)
  DRAM TRCD:    10.500ns(7CLK)
  DRAM TRP:     10.500ns(7CLK)
  DRAM TRAS:    30.0ns(20CLK)
  DRAM TRFC:    90.0ns(60CLK)
  DRAM TWR:     15.0ns(10CLK)
  DRAM TWTR:    7.500ns(5CLK)
  DRAM TRRD:    6.0ns(4CLK)
  DRAM TRTP:    7.500ns(5CLK)
```

► **DIMM 1/2/3/4 Memory SPD Information**
These items display the current status of the current DIMM Memory speed information such as momory type, max bandwidth, manufacture, part number, serial number, SDRAM cycle time, DRAM TCL, DRAM TRCD, DRAM TRP, DRAM TRAS, DRAM TRFC, DRAM TWR, DRAM TWTR, DRAM TRRD and DRAM TRTP. They are read only.

▶ **FSB/DRAM Ratio**
This item will allow you to adjust the FSB/Ratio of the memory.

▶ **Adjusted DRAM Frequency (MHz)**
It shows the adjusted DDR Memory frequency. Read-only.

▶ **ClockGen Tuner**
Press <Enter> to enter the sub-menu and the following screen appears.

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                            ClockGen Tuner

CPU Clock Drive              [800mV]              Help Item
PCI Express Clock Drive      [800mV]
CPU CLK Skew                 [Normal]                Options
MCH CLK Skew                 [Normal]
                                                  700mV
```

▶ **CPU Clock Drive/ PCI Express Clock Drive**
These items are used to select the CPU/ PCI Express clock amplitude.

▶ **CPU CLK Skew/ MCH CLK Skew**
These items are used to select the CPU/ North Bridge chipset clock skew. They can help CPU to reach the higher overclocking performace.

▶ **Adjust PCI Frequency (MHz)**
This field allows you to select the PCI frequency (in MHz).

▶ **Auto Disable DIMM/PCI Frequency**
When set to [Enabled], the system will remove (turn off) clocks from empty DIMM and PCI slots to minimize the electromagnetic interference (EMI).

▶ **CPU Voltage (V)/ CPU GTL REF0/ CPU GTL REF1/ DRAM Voltage (V)/ DDR_VREF_CA_A/ DDR_VREF_CA_B/ DDR_VREF_DA_A/ DDR_VREF_DA_B/ MCH Voltage (V)/ MCH GTL REF/ VTT FSB Voltage/ ICH Voltage (V)**
These items dispaly the power status of CPU, Memory, FSB and chipset. Read-only.

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

Important

1. *If you do not have any EMI problem, leave the setting at [Disabled] for optimal system stability and performance. But if you are plagued by EMI, select the value of Spread Spectrum for EMI reduction.*
2. *The greater the Spread Spectrum value is, the greater the EMI is reduced, and the system will become less stable. For the most suitable Spread Spectrum value, please consult your local EMI regulation.*
3. *Remember to disable Spread Spectrum if you are overclocking because even a slight jitter can introduce a temporary boost in clock speed which may just cause your overclocked processor to lock up.*

CPU and Memory Clock Overclocking
The **D.O.T Control, Adjust CPU FSB Frequency, Adjust CPU Ratio, FSB/Memory Ratio** are the items for you to overclock the CPU and the Memory. Please refer to the descriptions of these fields for more information.

Important

*1. CPU Speed = CPU Frequency * CPU Ratio*
2. This motherboard supports overclocking greatly. However, please make sure your peripherals and components are bearable for some special settings. Any operation that exceeds product specification is not recommended. Any risk or damge resulting from improper operation will not be under our product warranty.

Two ways to save your system from failed overclocking...

Reboot

1. Press the Power button to reboot the system three times. Please note that, to avoid electric current to affect other devices or components, we suggest an interval of more than 10 seconds among the reboot actions.

2. At the fourth reboot, BIOS will determine that the previous overclocking is failed and restore the default settings automatically. Please press any key to boot the system normally when the following message appears on screen.

Warning !!! The previous overclocking had failed,
and system will restore its defaults setting,
Press any key to continue.......

Clear CMOS

- Please refer to "chapter 2" for more information about how to clear CMOS data.

User Settings

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                            User Settings

  Save Settings 1         [Press Enter]           Help Item
  Load Settings 1         [Press Enter]
  Save Settings 2         [Press Enter]       Save Current SETUP
  Load Settings 2         [Press Enter]       Settings to store.




    ↑↓←→:Move  Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
            F6:Load Optimized Defaults        F7 :Load Fail-Safe Defaults
```
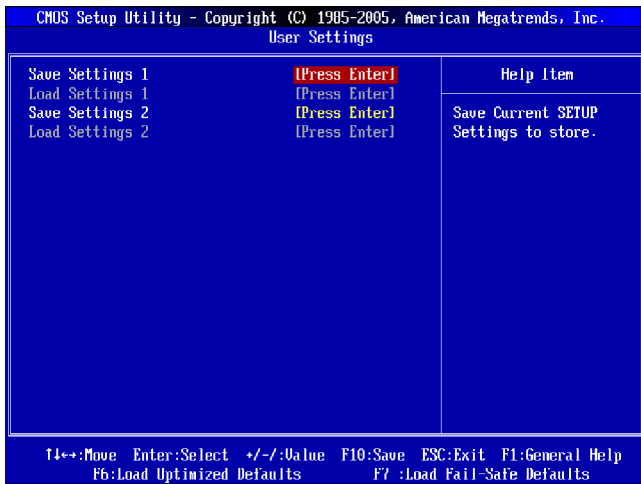
► **Save Settings 1/2**
Select this item and press "Enter" to save any changes you have made to your current settings.

► **Load Settings 1/2**
Select this item and press "Enter" to load settings from the store.

Load Fail-Safe/ Optimized Defaults

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

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

```
Load Fail-Safe Defaults?

  [Ok]      [Cancel]
```

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

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

```
Load Optimized Defaults?

  [Ok]      [Cancel]
```

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

Appendix A
X-Fi Xtreme Audio Card

The X-Fi Xtreme Audio card is powered by Creative CA0110 Audio chip. It supports up to 8-channel & SPDIF audio effect and allows users to attach 2, 4, 6, or 8 speakers for better surround sound effect. This manual will tell you about the specifications of the card, how to install it to a mainboard, how to connect 2, 4, 6, or 8 speakers to it, and to operate 2-, 4-, 6-, or 8-channel audio function.

MSI

MICRO-STAR INTERNATIONAL

Introduction

X-Fi Xtreme Audio Card is powered by Creative CA0110 Digital Audio Controller. This card provides advanced audio functions by offering a comprehensive suite of software applications. The advanced tools and amazing features provided will allow you to experience a full array of exciting activities, such as listening to effects enhanced music, watching a multi-channel movie, playing the latest game or recording a high quality audio track.

S/PDIF-Out Connector - Pin definition
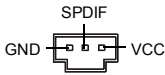
Front Panel Audio Connector - Pin definition
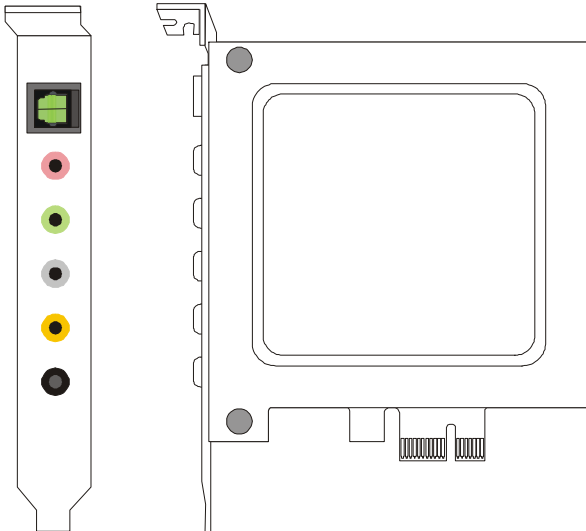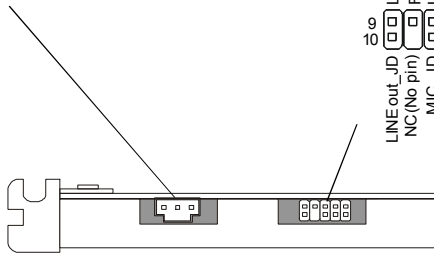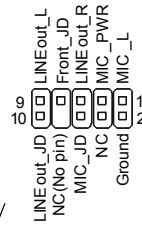
Features

High Definition Audio Quality
 - 144-pin LQFP ASIC with 64 audio channel playback at independent sample rates
 - 24-bit Analog-to-Digital conversion of analog inputs at 96kHz sample rate
 - 24-bit Digital-to-Analog conversion of digital sources at 96kHz to analog 7.1 speaker output
 - 16-bit and 24-bit recording with sampling rates of 8, 11.025, 16, 22.05, 24, 32, 44.1, 48 and 96kHz
 - SPDIF output up to 24-bit resolution at selectable sampling rate of 44.1, 48 or 96kHz

EAX® ADVANCED HD™ Audio Technology
 - User-selectable EAX ADVANCED HD MUSIC presets, pre-configurable modes simulating various acoustic environments
 - Optimized settings for headphones, stereo, 4.1, 5.1, 6.1 or 7.1 speakers
 - Creative Multi-Speaker Surround™ (CMSS®) technology transforms all stereo audio into 7.1 multi-channel playback

Realistic Wave-Table Synthesis
 - 64-Voice polyphony and multi-timbral capability
 - 128 GM & GS compatible instruments and 10 drum kits
 - 2MB or 4MB GM SoundFont Bank included

Sound Blaster Live! 24-bit Input/Output
 - Line level out (Front/ Side/ Rear/ Centre/ Subwoofer) or Headphone out
 - Line In / Microphone In
 - S/PDIF In and S/PDIF Out
 - Auxiliary Audio in

Works with the Following Standards
 - Windows® XP SP2 and Vista
 - Sound Blaster MIDI and General MIDI
 - Microsoft® DirectSound®, DirectSound 3D & derivatives
 - Plug and Play
 - Sound Blaster PCI
 - EAX® ADVANCED HD™
 - EAX
 - PCI 2.3 compliant
 - AC97 compliant

Sound Blaster Live! 24-bit Audio Performance
 - Signal-to-Noise Ratio (A-Weighted) = 100 dB (2V)
 - Frequency Response at -3 dBr = <10 Hz to 40 kHz

Hardware Installation

Installing the Card

The interface of X-Fi Xtreme Audio Card is PCI-E x1. You can install it to the PCI-E x1 slot. Follow the steps below to install the card, then you can activate the advanced function and enjoy the audio effect.

1. Turn off your computer and disconnect the power cord.
2. Open and remove the case of the computer.
3. Find an empty PCI-E x1 slot. Or you can also install it to PCI-E x4, or x16 slot, only the speed remains x1.
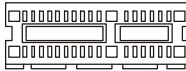
4. Remove the bracket which may obstruct the PCI-E x1 slot.
5. Gently but firmly install the X-Fi Xtreme Audio Card to the PCI-E slot and secure the card bracket with a screw.
6. Replace and secure the case. Reconnect the power cord to the computer.

Select Audio Controller

If your mainboard integrates audio function or an audio card installed, after installing the X-Fi Xtreme Audio Card and its driver, there will be two audio controllers available on your system. Either one can be selected and used at a time. Please follow the steps below to select and operate.

1. Go to **Control Panel**, double click on the **Sound and Audio Devices**.
2. Select **Sound Blaster X-Fi Xtreme Audio** in the **Default Device** drop-down menus of **Audio** and **Voice** tags.
3. Click OK button to save settings and close the window.
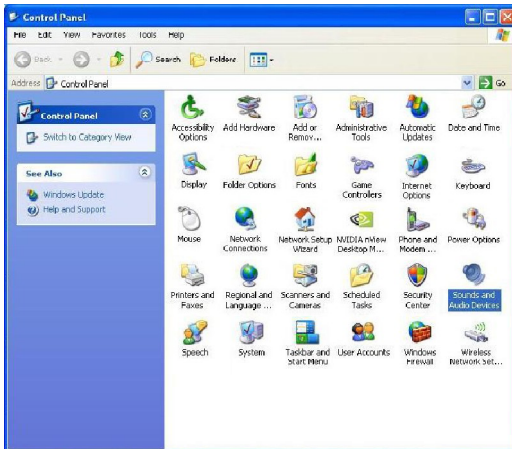
4. If you need to use the function of another audio controller, select the corresponding option.

Connecting the Speakers

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

n 2-Channel Mode for 2-Speaker Output

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

2-Channel Analog Audio Output

1. S/PDIF Out-Optical
2. MIC & Line-In
3. Line Out *(Front channels)*
4. No function
5. No function
6. No function
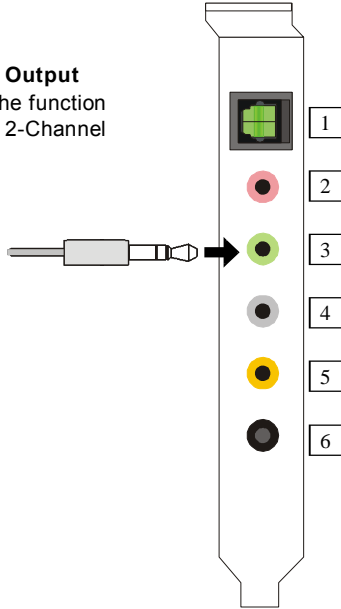
n 4-Channel Mode for 4-Speaker Output

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

4-Channel Analog Audio Output

1. S/PDIF Out-Optical
2. MIC & Line-In
3. Line Out *(Front channels)*
4. No function
5. No function
6. Line Out *(Rear channels)*

A-5
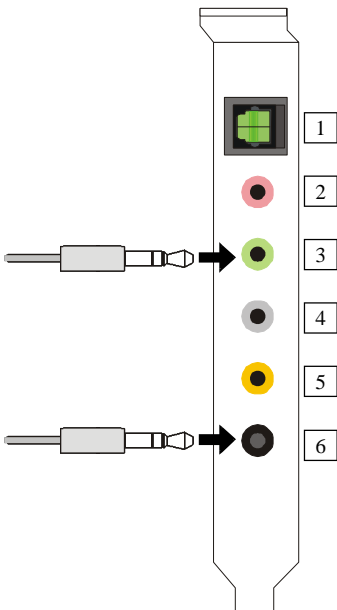
n 6-Channel Mode for 6-Speaker Output
Refer to the diagram and caption for the function of each jack on the back panel when 6-Channel Mode is selected.

6-Channel Analog Audio Output
1 S/PDIF Out-Optical
2 MIC & Line-In
3 Line Out *(Front channels)*
4 No function
5 Line Out *(Center and Subwoofer channel)*
6 Line Out *(Rear channels)*
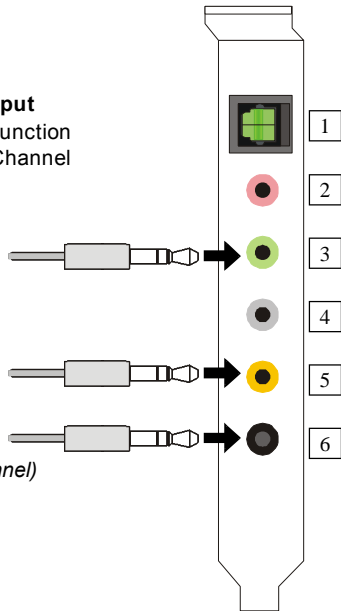
n 8-Channel Mode for 8-Speaker Output
Refer to the diagram and caption for the function of each jack on the back panel when 8-Channel Mode is selected.

8-Channel Analog Audio Output
1 S/PDIF Out-Optical
2 MIC & Line-In
3 Line Out *(Front channels)*
4 Line Out *(Side channels)*
5 Line Out *(Center and Subwoofer channel)*
6 Line Out *(Rear channels)*
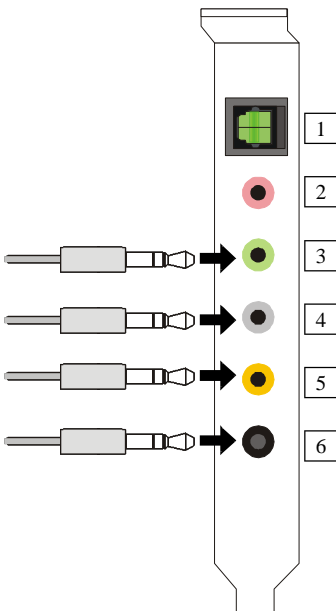
Installing the Creative Audio Driver

You need to install the driver for Creative CA0110 to function properly before you can get access to 2-, 4-, 6- or 8- channel and SPDIF audio operations. Follow the procedures below to install the drivers for Windows 2000/ XP/ VISTA operating system.

Installation for Windows XP/ VISTA
Install Windows® XP Service Pack 1 for Windows® XP before installing the driver.

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

1. Insert the Creative audio driver CD into the CD-ROM drive. The setup screen will automatically show on the screen as below.

2. Click **Next** to go to next page.

Important

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

A-7

3. Select your region from the list .

4. Select the language that you need from the list .

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

6. Finally, you have to **restart** the system after the installation is done .

Software Configuration

After installing the creative audio driver, you are able to use the 2-, 4-, 6- or 8-channel and the SPDIF audio features. Double click on the creative volume control audio icon 🔊 from the system tray at the lower-right corner of the screen to activate the Sound Blaster X-Fi Xtreme Audio Applications, simply click on each icon to enter the configuration screen. Or you can move the mouse cursor to the top of screen and a **Creative MediaSource Go** quick start bar will float on the desktop, simply click on each icon to enter the configuration screen.

Creative MediaSource Go quick start bar
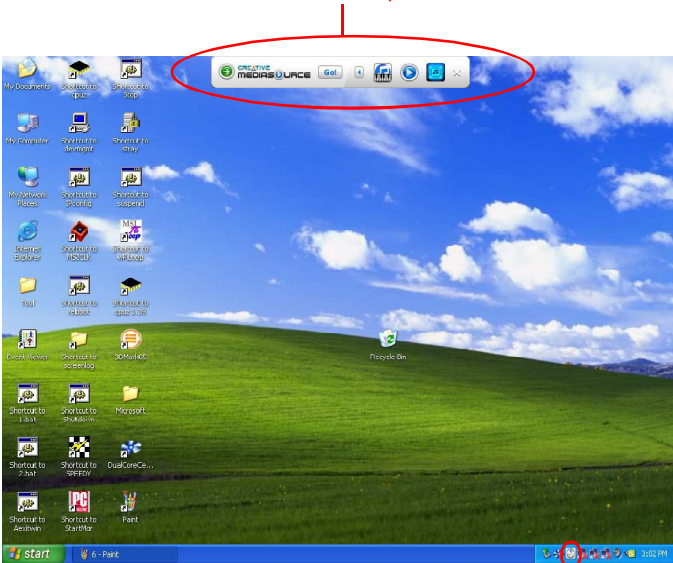
Creative volume control icon

Creative MediaSource Go! Launcher

Click on the **Creative MediaSource Go! Launcher** icon to enter its configuraton screen.

Creatvie MediaSource Go! Launcher consists of various tabs such as **Programs, Product Settings, Product Support and Companion Products**. In each tab, you can access different applications, called Tasks. For more information and usage details on each Task, please refer to its online Help (simply click on the "?" button to get the online help information).

click on this button to get the online help information

Soundfont Bank Manager

Click on the **SOUNDFONT® BANK MANAGER** icon to enter its configuraton screen.

With SoundFont Bank Manager (SFBM), you can:

click on this button to get the online help information

- Load SoundFont banks
Replace the default sounds on your computer with the high-quality sound of a SoundFont bank.

- Adjust SoundFont cache memory
Allocate SoundFont cache memory according to your needs, to better utilize the memory resources of yout computer.

- Audition presets on your computer
The virtual keyboard in SFBM allows you to audition presets quickly on your computer. You can also audition presets from an external MIDI device, such as a MIDI keyboard.

- Edit SoundFont banks
Perfrom simple editing tasks like creating new SoundFont banks, and copying presets from one SoundFont to another.

For more information and usage details on each Task, please refer to its online Help (simply click on the "?" button to get the online help information).

> **Important**
>
> *SFBM is compatible with SoundFont 1.0, 2.0, and 2.1 file formats.*

Creative MediaSource^{TM} Play/ Organizer

Click on the **Creative MediaSource^{TM} Play/ Organizer** icon to enter its configuraton screen.

Creative MediaSource^{TM} Player/ Oraganizer is your digital music center for playing , creating, organizing and transferring digital music. This is your ultimate all-in-one digital entertainment software.
With Creative MediaSource^{TM} Player/ Oraganizer, you can:

click on this button to get the online help information

- Clean up and convert your vinyl records and cassette tapes to digital formats with the integrated recorder.
- Rip CDs and create high quality digital audio files (up to 320 kbps for WMA).
- Use the Super Rip feature on your audio CDs to get superior quality audio tracks enhanced with X-Fi Cystalizer, X-Fi CMSS-3D Surround and X-Fi CMSS-3D Headphone effects.
- 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 your type.
- Transfer tracks and files seamlessly to and from your digital audio players 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.
- Play Copy Control^{TM} CDs.
- Use Smart Crossfade to enjoy continuous audio. Smart Crossfade uses crossfading and beatmatching to link tracks together.
- Add cover art to audio files.
Some features and options are available only with selected products.

For more information and usage details on each Task, please refer to its online Help (simply click on the "?" button to get the online help information).

Entertainment Mode Console

Click on the **Entertainment Mode** icon to enter its configuraton screen.
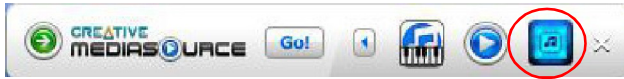
In Entertainment Mode, you audio device is optimized for movie soundtrack and music playback.
You can configure Entertainment Mode settings in the Entertainment Mode consloe. With the Entertainment Mode console, you can:

click on this button to get the online help information
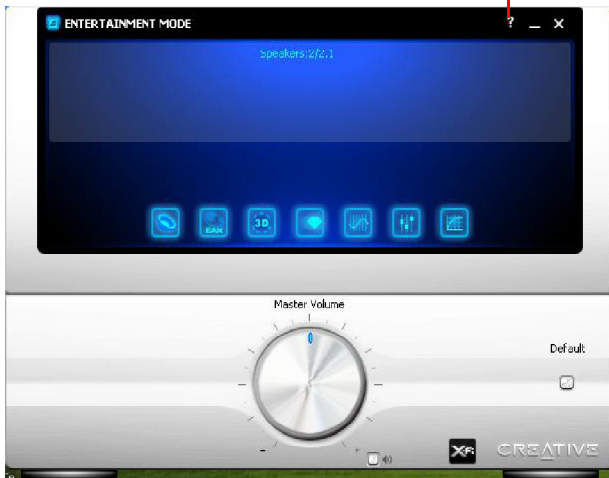
- Adjust master volume or speaker volume, bass and treble levels.
- Adjust volume mixer settings.
- Configure playback settings for your speakers or headphones.
- Adjust equalizer settings.
- Enable environment effects.
- Enable multichannel upmixing.
- Enable virtual surround sound.
- Enhance detail and impact of audio with X-Fi™ Crystalizer™.
Some choices are different for selected audio devices.

For more information and usage details on each Task, please refer to its online Help (simply click on the "?" button to get the online help information).

The following table lists the function of each control on the main interface.

✕	Close button - Click on this button to close the Entertainment Mode console.
▬	Minimize button - Click on this button to minimize the Entertainment Mode window to the task bar.
?	Help button - Click on this button to read information about the Entertainment Mode console. Select Help Contents to display the online Help. Click the Contents tab and select a topic, or click on the Search tab and search for a specific topic by entering a keyword.
	Volume control - Turn this knob to adjust master volume or speaker volume.
	Mute button - Click on this button to mute the master volume or speaker volume.
Default	Default button - Click on this button to revert all the settings in Entertainment Mode to the default.
← Main Display	Main Display button - Click on this button to revert to the main display. This button disappears when you are in the main display.
	Speaker button - Click on this button to show speaker settings.
	Jack Sensing button - Click on this button to show the jacks connected. (Available only in Windows Vista.)
EAX	EAX Effects button - Click on this button to display EAX Effects settings.
3D	X-Fi CMSS-3D button - Click on this button to show X-Fi CMSS-3D settings.
	X-Fi Crystalizer button - Click on this button to show X-Fi Crystalizer settings.
	EQ button - Click on this button to show EQ settings.
	Mixer button - Click on this button to show volume mixer settings.
	Performance button - Click on this button to show sampling rate and bit depth settings. (Available in Windows XP and Windows 2000.)

Speaker & Headphone

Click on the speaker button to enter its configuration screen.

Here you can adjust your speakers configuration. Select the type of your speaker system, and adjust the volume and cuff 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 connected.
- Testing your speakers => click on the Channel or Noise button to test the speakers.

For more information and usage details on MIXER, refer to its online Help (click on the "?" button).

X-Fi CMSS-3D

Click on the X-Fi CMSS-3D button to enter its configuration screen.

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 X-Fi CMSS-3D Virtual** item. Then you can select CMSS for multichannel audio enhancement on 4/4. 1, 5.1, 6.1 or 7.1 speaker systems.
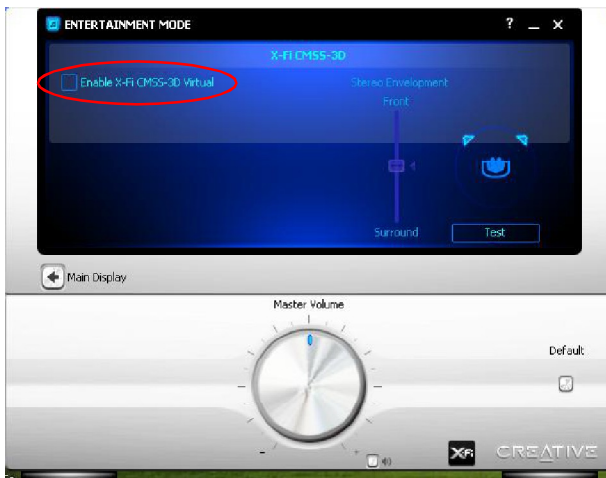
Important

*To enable the **X-Fi CMSS-3D Virtual** item when you want to use 4/ 5.1/ 7. 1 channel audio-out.*
The multichannel upmix depends on your speakers and the speaker settings. For example, if you want to upmix to 5.1 channels, make sure you have connected 5.1-channel speakers to audio jacks, and have selected the 5.1 speaker option in your speakers & headphone setup.

Appendix B
Dual Core Center

Dual CoreCenter, the most useful and powerful utility that MSI has spent much research and efforts to develop, helps users to monitor or configure the hardware status of MSI Mainboard & MSI Graphics card in windows, such as CPU/GPU clock, voltage, fan speed and temperature.

Before you install the Dual CoreCenter, please make sure the system has meet the following requirements:

1. Intel Pentium4 / Celeron or newer CPU.
2. 256MB system memory.
3. CD-ROM drive for software installation.
4. Operation system: Windows XP.
5. DotNet Frame Work 2.0

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Activating Dual Core Center

Once you have your Dual Core Center installed (locate the setup source file in the setup CD accompanying with your mainboard, path: **Utility --> MSI Utility --> Dual Core Center**), 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 Dual Core Center.

short-cut icon in the system tray
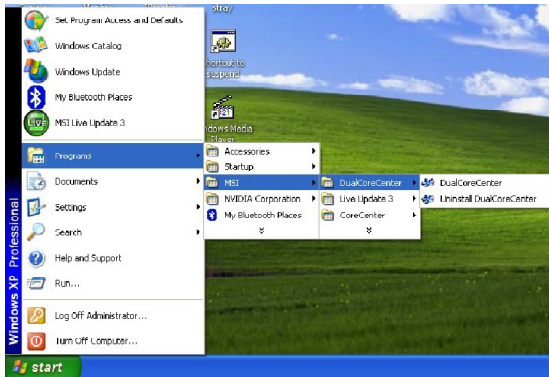
short-cut path in the start-up menu
(path: Start-->Programs-->MSI-->
DualCoreCenter-->DualCoreCenter)

Main

Before using this utility, we have to remind you: only when installing the MSI V044 (V044 has to install with the version 8.26 or newer driver)/ V046 or V060 graphics card can activate the full function of this utility. If you install a graphics card of other brand, only hardware status of the MSI mainboard would be available.

Introduction:

Click each button appearing above to enter sub-menu to make further configuration or to execute the function.

> ***MB***
> Click MB button to read current CPU temperature, FSB and CPU clock of mainboard will show below.
>
> ***VGA***
> Click VGA button to read current GPU temperature, GPU clock and memory clock of graphics card will show below.
>
> ***DOT***
> Click DOT button to enable or disable the Dynamic Overclocking Technology.
>
> ***Green Power***
> Click it to enter the GreenPower Center menu. Please read the GreenPower Genie user guide that be included in the mainboard package for details.

B-3

AV/ Game/ Office/ Silence/ Cool

MSI provides five common settings for different environments. The settings had been set to optimal values to reach better performance in each environment. Click the button you need.

Important

Before clicking the AV/ Game/ Office/ Silence or Cool button, select Smooth mode or Sharp mode to decide whether you want the system to reach the optimal values smoothly or quickly.

Sharp mode ———— *Smooth mode*

Clock

In this sub-menu, you can adjust and monitor the clocks of MB and graphics card.

Voltage

In this sub-menu, you can adjust and monitor the voltages of MB and graphics card.

FAN Speed

In this sub-menu, you can adjust and monitor the fan speeds of MB and graphics card.

Temperature

In this sub-menu, you can monitor the temperatures of MB and graphics card.

User Profile

In this sub-menu, you can set the values of clock, voltage and fan speed by your need and save them in a profile. You can save 3 profiles for further use.

Important

Click on the icon, the clock, voltage, fan, and temperature buttons will appear beside the icon.
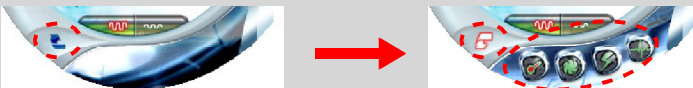
DOT (Dynamic OverClocking)

Dynamic Overclocking Technology is an automatic overclocking function, included in the MSI™'s newly developed Dual CoreCenter Technology. It is designed to detect the loading of CPU/ GPU while running programs, and to over-clock automatically. When the motherboard detects that the loading of CPU is exceed the default threshold for a time, it will speed up the CPU and fan automatically to make the system run smoother and faster. When the graphics card detects that the loading of GPU is exceed the default threshold for a time, it will speed up the GPU, memory, fan and voltage automatically to make the system run smoother and faster. When the CPU/ GPU is temporarily suspending or staying in low loading balance, it will restore the default settings instead. Usually the Dynamic Overclocking Technology will be powered only when users' PC runs huge amount of data, like 3D games or video process, and the motherboard/ graphicd card need to be boosted up to enhance the overall performance. There will be several selections when you click the DOT rate button (include increase rate [ ] and decrease [ ] rate buttons), to select the DOT level, then you have to click the DOT button [ ] to apply the DOT function.
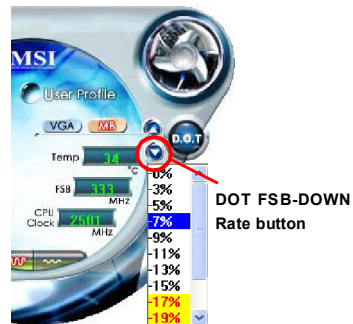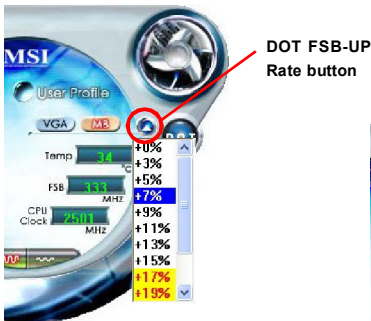
DOT FSB-UP
Rate button

DOT FSB-DOWN
Rate button

Important

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 overclock regularly first. If you find the PC appears to be unstable or reboot incidentally, it's better to lower the level of overclocking options. By the way, if you need to conduct overclocking manually, please do not to apply the DOT function.

Clock

In the **Clock** sub-menu, you can see clock status (including FSB/ CPU clock of mainboard and GPU/ memory clock of graphics card) of your system. And you can select desired value for overclocking. There will be several items for you to select for overclocking after you click [▼   ] button. You can click the plus sign button [+] to increase the clock, or click the minus sign button [−] to decrease the clock. And finally, click the Apply button to apply the values adjusted. If you do not want to apply the adjustments, click the Cancel button to cancel. Or click the Default button to restore the default values.
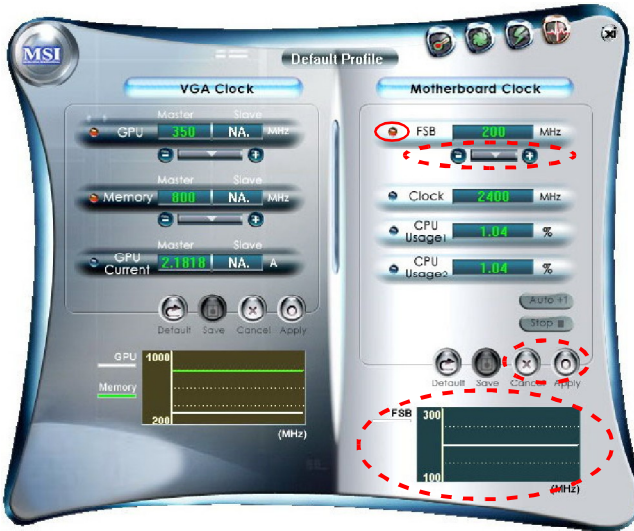
On the underside, it shows the graphs of the clocks. Only the curves of the item which the button is lit up with red color will be shown.

Important

*In the user profile, clicking the **Save** button can save the changes to it. In the default profile, the Save button is not available.*

Voltage

In the **Voltage** sub-menu, you can see voltage status (including Vcore, memory, GPU voltage... etc.) of your system, and you can select desired value for overclocking. It will show several items to select for overclocking after you click the ▼ button. You can click the plus sign button 🔵 to increase the voltage, or click the minus sign button 🔵 to decrease. And finally, click the Apply button to apply the adjustments. If you do not want to apply the adjustments, click the Cancel button to cancel. Or click the Default button to restore the default values.

On the underside, it shows the graphs of the voltages. Only the curves of the item which the button is lit up with red color will be shown.

Important

*In the user profile, clicking the **Save** button can save the changes to it. In the default profile, the Save button is not available.*

FAN Speed

In the **FAN Speed** sub-menu, you can read fan status of your system. Select higher speed for better cooling effect. There are several sections for you to change the fan speed to a section after clicking [_____▼] button. Click the plus sign button ⊕ to increase the fan speed to a section, or click the minus sign button ⊖ to decrease. Or click the Default button to restore the default values.
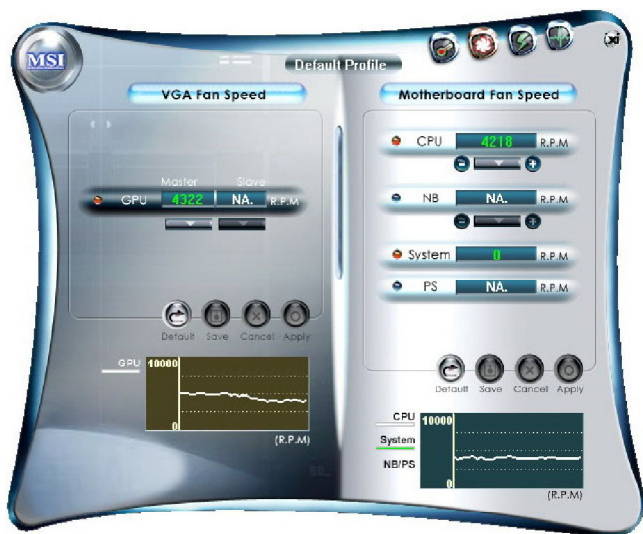
On the underside, it shows the graphs of the fan speed. Only the curves of the item which the button is lit up with red color will be shown.

Important

1. *When you set the fan speed manually, please make sure to disabled the "CPU Smart FAN Target" item in the BIOS.*
2. *In the user profile, clicking the **Save** button can save the changes to it. In the default profile, the Save button is not available.*

Temperature

In the **Temperature** sub-menu, you can see temperature status of your system.
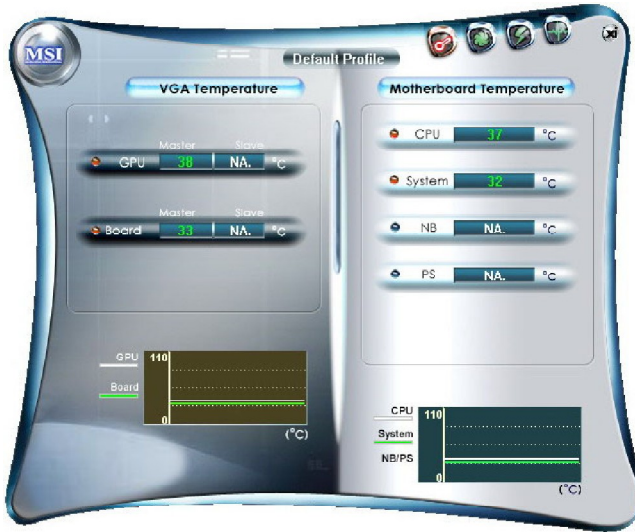
On the underside, it shows the graphs of the temperatures. Only the curves of the item which the button is lit up with red color will be shown.

User Profile

In the **User Profile** sub-menu, click the setting button that besides the user profile bar, and the next screen will appear.
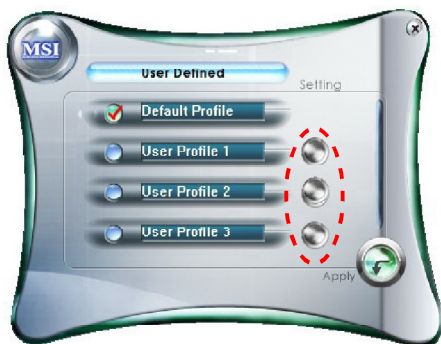
Here you can define the clock/ fan speed/ voltage by your need, click the button to choose a value quickly, or click the plus / minus sign button to increase/ decrease the value.

Use the draw bar to set the max system temperature. When the system temperature exceeds the threshold you defined, the system will pop up a warning message and shut down the system.

Use the draw bar to set the minimal fan speed. When the fan speed is lower than the threshold you defined, the system will pop up a warning message.

After setting all values you need, you can change the user profile name in the box then click the save button to save all changes in a profile.
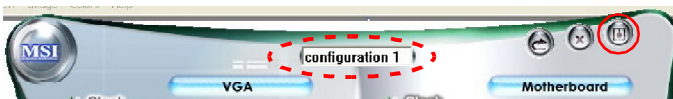
Finally, you can choose the user profile by click the button in the left side and click the Apply button to load the user profile.
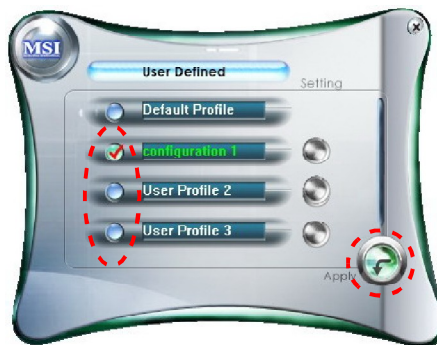
Appendix C
Intel ICH10R SATA RAID

This appendix will assist users in configuring and enabling RAID functionality on platforms

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ICH10R Introduction

The ICH10R provides a hybrid solution that combines 6 independent SATAII ports for support of up to 6 Serial ATAII (Serial ATAII RAID) drives.

Serial ATAII (SATAII) is the latest generation of the ATA interface. SATA hard drives deliver blistering transfer speeds up to 3Gb/s. Serial ATA uses long, thin cables, making it easier to connect your drive and improving the airflow inside your PC. The most outstanding features are:

1. Supports 3Gb/s transfers with CRC error checking.
2. Supports Hot-plug-n-play feature.
3. Data handling optimizations including tagged command queuing, elevator seek and packet chain command.

Intel® ICH10R offers RAID level 0 (Striping), RAID level 1 (Mirroring and Duplexing), RAID level 5 (Block Interleaved Distributed Parity), RAID level 10 (A Stripe of Mirrors), Intel® Martix Storage Technology and Intel® Rapid Recover Technology.

RAID 0 breaks the data into blocks which are written to separate hard drives. Spreading the hard drive I/O load across independent channels greatly improves I/O performance.

RAID 1 provides data redundancy by mirroring data between the hard drives and provides enhanced read performance.

RAID 5 Provides data striping at the byte level and also stripe error correction information. This results in excellent performance and good fault tolerance. Level 5 is one of the most popular implementations of RAID.

RAID 10 Not one of the original RAID levels, multiple RAID 1 mirrors are created, and a RAID 0 stripe is created over these.

Intel Matrix RAID Technology is the advanced ability for two RAID volumes to share the combined space of two hard drives being used in unison.

Intel Rapid Recover Technology utilizes RAID 1 functionality to copy data from a designated Master drive to a designated Recovery drive. The size of the Mater drive must be less than or equal to the size of the Recovery drive. When a Recovery volume is created, complete capacity of the Master drive will be used as the Master volume. Only one Recovery Volume can exist on a system. There are 2 methods of updating the data on the Master to the Recovery drive. They are Continuous Update Policy and On Request Update Policy.

> **Important**
>
> *The least number of hard drives for RAID 0, RAID 1, Recovery or Matrix mode is 2. The least number of hard drives for RAID 10 mode is 4. And the least number of hard drives for RAID 5 mode is 3.*
> *All the information/ volumes/ pictures listed in your system might differ from the illustrations in this appendix.*

BIOS Configuration

The Intel Matrix Storage Manager Option ROM should be integrated with the system BIOS on all motherboards with a supported Intel chipset. The Intel Matrix Stroage Manager Option ROM is the Intel RAID implementation and provides BIOS and DOS disk services. Please use <Ctrl> + <I> keys to enter the "Intel(R) RAID for Serial ATA" status screen, which should appear early in system boot-up, during the POST (Power-On Self Test). Also, you need to enable the RAID function in BIOS to create, delete and reset RAID volumes.

Using the Intel Matrix Stroage Manager Option ROM

1. Creating, Deleting and Resetting RAID Volumes:

The Serial ATA RAID volume may be configured using the RAID Configuration utility stored within the Intel RAID Option ROM. During the Power-On Self Test (POST), the following message will appear for a few seconds:

Important

The "Driver Model", "Serial #" and "Size" in the following example might be different from your system.

After the above message shows, press <Ctrl> and <I> keys simultaneously to enter the RAID Configuration Utility.

Important

The following procedure is only available with a newly-built system or if you are reinstalling your OS. It should not be used to migrate an existing system to RAID.

After pressing the <Ctrl> and <I> keys simultaneously, the following window will appear:
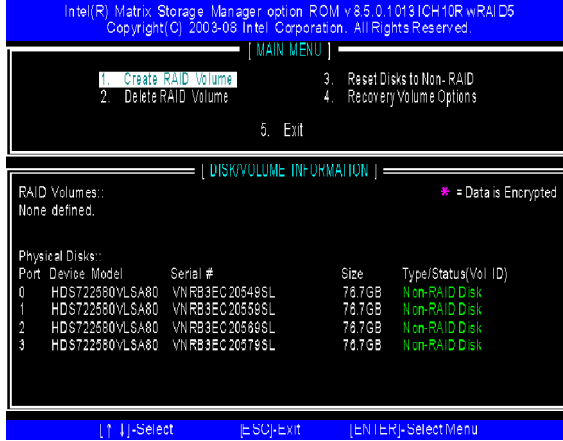
(1) Create RAID Volume

1. Select option 1 "Create RAID Volume" and press <Enter> key. The following screen appears. Then in the **Name** field, specify a RAID Volume name and then press the <TAB> or <Enter> key to go to the next field.
2. Use the arrow keys to select the RAID level best suited to your usage model in **RAID Level**.
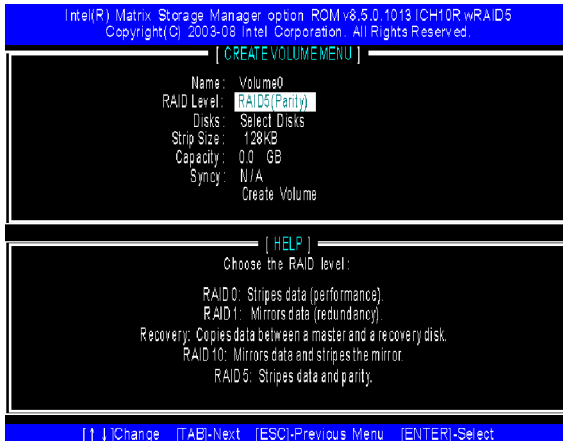
3. In the **Disk** field, press <Enter> key and the following screen appears. Use <Space> key to select the disks you want to create for the RAID volume, then click <Enter> key to finish selection.
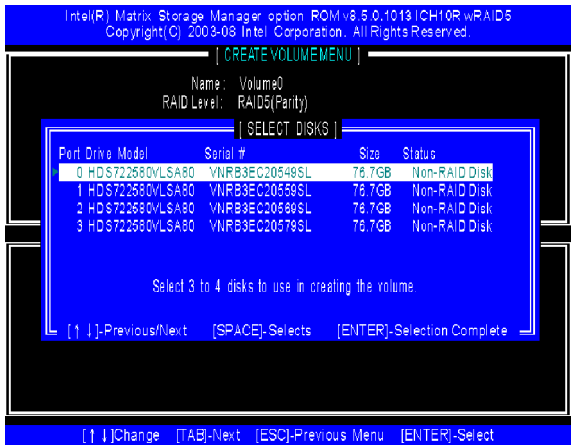
4. Then select the strip value for the RAID array by using the "upper arrow" or "down arrow" keys to scroll through the available values, and pressing the <Enter> key to select and advance to the next field. The available values range from 4KB to 128 KB in power of 2 increments. The strip value should be chosen based on the planned drive usage. Here are some typical values:
   RAID0 – 128KB
   RAID10 – 64KB
   RAID5 – 64KB

5. Then select the capacity of the volume in the **Capacity** field. The default value is the maximum volume capacity of the selected disks.
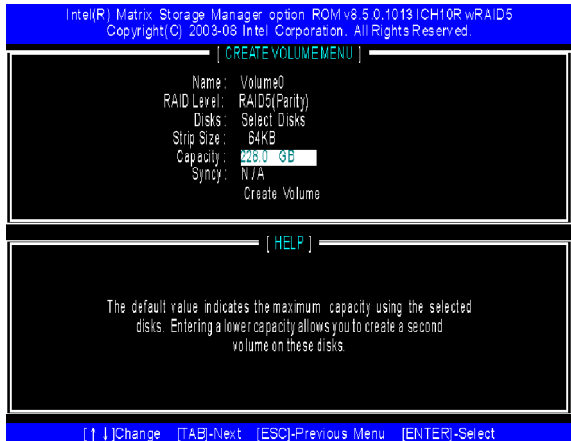
Important

Since you want to create two volumes (Intel Matrix RAID Technology), this default size (maximum) needs to be reduced. Type in a new size for the first volume. As an example: if you want the first volume to span the first half of the two disks, re-type the size to be half of what is shown by default. The second volume, when created, will automatically span the remainder of two hard drives.

6. Then the following screen appears for you to confirm if you are sure to create the RAID volume. Press <Y> to continue.
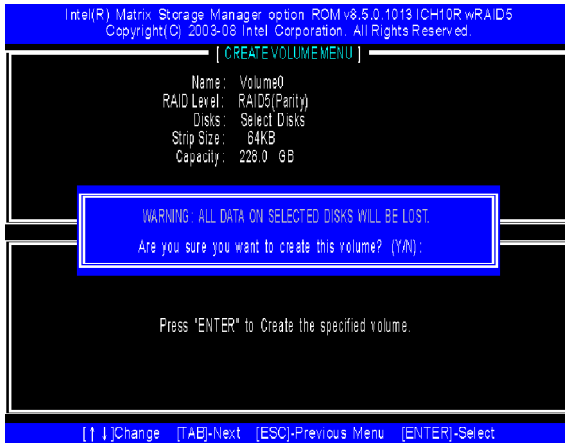
7. Then the following screen appears to indicate that the creation is finished.
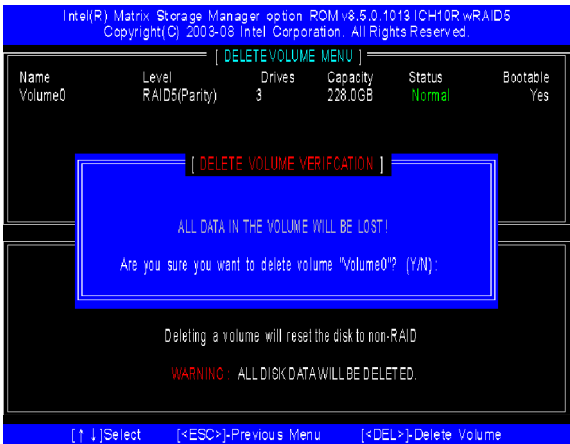
(3) Reset Disks to Non-RAID

Select option 3 **Reset Disks to Non-RAID** and press <Enter> to delete the RAID volume and remove any RAID structures from the drives. The following screen appears:

Press <Y> key to accept the selection.

Important

1. You will lose all data on the RAID drives and any internal RAID structures when you perform this operation.
2. Possible reasons to 'Reset Disks to Non-RAID' could include issues such as incompatible RAID configurations or a failed volume or failed disk.

(4) Recovery Volume Options

Select option 4 **Recovery Volume Options** and press <Enter> to change recovery volume mode. The following screen appears:
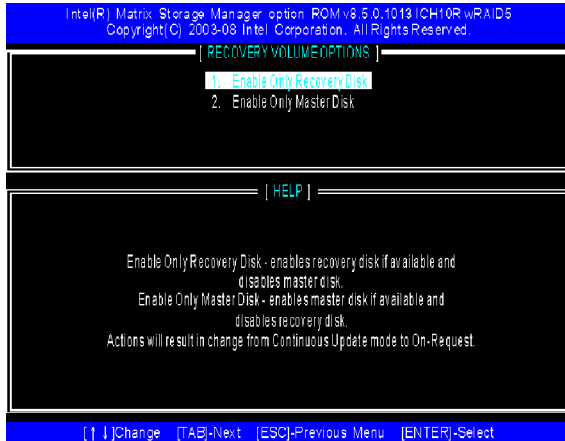
Recovery mode will change from Continuous Update to On-Request after you enable Only Recovery Disk or Only Master Disk.

Installing Driver

Install Driver in Windows Vista / XP / 2000

† **New Windows Vista / XP / 2000 Installation**

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

1. When you start installing Windows XP and older operating systems, you may encounter a message stating, "Setup could not determine the type of one or more mass storage devices installed in your system". If this is the case, then you are already in the right place and are ready to supply the driver. If this is not the case, then press F6 when prompted at the beginning of Windows setup.
2. Press the "S" key to select "Specify Additional Device".
3. You should be prompted to insert a floppy disk containing the Intel® RAID driver into the A: drive.
   Note: For Windows Vista you can use Floppy, CD/DVD or USB.

> **Important**
>
> *Please follow the instruction below to make an "Intel® 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 \\IDE\Intel\ICH10R\Floppy to a formatted floppy diskette.*
> *4. The driver diskette for Intel® ICH10R RAID Controller is done.*

4. For Windows Vista:
   During the Operating system installation, after selecting the location to install Vista click on "Load Driver" button to install a third party SCSI or RAID driver.
5. When prompted, insert the floppy disk or media (Floppy, CD/DVD or USB) you created in step 3 and press Enter.
6. You should be shown a list of available SCSI Adapters. This list should include "Intel(R) 82801HEM SATA RAID Controller(ICH8M-E)" when the system is in RAID mode and "Intel(R) 82801HEM SATA AHCI Controller(ICH8M-E)" or "Intel(R) 82801HBM SATA AHCI Controller(ICH8M)" when the system is in AHCI mode.
7. Select the appropriate Intel RAID controller and press ENTER.
8. The next screen should confirm that you have selected the Intel® RAID controller. Press ENTER again to continue.
9. You have successfully installed the Intel® Matrix Storage Manager driver, and Windows setup should continue.
10. Leave the disk in the floppy drive until the system reboots itself. Windows setup will need to copy the files from the floppy again after the RAID volume is formatted, and Windows setup starts copying files.

† **Existing Windows Vista/XP/2000 Driver Installation**
1. Insert the MSI CD into the CD-ROM drive.
2. The CD will auto-run and the setup screen will appear.
3. Under the Driver tab, click on *Intel IAA RAID Edition*.
4. The drivers will be automatically installed.

† **Confirming Windows Vista/XP/2000 Driver Installation**
1. From Windows Vista/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 *Intel(R) ICH10R SATA RAID Controller* should appear.

Installing Software

Install Intel Matrix Storage Console

The Intel Application Accelerator RAID Edition driver may be used to operate the hard drive from which the system is booting or a hard drive that contains important data. For this reason, you cannot remove or un-install this driver from the system after installation; however, you will have the ability to un-install all other non-driver components.

Insert the MSI CD and click on the **Intel IAA RAID Editor** to install the software.
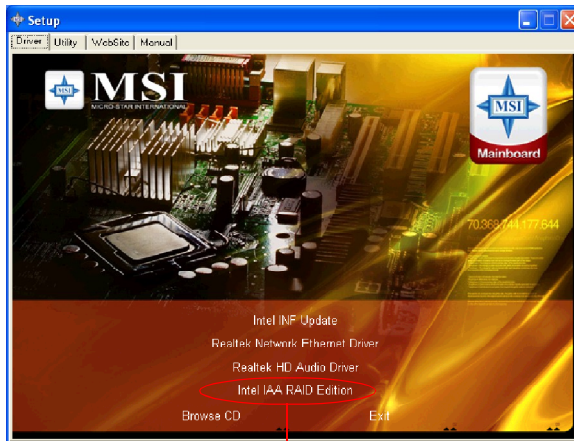
Click on this item

The **InstallShield Wizard** will begin automatically for installation showed as following:
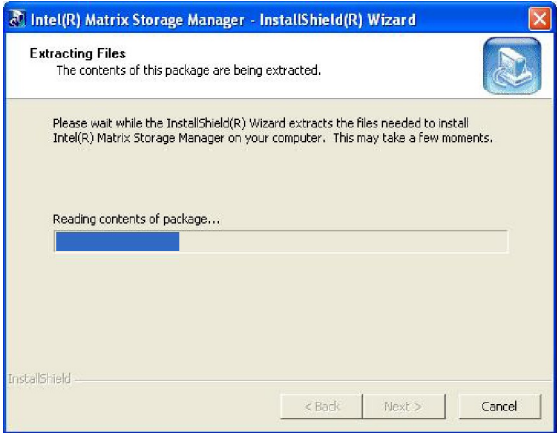
Click on the **Next** button to proceed the installation in the welcoming window.
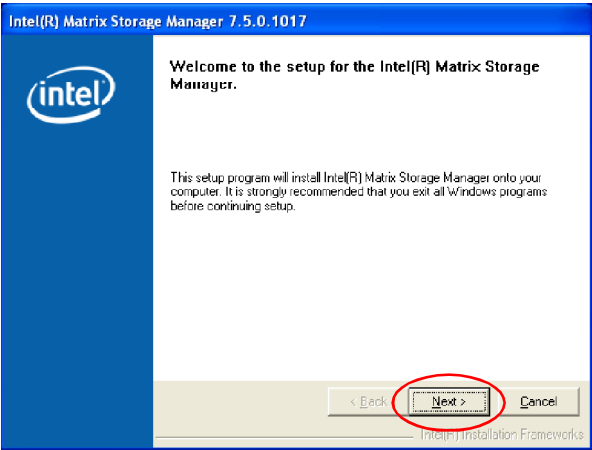
The window shows the components to be installed. Click **Next** button to continue.
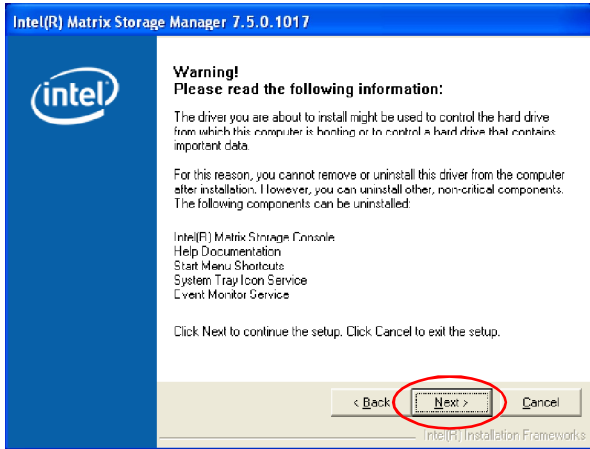
After reading the license agreement in the following window, click **Yes** button to continue.
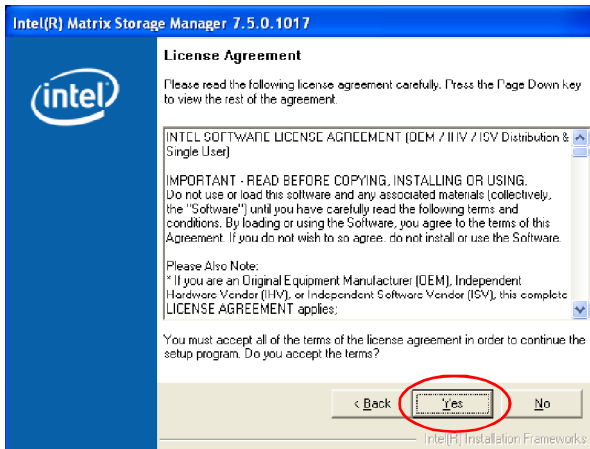
The following window appears to show the Readme File Information. It shows the system requirements and installation information.
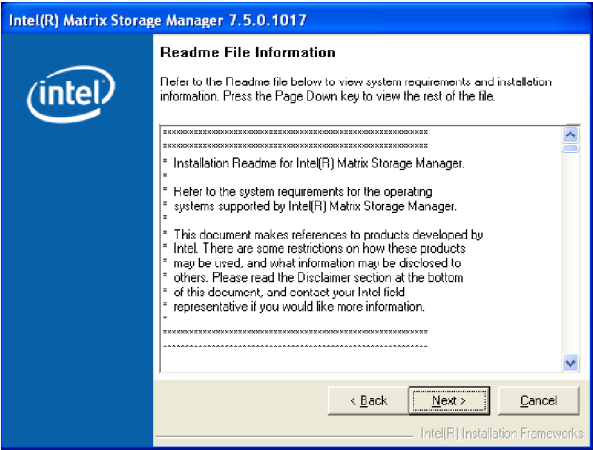
Once the installation is complete, the following window appears.
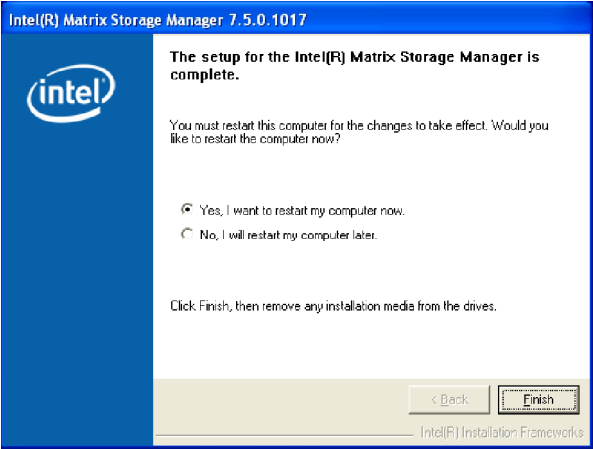
RAID Migration Instructions

The Intel Matrix Storage Console offers the flexibility to upgrade from a single Serial ATA (SATA) hard drive to RAID configuration when an additional SATA hard drive is added to the system. This process will create a new RAID volume from an existing disk. However, several important steps must be followed at the time the system is first configured in order to take advantage of RAID when upgrading to a second SATA hard drive:

1. BIOS must be configured for RAID before installing Windows on the single SATA hard drive. Refer to **On-Chip ATA Devices** for properly setting of the BIOS.
2. Install the Intel Application Accelerator RAID Driver during Windows Setup. Refer to **Installing Software** for instructions on installing the driver during Windows Setup.
3. Install the Intel Matrix Storage Console after the operating system is installed.

To create a volume from an existing disk, complete the following steps:

Important

*A **Create from Existing Disk** operation will delete all existing data from the added disk and the data cannot be recovered. It is critical to backup all important data on the added disk before proceeding. However, during the migration process, the data on the source disk is preserved.*

After the Intel Matrix Storage Console has been successfully installed and the system has rebooted, click on the Intel Application Accelerator shortcut link (**Start --> All Programs --> Intel Matrix Storage Manager --> Intel Matrix Storage Console**) and the following window will appear:
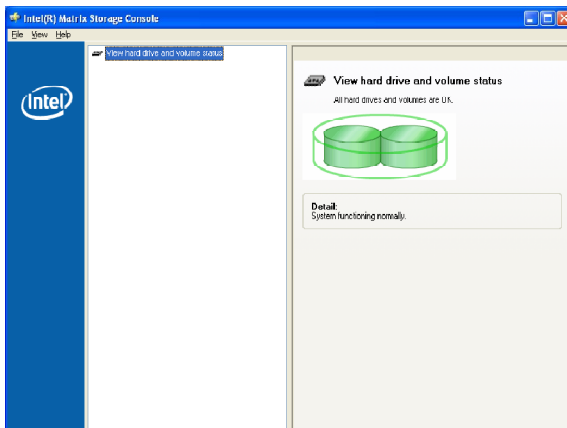
Create RAID Volume from Existing Disk

To create a RAID volume from an existing disk, choose **Action --> Create RAID Volume from Existing Hard Drive**.
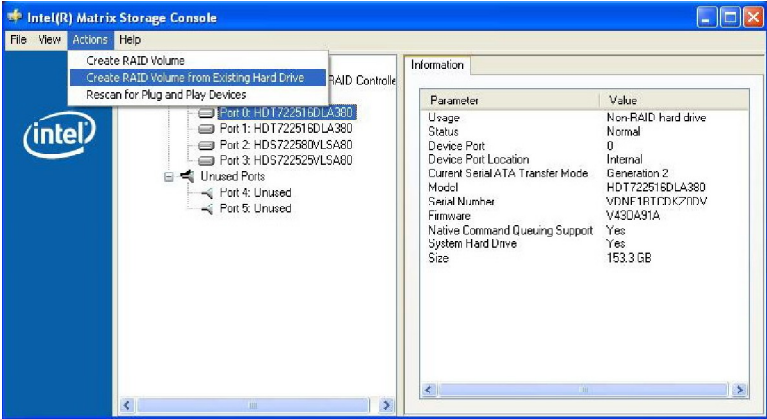
The **Create RAID Volume from Existing Hard Drive Wizard** pops up to lead you for the following procedure. Click **Next** to continue.
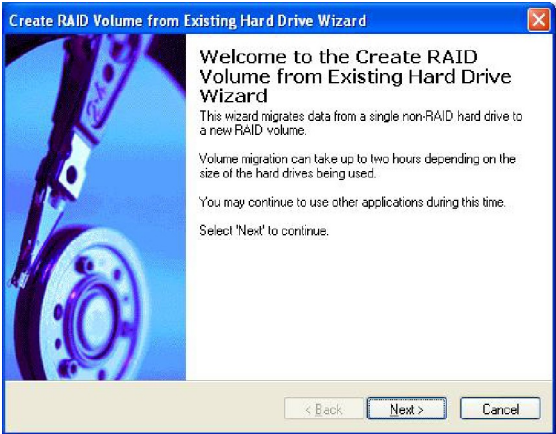
(1) Configure Volume

Here you can configure the new RAID volume by entering the volume name, selecting the RAID level and strip size.
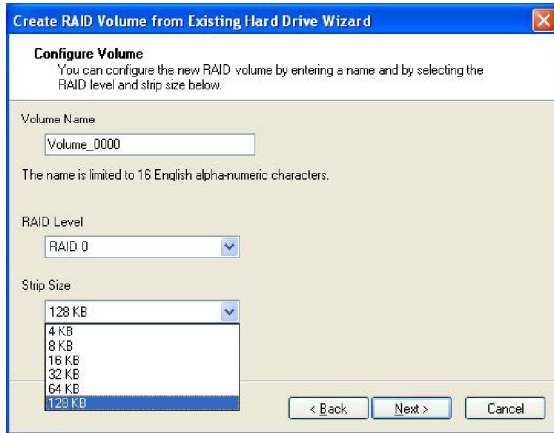
† **RAID Volume Name:**
A desired RAID volume name needs to be typed in where the 'RAID_Volume1' text currently appears above. The RAID volume name has a maximum limit of 16 characters. The RAID volume name must also be in English alphanumeric ASCII characters.

† **RAID Level:**
Select the desired RAID level:

RAID 0 (Performance) – A volume optimized for performance will allow you to access your data more quickly.

RAID 1 (Redundancy) – A volume optimized for data redundancy will provide you with a realtime duplicate copy of your data. Note: Only half of the available volume space will be available for data storage.

RAID 5 (Useful) – RAID 5 can be used on three or more disks, with zero or more spare-disks. The resulting RAID-5 device size will be $(N-1)*S$, where N is the how many drive, S is the size of the smallest drive in the array. If one of the disks fail, all data are still intact. It can rebuild the disk from the parity information. If spare disks are available, reconstruction will begin immediately after the device failure. If two disks fail simultaneously, all data are lost. RAID-5 can survive one disk failure, but not two or more. Both read and write performance usually increase, but can be hard to predict how much. Reads are similar to RAID-0 reads, writes can be either rather

expensive (requiring read-in prior to write, in order to be able to calculate the correct parity information), or similar to RAID-1 writes. The write efficiency depends heavily on the amount of memory in the machine, and the usage pattern of the array. Heavily scattered writes are bound to be more expensive.

RAID 10 (Mirrored Stripes) – A RAID 1 array of two RAID 0 arrays.

† **Strip Sizes:**

Select the desired strip size setting. As indicated, the optimal setting is 128KB. Selecting any other option may result in performance degradation. Even though 128KB is the recommended setting for most users, you should choose the strip size value which is best suited to your specific RAID usage model. The most typical strip size settings are:

4KB: For specialized usage models requiring 4KB strips

8KB: For specialized usage models requiring 8KB strips

16KB: Best for sequential transfers

32KB: Good for sequential transfers

64KB: Good general purpose strip size

128KB: Best performance for most desktops and workstations

(2) Select the source disk

Then select the source disk that you wish to use and then click **"--->"** to move it to the **Selected** field. Then click **Next** to continue.

It is very important to note which disk is the source disk (the one containing all of the information to be migrated) and which one is the target disk. On a RAID Ready system, this can be determined by making a note during POST of which port the single disk is attached to.

You can also use the Intel Application Accelerator RAID Edition utility before the second disk is installed to verify the Port and serial number of the drive that contains all the data.
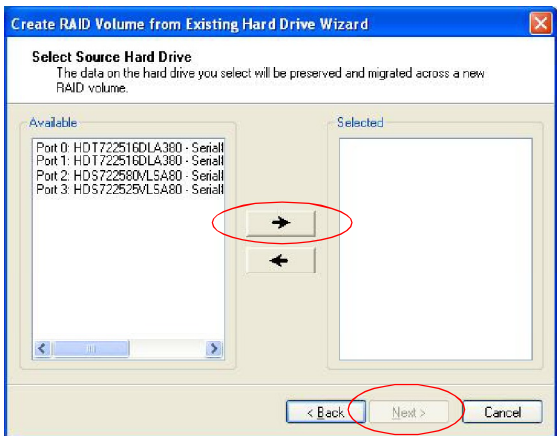
(3) Select Member Hard Drive(s)
Then select the member disk (the target disk) that you wish to use and then click **"--->"** to move it to the **Selected** field. Then click **Next** to continue.
Please note that the existing data on the selected hard drive(s) will be deleted permanently. Do not forget to back up all the important data before continuing.
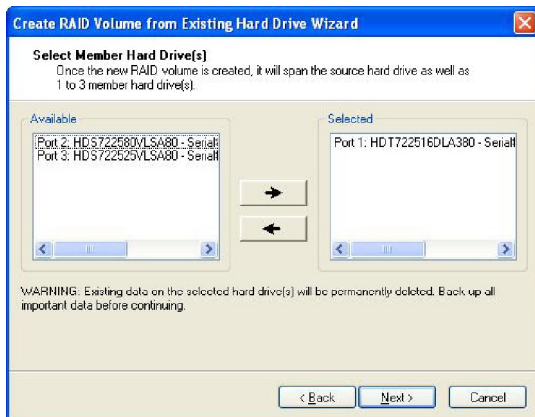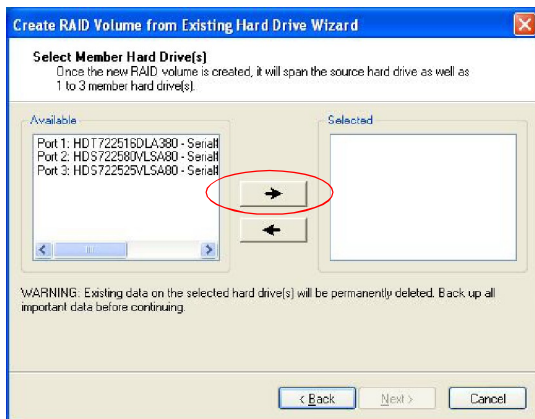
(4) Specify Volume Size
Specify the amount of available array space to be used by the new RAID volume. You may enter the amount in the space or use the slider to specify. It is recommended you use 100% of the available space for the optimized usage. For RAID 0 volume, if you do not specify 100% of the hard drive space, the rest hard drive space will be worked as RAID 1 volume, which is the new technology called Intel Matrix RAID. Then click **Next** to continue.
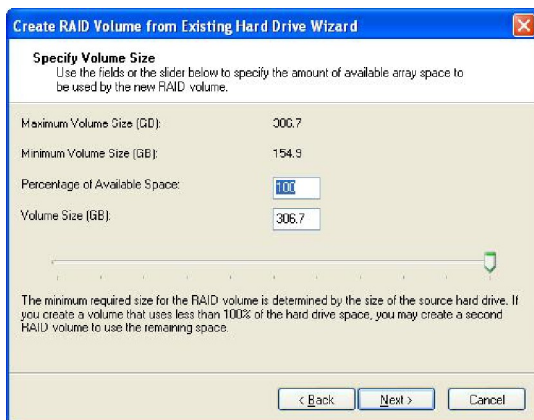
(5) Start Creating RAID Volume from Existing Hard Drive Wizard
Before you continue the procedure of RAID volume creation from existing hard drive, read the dialogue box below carefully. Please note that once you click **Finish**, the existing data on the selected hard drive(s) will be deleted permanently and this operation cannot be undone. It is critical that you backup all important data before selecting **Finish** to start the migration process.
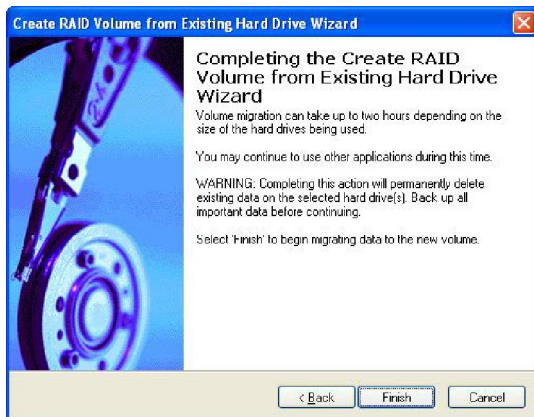
(6) Start Migration

The migration process may take up to two hours to complete depending on the size of the disks being used and the strip size selected. A dialogue window will appear stating that the migration process may take considerable time to complete, meanwhile a popup dialogue at the taskbar will also show the migration status. While you can still continue using your computer during the migration process, once the migration process starts, it cannot be stopped. If the migration process gets interrupted and your system is rebooted for any reason, it will pick up the migration process where it left off. You will be provided with an estimated completion time (the remaining time will depend on your system) once the migration process starts.

The following screen appears if the migration process is completed successfully. Then you have to reboot your system to use the full capacity of the new volume.
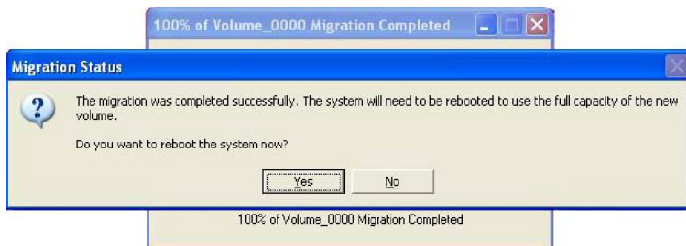
Recovery Volume Creation

A recovery volume can be created using either Basic mode or Advanced mode in the Intel Matrix Storage Console.

**Recovery Volume in Basic Mode Creation**

Important

Creating a recovery volume will permanently delete any existing data on the drive selected as the recovery drive. Back up all important data before beginning these steps.

This option may or may not be available depending on your system configuration. If you do not see the option listed, refer to Recovery Volume Creation in Advanced Mode.

To create a recovery volume in Basic mode, use the following steps:

(1) Open the Intel Matrix Storage Console. **(Start --> All Programs --> Intel Matrix Storage Manager --> Intel Matrix Storage Console)**

(2) Select Protect data using IntelR Rapid Recover Technology.
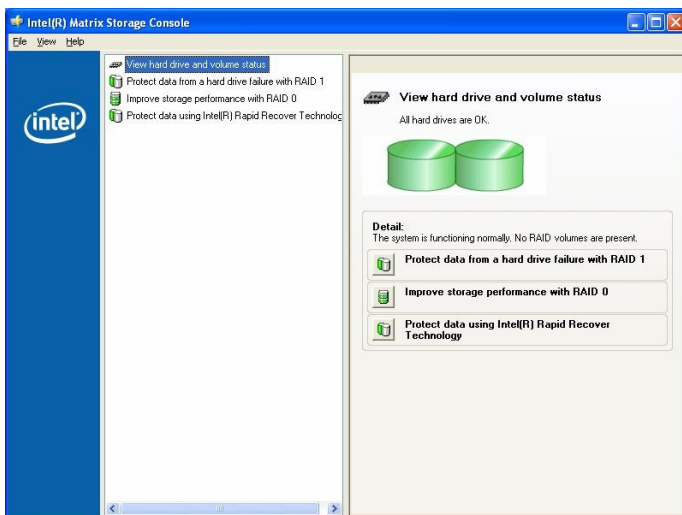
(3) Select **Yes** to confirm volume creation.
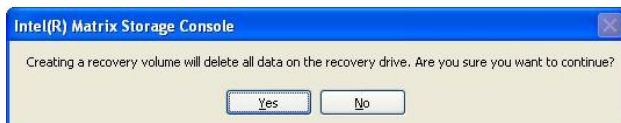
Recovery Volume in Advanced Mode Creation

Important

Creating a recovery volume will permanently delete any existing data on the drive selected as the recovery drive. Back up all important data before beginning these steps.

To create a recovery volume in Advanced mode, use the following steps:

(1) Open the Intel Matrix Storage Console. **(Start --> All Programs --> Intel Matrix Storage Manager --> Intel Matrix Storage Console)**
(2) Select Advanced Mode in the View menu.
(3) Select **Create Recovery Volume** in the Actions menu.
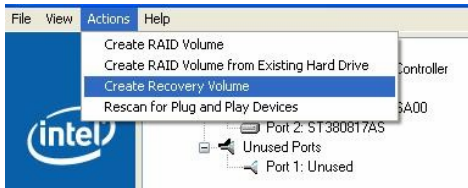
(4) Select **Next** to continue.
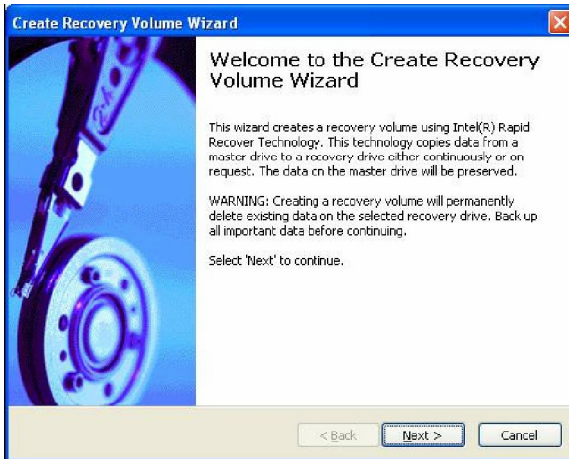
(5) Modify the recovery volume name if you wish.

(6) Select a hard drive to be used as the master hard drive for the recovery volume.
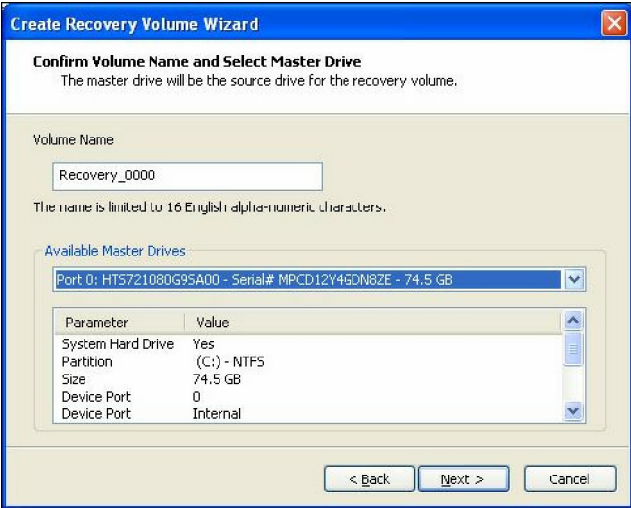
(7) Select a hard drive to be used as the recovery hard drive for the recovery volume.
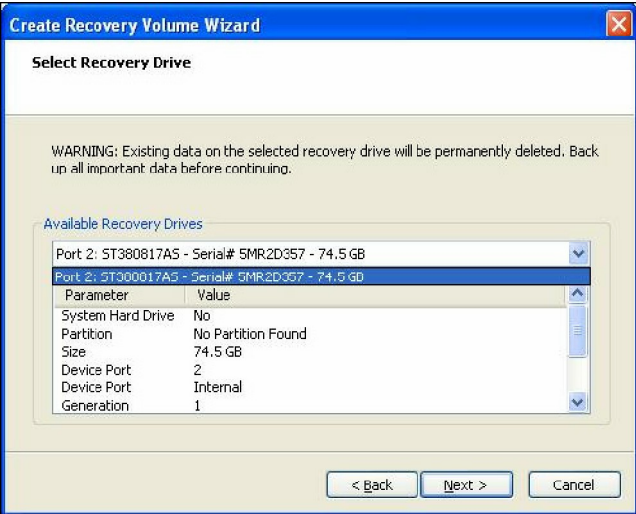
(8) Select an update policy.
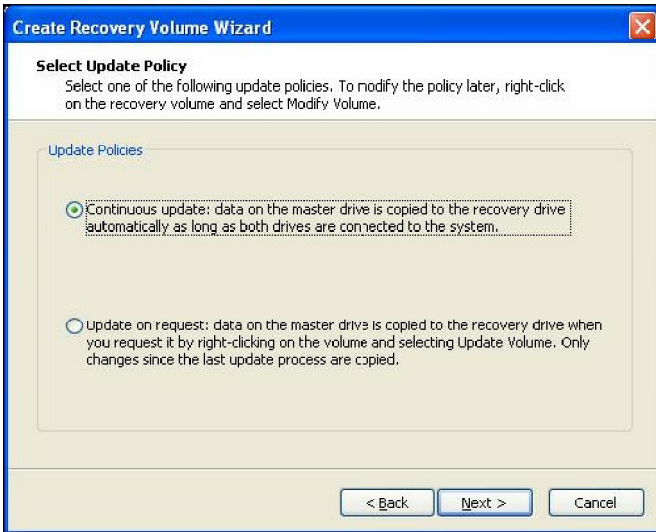
(9) Select **Finish** to begin recovery volume creation.
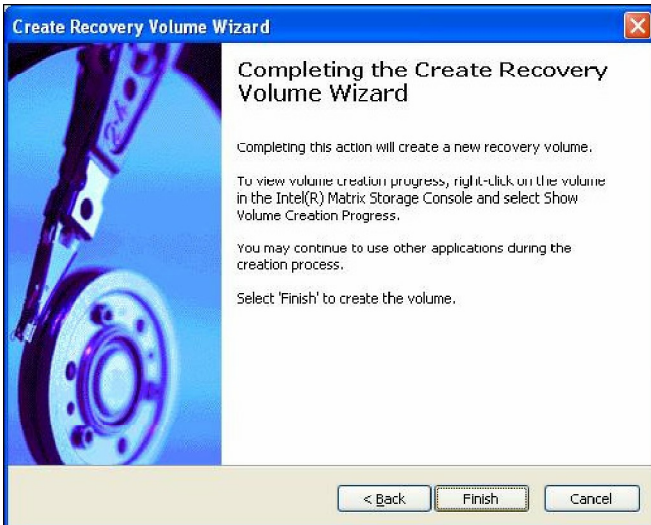
Degraded RAID Array

A RAID 1, RAID 5 or RAID 10 volume is reported as degraded when one of its hard drive members fails or is temporarily disconnected, and data mirroring is lost. As a result, the system can only utilize theremaining functional hard drive member. To re-establish data mirroring and restore data redundancy, refer to the procedure below that corresponds to the current situation.

Missing Hard Drive Member
1. Make sure the system is powered off.
2. Reconnect the hard drive.
3. Reboot the system to Windows; the rebuild will occur automatically.

Failed Hard Drive Member
1. Make sure the system is powered off.
2. Replace the failed hard drive with a new one that is of equal or greater capacity.
3. Reboot the system to Intel RAID Option ROM by press <Ctrl> and <I> keys simultaneously during the Power-On Self Test (POST).
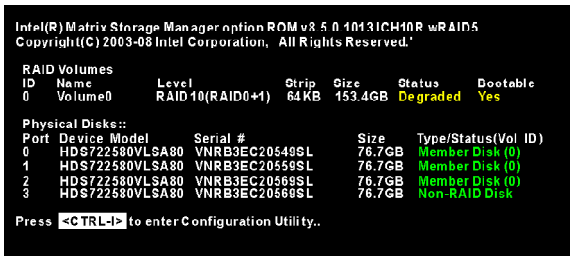
4. Select the port of the destination disk for rebuilding, and then press ENTER.

5. Exit Intel RAID Option ROM, and then reboot to Windows system.
6. When prompted to rebuild the RAID volume, click 'Yes'.
7. The Intel(R) Storage Utility will be launched. Right-click the new hard drive and select 'Rebuild to this Disk'. The 'Rebuild Wizard' will be launched which will guide you through the process of rebuilding to the new hard drive.
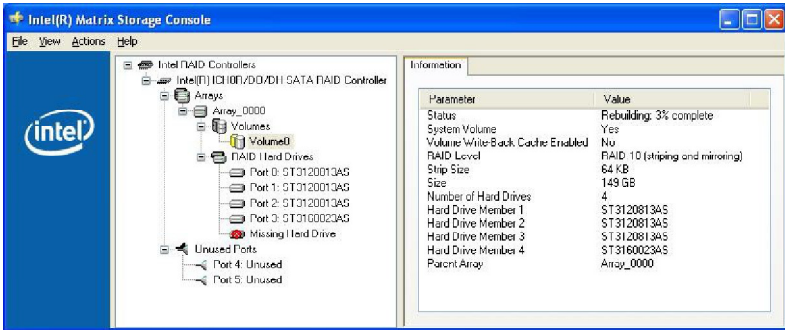
Appendix D
JMicron RAID Introduction

This appendix will assist users in configuring and enabling RAID functionality on platforms
The JMicron RAID solution supports RAID level 0 (striping), RAID level 1 (mirroring) and JBOD (Concatenate).

MSI
MICRO-STAR INTERNATIONAL

Introduction

JMicron JMB363 offers RAID level 0 (Striping), RAID level 1 (Mirroring and Duplexing) and JBOD (Concatenate).

RAID 0 breaks the data into blocks which are written to separate hard drives. Spreading the hard drive I/O load across independent channels greatly improves I/O performance. RAID 1 provides data redundancy by mirroring data between the hard drives and provides enhanced read performance. JBOD provides a method for combining drives of different sizes into one large disk.

Important

The least number of hard drives for RAID 0, RAID 1 or JBOD mode is 2. All the information/ volumes/ pictures listed in your system might differ from the illustrations in this appendix.

JMicron RAID BIOS Utility

Be sure to set **RAID** mode for the *JMicron 36x ATA Controller* in BIOS before configuring the JMicron BIOS utility. After that, save the configuration and exit. During boot up (POST), press CTRL+J to enter the JMicron BIOS RAID utility.

The RAID Utility menu screen will be displayed. A brief description of each section is presented below.

Main Menu

Cerate RAID Disk Drive - Create a new legacy RAID set.
Delete RAID Disk Drive - Delete a legacy RAID set.
Revert HDD to Non-RAID - Revert an existed-RAID HDD to non-RAID.
Solve Mirror Conflict - Sovle a mirror conflict.
Rebuild Mirror Drive - Rebuild data, when RAID 1 data mirroring is lost.
Save And Exit Setup - Save all settings and exit the BIOS utility.
Exit Without Saving - Exit the BIOS utiltiy without any saving.
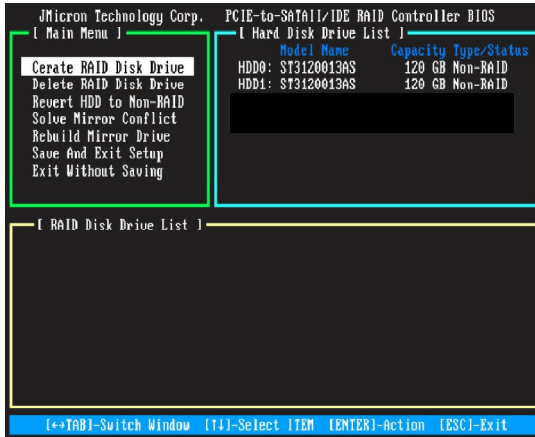
Hard Disk Driver List

The menu shows the model number and capacities of the drives physically attached to the SATAII & PATA ports.
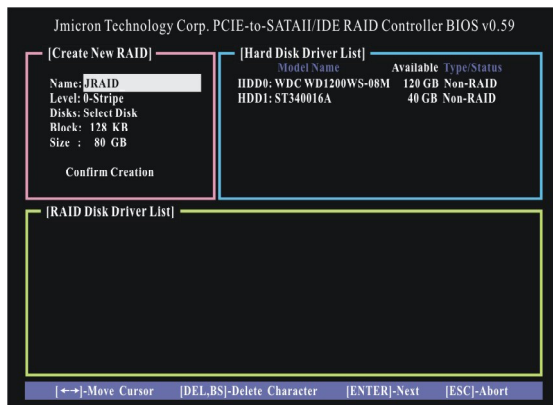
RAID Disk Driver List

The menu shows the current configuration of RAID set.

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Creating RAID set

1. Select "Create RAID Disk Drive". Then press <Enter>.
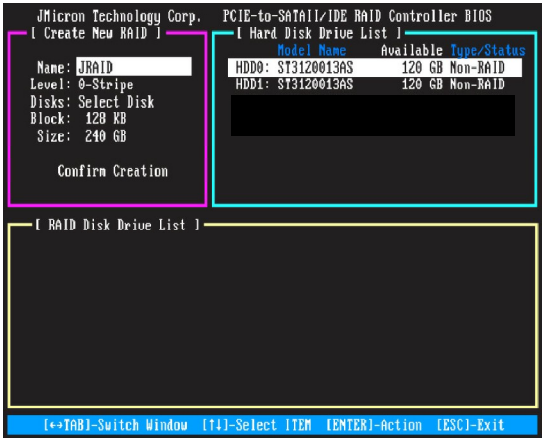

2. Then in the **Name** field, specify a RAID set name and then press the <Enter> to go to the next field.


3. Choose a 0-Striped, a 1-Mirror, or a JBOD-Concatenate combination set and then press <Enter> to go to the next step.

4. In the **Hard Disk Disk List** menu, use <Space> key to select the disks you want to create for the RAID set, then click <Enter> key to finish selection.


5. Then select the block value (stripe value) for the RAID array by using the "upper arrow" or "down arrow" keys to scroll through the available values, and pressing the <Enter> key to select and advance to the next field. The available values range from 4KB to 128 KB. The default and typical value for RAID 0 is 128KB. (This field only available for RAID 0 mode.)
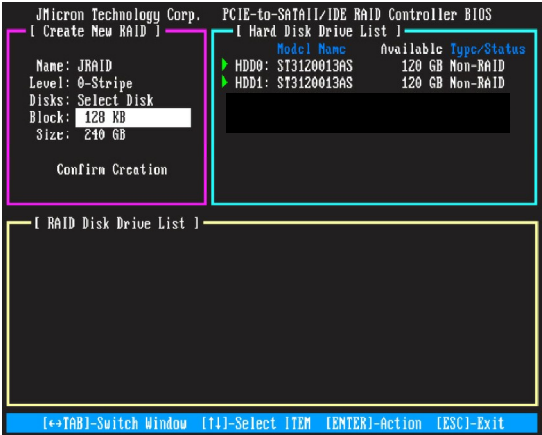
6. Then select the capacity of the RAID set in the **Size** field. The default value is the maximum capacity of the selected disks. Then press <Enter> to the Confirm Creation field.

7. The Creation field will display a message to ask you to confirm the creation. Then press <Y> key to proceed with the RAID set creation.
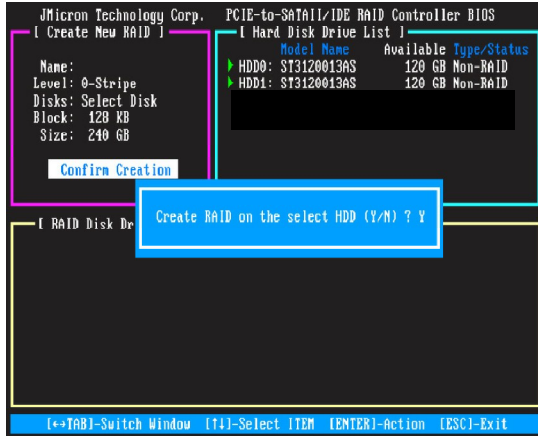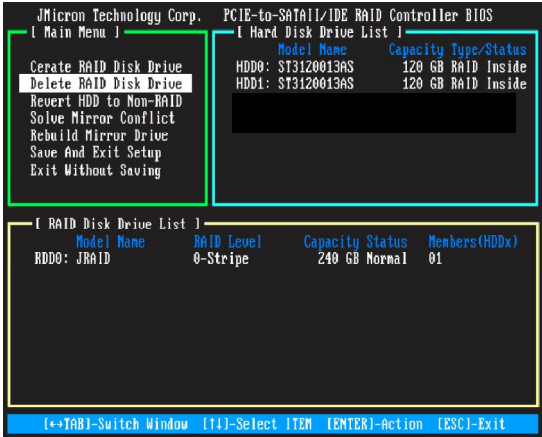

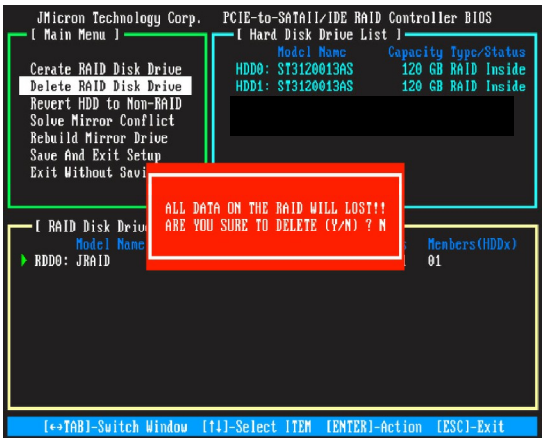8. Then the following screen appears to indicate that the creation is finished.
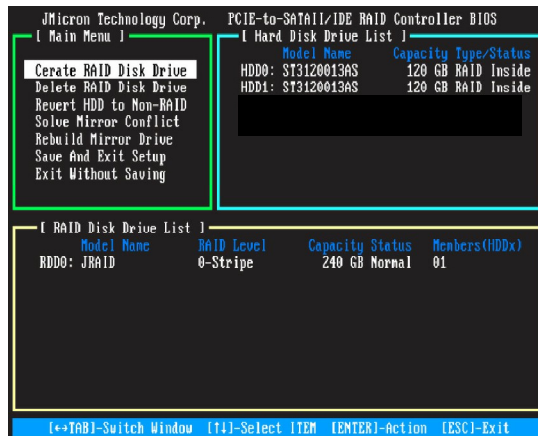
9. Go to the Save And Exit Setup field and press <Enter>, a message will display to ask you to confirm the setup. Then press <Y> key to save the setting and exit the BIOS utility.

Deleting RAID set

1. Select "Delete RAID Disk Drive". Then press <Enter>.

2. In the RAID Disk Driver List menu, use <Space> key to select the RAID set you want to delete. Then press <Del> key.
3. Press "Y" to accept the deletion when a deletion message is appeared.

Revert HDD to non-RAID

Select **Revert HDD to non-RAID** and press <Enter>. In the Hard Disk Driver List menu use <Space> key to select the disks you want to revert then click <Enter> key. The following screen appears, press <Y> key to remove any RAID structures from the drives.
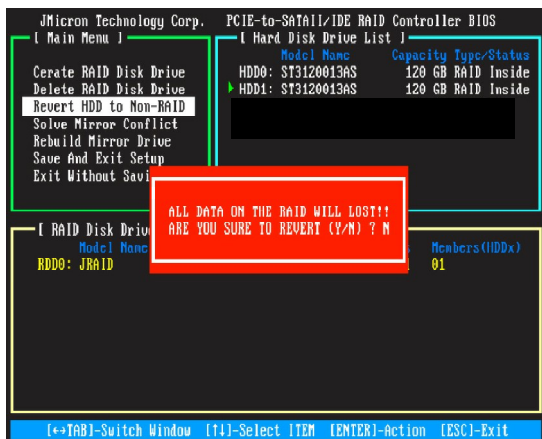
Important

1. *You will lose all data on the RAID drives and any internal RAID structures when you perform this operation.*
2. *Possible reasons to 'Revert HDD to non-RAID' could include issues such as incompatible RAID configurations or a failed volume or failed disk.*
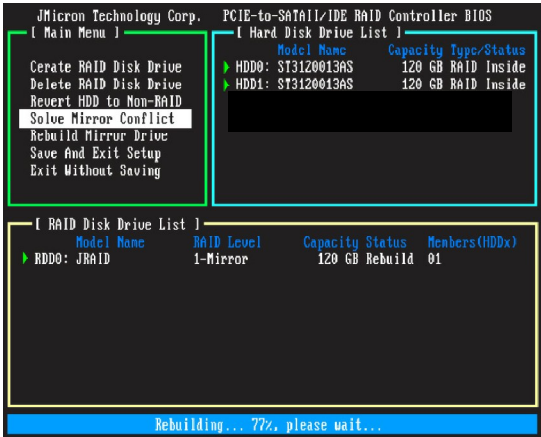
Solving a Mirror Conflict

A Mirror conflict occurs when both disks in a RAID 1 (Mirror) configuration are unplugged from the system in turn, then plugged in again. Since both disks contain exactly the same data, the system will be unable to determine which of the two is the source drive. This option allows you to set the source drive and rebuild the Mirror drive according to the contents of the source drive.

To solving a Mirror conflict:

Select **Solving a Mirror Conflict** and press <Enter>. In the Hard Disk Driver List menu use <Space> key to select the disks you want to set as source drive. Using the <TAB>, move to the RAID Disk Drive List menu and highlight the RAID set that you want to rebuild. Press <Del> to begin rebuilding the Mirror configuration.

A status bar at the bottom of the screen shows the progress of the rebuilding.

```
        JMicron Technology Corp.   PCIE-to-SATAII/IDE RAID Controller BIOS
   ┌─[ Main Menu ]─────────────┬─[ Hard Disk Drive List ]──────────────────┐
   │                           │         Model Name       Capacity Type/Status
   │   Cerate RAID Disk Drive  │ ▶ HDD0: ST3120013AS      120 GB RAID Inside
   │   Delete RAID Disk Drive  │ ▶ HDD1: ST3120013AS      120 GB RAID Inside
   │   Revert HDD to Non-RAID  │
   │  ┌──────────────────────┐ │
   │   Solve Mirror Conflict  │
   │  └──────────────────────┘ │
   │   Rebuild Mirror Drive    │
   │   Save And Exit Setup     │
   │   Exit Without Saving     │
   │                           │
   └───────────────────────────┴────────────────────────────────────────────┘
   ┌─[ RAID Disk Drive List ]───────────────────────────────────────────────┐
   │          Model Name      RAID Level      Capacity Status   Members(HDDx)
   │ ▶ RDD0: JRAID            1-Mirror         120 GB Rebuild  01
   │
   │
   │
   │
   │
   └────────────────────────────────────────────────────────────────────────┘
   ┌────────────────────────────────────────────────────────────────────────┐
   │                Rebuilding... 77%. please wait...                         │
   └────────────────────────────────────────────────────────────────────────┘
```

Rebuilding a Mirror drive

When one of the disk in a RAID 1 (Mirror) configuration is unplugged from the system, then plugged in again, a dialogue box appears to ask you to rebuild the Mirror drive. Press <Y> to confirm; otherwise, press <N>.

This option allows you to rebuild the Mirror drive later and synchronize the data between two hard disks.

To rebuild a Mirror drive:

Select **Rebuild Mirror Drive** and press <Enter>. Using the <TAB>, move to the RAID Disk Drive List menu and highlight the RAID set that you want to rebuild. Press <Del> to begin rebuilding the Mirror configuration.

A status bar at the bottom of the screen shows the progress of the rebuilding.
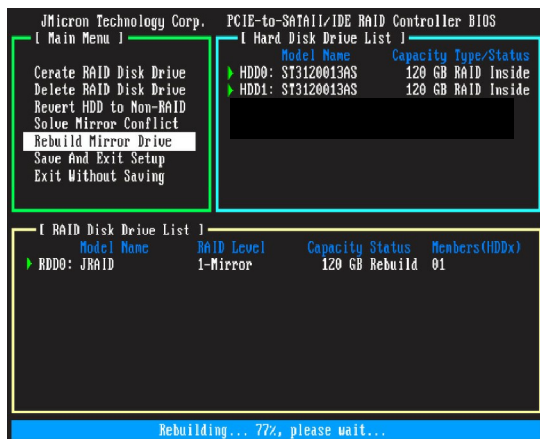
Installing Driver

Install Driver in Windows Vista / XP

† **New Windows Vista / XP Installation**
The following details the installation of the drivers while installing Windows XP.

1. When you start installing Windows XP and older operating systems, you may encounter a message stating, "Setup could not determine the type of one or more mass storage devices installed in your system". If this is the case, then you are already in the right place and are ready to supply the driver. If this is not the case, then press F6 when prompted at the beginning of Windows setup.
2. Press the "S" key to select "Specify Additional Device".
3. You should be prompted to insert a floppy disk containing the JMicron RAID driver into the A: drive.

> **Important**
>
> *Please follow the instruction below to make an **"JMicron 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 **\\IDE\JMicron\Floppy32** (for 32-bit OS) or **\\IDE\JMicron\Floppy64** (for 64-bit OS) to a formatted floppy disk.*
> *   **Note:** For Windows Vista you can use Floppy, CD/DVD or USB.*
> *4. The driver diskette for **JMicron RAID Controller** is done.*

4. When prompted, insert the floppy disk you created in step 3 and press Enter.
5. You should be shown a list of available SCSI Adapters.
6. Select the appropriate JMicron RAID controller and press ENTER.
7. The next screen should confirm that you have selected the JMicron RAID controller. Press ENTER again to continue.
8. You have successfully installed the JMicron RAID driver, and Windows setup should continue.
9. Leave the disk in the floppy drive until the system reboots itself. Windows setup will need to copy the files from the floppy again after the RAID volume is formatted, and Windows setup starts copying files.

For Windows Vista:

After selecting the location to install Windows Vista, please click on the "Load Driver" button to install the RAID driver. Please refer the **Important** notice above to make a RAID Driver medium. And then, follow the instructions to complete the RAID drive installation and the Windows Vista installation.

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† **Existing Windows Vista/XP Driver Installation**
1. Insert the MSI CD into the CD-ROM drive.
2. The CD will auto-run and the setup screen will appear.
3. Under the Driver tab, click on *JMicron Drivers*.
4. The drivers will be automatically installed.

† **Confirming Windows Vista/XP Driver Installation**
1. From Windows Vista/XP, 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 *JMicron JMB36X Controller* should appear.

JMicron Raid Configurer

There is an application called JMRaidTool which helps you perform the following tasks of JMicron RAID.
• **Viewing RAID Array Configurations**
  View an array configuration (mirrored, striped)
• **Creating RAID Arrays**
• **Deleting a RAID Array**
• **Rebuilding RAID Arrays**
• **Solving Mirror Conflict**

View RAID Array Configurations

Left-click the "Show Disks" button and the information of all hard disks will display on the right side of the window.
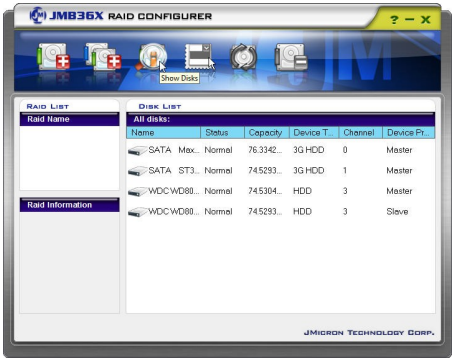
Left-click the name of the disk array and the information of all hard disks of the selected disk array will display on the right side of the window. The information of the disk array will also display on the lower-left part of the window.

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Create RAID

JMRaidTool supports the creation of RAID 0, 1 and JBOD.
1. Left-click the "Create Raid" button.
2. A CREATE RAID WIZARD dialogue will display on the screen, following the description of every step to complete the creation.
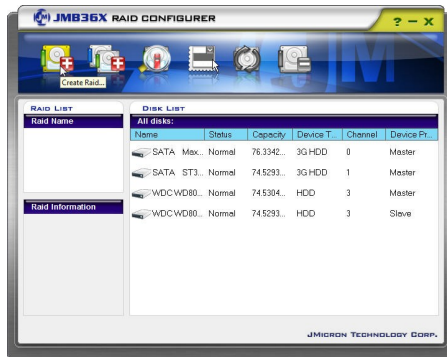

Create RAID from Existing Disk

You can combine the Existing Disk (Source disk may content OS and Data) with other HD (must be larger than source Disk) to be RAID. The data on Source Disk will be reserved. After RAID is built, system will need to reboot.
1. Left-Click the "Create RAID from Existing Disk" icon on the toolbar.
2. A "CREATING RAID FROM EXISTING DISK" wizard dialogue will display on the screen, following the description of every step to complete the creation.
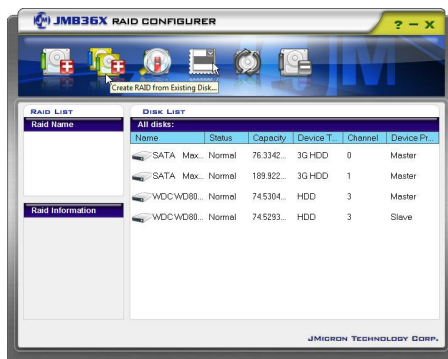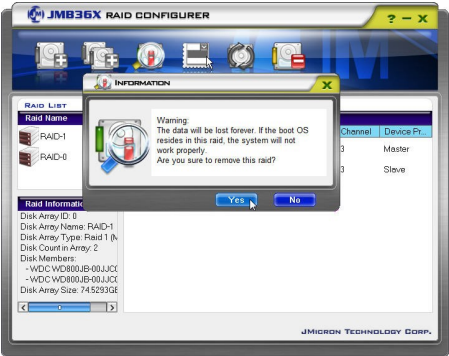
Remove RAID

There are two ways you can choose to remove RAID.

Way 1
1. Right-click the name of the disk array you want to delete and the "Remove" menu
   will appear. Select the "Remove Raid" of the pop-up menu.
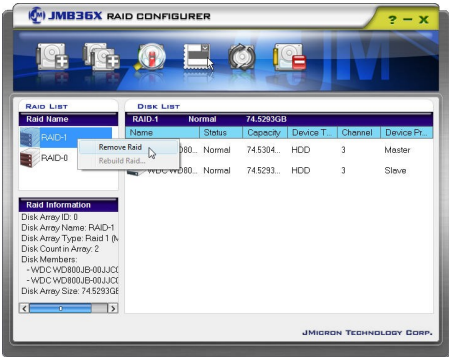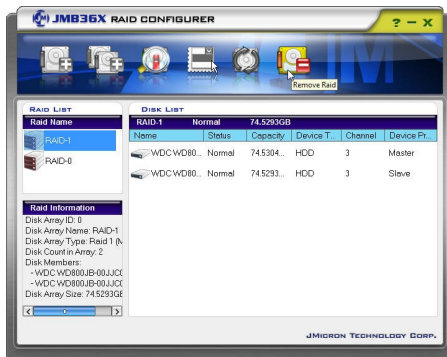

2. A warning message appears to remind you that the data will be lost. Press the
   "Yes" button if you really want to delete the disk array.

Way2
1. Left-Click the "Remove Raid" icon on the toolbar.
2. A "REMOVE RAID" wizard dialogue will display on the screen, following the de-
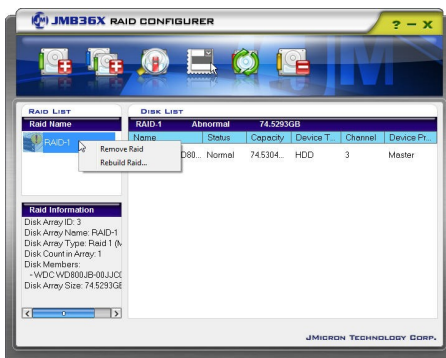   scription of every step to complete the deletion.
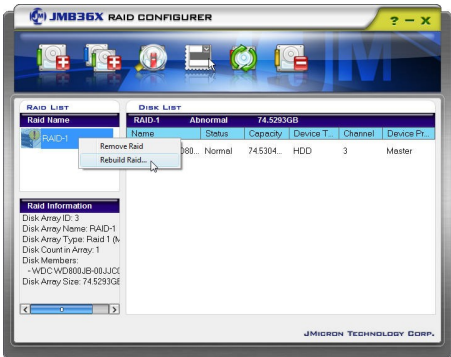

Rebuild RAID

RAID 1 can be rebuilt while RAID 0, JBOD cannot be rebuilt. There are two ways you
can choose to rebuild RAID.

Way 1
1. Right-click the name of the disk array you want to rebuild and the "Rebuild" menu
   will appear.

2. Select "Rebuild Raid".
3. A "REBUILD RAID WIZARD" dialogue will display on the screen, following the description of every step to complete the rebuilding.
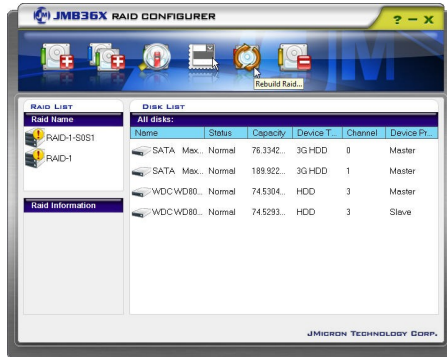

Way 2
1. If the disk array needs to rebuild then the rebuild button will be enabling on the toolbar.

2. Left-Click the "Rebuild Raid" button on the toolbar.
3. A "REBUILD RAID WIZARD" dialogue will display on the screen, following the description of every step to complete the rebuilding.

Solve Mirror Conflict

If the conflict occurs, it will show the "REBUILDING RAID WIZARD" dialogue to ask you if you want to rebuild RAID, following the description of every step to rebuild the RAID.