User Guide

XFX nForce 650i
Ultra Motherboard

Installation and Configuration

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Before You Begin...

Inside the 650i Ultra Installation CD

The following tools are in the 650i Ultra Installation CD:

- ❑ Motherboard Drivers for:
  - ➢ Windows XP
  - ➢ Windows XP 64-bit
  - ➢ Windows Vista
  - ➢ Windows Vista 64-bit
- ❑ Onboard Audio Drivers
  - ➢ Windows XP
  - ➢ Windows XP 64-bit
  - ➢ Windows Vista
  - ➢ Windows Vista 64-bit
- ❑ Adobe Acrobat Reader 8.0
- ❑ Raid Setup Floppy Disk Creator
  - ➢ Windows XP
  - ➢ Windows XP 64-bit
- ❑ NVIDIA Software
  - ➢ NVIDIA MediaShield Storage
  - ➢ NVIDIA nTune 5.0

Parts NOT in the Kit

This kit contains all the hardware necessary to install and connect your new XFX nForce® 650i Ultra motherboard. However, it does not contain the following items that must be purchased separately to make the motherboard functional.

❑ Intel microprocessor:
Intel Core 2 Extreme, Intel Core 2 Quad, Intel Core 2 Dual, Pentium

❑ Cooling fan for the microprocessor

❑ System memory support:
Supports dual channel DDR2 533/667/800. Supports up to 8 GBs DDR2 memory.

❑ Power Supply
To calculate the power you are going to require for your specific configuration, go to www.slizone.com.

These instructions tell you how to install each of the parts listed so you can have a functioning motherboard. As you go through the installation instructions, we are assuming you have purchased the necessary parts.

Intentions of the Kit

This kit provides you with the motherboard and all connecting cables necessary to install the motherboard into a PC cabinet. If you are *building* a PC, you will use most of the cables provided in the kit. If however, you are *replacing* a motherboard, you will not need many of the cables.

When *replacing* a motherboard in a PC cabinet, you will need to reinstall an operating system even though the current drives have an operating system.

Introduction

Thank you for buying the XFX nForce® 650i Ultra Motherboard. This motherboard offers the tools and performance PC users' demand.

Features

Ultimate Overclocking

Unleash the underlying hardware. With comprehensive overclocking tools to push the limits on front side bus (FSB) speed and support for higher memory speeds, the NVIDIA nForce 650i Ultra MCPs were designed for overclocking.

Guaranteed FSB speeds

Reach FSB speeds of 1333MHz with a CPU that supports this specification.

High-speed Memory

This board supports high-speed memory up to DDR2-800 to keep pace with overclocked system components.

Comprehensive Overclocking Tools

Award-winning NVIDIA overclocking tools provide a complete kit of tools giving everyone from the most veteran enthusiast to the novice overclocker the ability to unleash the hardware in their PC.

NVIDIA nTune Utility

NVIDIA nTune™ is a Windows-based utility that has added access to more settings. Adjust CPU and memory speeds without rebooting. You can also access most BIOS settings from inside Windows without having to go into the BIOS. Save and automatically load profiles for each application you run.

NV BIOS

NV BIOS delivers easy-to-use tuning to let you have full control over your hardware including processor voltage tables and memory drive strengths.

True x16 PCI Express Support

One full-bandwidth, 16-lane PCI Express link ensure maximum graphics performance for next-generation GPUs and games.

DualDDR2 Memory Architecture

A state-of-the-art Dual DDR2 memory controller allows high bandwidth and low latency data access to the CPU and GPU. Ensures data and information are relayed through the system as quickly as possible for incredible performance.

NVIDIA MediaShield™ Storage

NVIDIA MediaShield is a suite of features that safeguards your most important digital media assets; always reliable, scalable, and accessible. MediaShield includes RAID and SATA drive support.

Multiple Disk Setup

Through a simple wizard-based interface, you can effortlessly set up your drives for better data protection, faster disk access or maximum storage capacity. MediaShield automatically selects RAID 0, 1, 0+1 or 5 configurations according to your needs. Advanced users can access RAID options directly.

DiskAlert System

The event of a disk failure, MediaShield users see an image that highlights which disk has failed to make it easier to identify, replace, and recover.

RAID Morphing

MediaShield allows users to change their current RAID set-up to another configuration in a one-step process called morphing. This eliminates the need to back up data and follow multiple steps in the process.

Bootable Multidisk Array

MediaShield storage fully supports the use of multi-disk array for loading the operating system at power-up.

Networking with NVIDIA nForce

NVIDIA networking delivers the highest network throughput at the lowest CPU utilization. The manageable and stable NVIDIA networking solution results in better networking management and a lower total cost of ownership. Only NVIDIA integrates this level of networking features to allow you to take your online experience to the next level.

NVIDIA Native Gigabit Ethernet

The industry's fastest Gigabit Ethernet performance eliminates network bottlenecks and improves overall system efficiency and performance.

NVIDIA FirstPacket™ Technology

Be the 'King of Ping' with NVIDIA FirstPacket technology. Get the crystal-clear phone conversations and online gaming performance you expect. NVIDIA FirstPacket technology assures your game data, VoIP conversations, and large file transfers are delivered according to preferences set by you in an intuitive wizard.

High Definition Audio (HDA)

High definition audio brings consumer electronics quality sound to the PC delivering high quality sound from multiple channels. Using HDA, systems can deliver 192 kHz/32-bit quality for eight channels, supporting new audio formats.

USB 2.0

USB 2.0 is standard plug-and-play interface that provides easy-to-use connectivity for USB devices.

Motherboard Specifications

❑ Size
ATX form factor of 12 inch x 9.6 inch

❑ Microprocessor support
Intel Core 2 Extreme, Intel Core 2 Quad, Intel Core 2 Dual, Pentium

❑ Operating systems:
Supports Windows XP 32bit/64bit and Windows Vista 32bit/64bit

❑ Contains NVIDIA nForce 650i Ultra MCP and SPP

❑ System Memory support
Supports dual channel JEDEC DDR2-800. Supports up to 8 GBs DDR2 memories.

❑ USB 2.0 Ports

➢ Supports hot plug

➢ Eight USB 2.0 ports (four rear panel ports, four onboard USB headers)

➢ Supports wake-up from S1 and S3 mode

➢ Supports USB 2.0 protocol up to 480 Mbps transmission rate

❑ Onboard Serial ATA II

➢ 300MBps data transfer rate

➢ Four Serial ATA II connectors

➢ NVIDIA MediaShield RAID with support for RAID 0, RAID 1, RAID 0+1, RAID 5, and JBOD

➢ Supports hot plug and NCQ (Native Command Queuing)

❑ Onboard LAN

➢ Single LAN interface built-in onboard

➢ Supports 10/100/1000 Mbit/sec Ethernet

❑ Audio

➢ Azalia High-Definition audio

➢ Supports 8-channel audio

➢ Supports S/PDIF output

➢ Supports Jack-Sensing function

❑ PCI Express x16 Support

➢ Supports 4 GB/sec (8 GB/sec concurrent) bandwidth

➢ Low power consumption and power management features

❑ Green Function

➢ Supports ACPI (Advanced Configuration and Power Interface)

➢ Supports S0 (normal), S1 (power on suspend), S3 (suspend to RAM), S4 (Suspend to disk - depends on OS), and S5 (soft - off)

❑ Expansion Slots

➢ Three PCI slots

➢ Two PCI Express x1 slot

➢ One PCI Express x16 Graphics slot

Unpacking and
Parts Descriptions

Unpacking

The XFX nForce 650i Ultra motherboard comes with all the necessary cables for adding a motherboard to a new chassis. If you are replacing a motherboard, you may not need many of these cables.

Be sure to inspect each piece of equipment shipped in the packing box. If anything is missing or damaged, contact your reseller.

All parts shipped in this kit are RoHS-compliant (lead-free) parts.

Equipment

The following equipment is included in the XFX nForce 650i Ultra motherboard box.

	XFX nForce 650i Ultra Motherboard This PCI Express motherboard contains the NVIDIA nForce 650i Ultra SPP and MCP.
	I/O Shield Installs in the chassis to block radio frequency transmissions, protect internet components from dust and foreign objects and aids in proper airflow within the chassis.
	Floppy Cable Used to attach a floppy drive to the motherboard.
	2-Port SATA Power Cable (Qty One)

	SATA Signal Cable (Qty Two)
	Used to support the Serial ATA protocol and each one connects a single drive to the motherboard
	IDE-ATA 133 HDD Cable

XFX nForce 650i Ultra Motherboard

The XFX nForce 650i Ultra motherboard with the NVIDIA nForce 650i Ultra SPP and MCP processors is a PCI Express motherboard. Figure 1 shows the motherboard and Figures 2 shows the back panel connectors.

1. CPU Socket
2. NVIDIA SPP
3. CPU fan connector
4. DDR DIMM slots 0 - 3
5. 24-pin ATX power connector
6. IDE connector
7. NVIDIA MCP
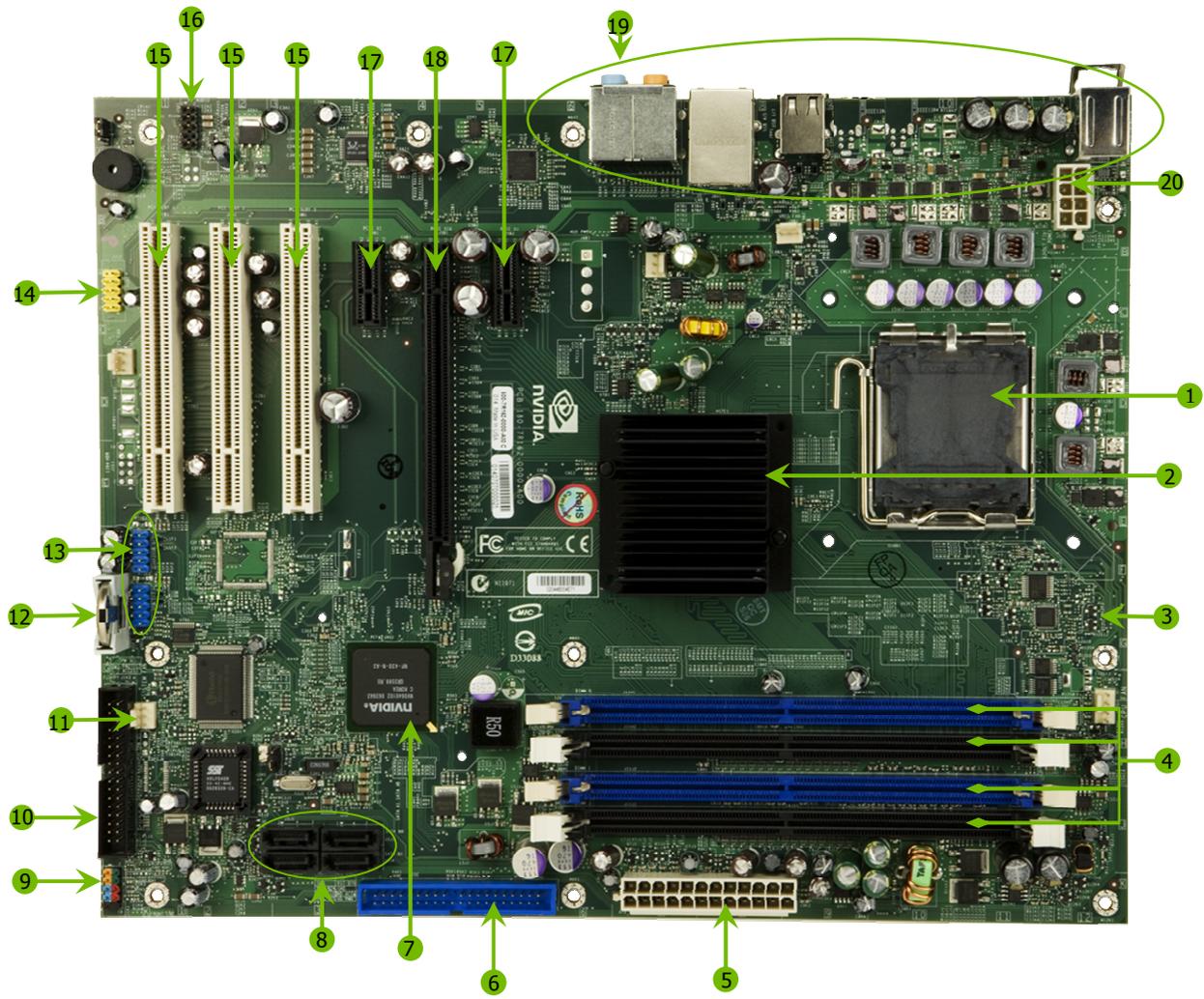
8. Serial-ATA connectors
9. Front panel connector
10. Floppy drive connector
11. System fan connector
12. Motherboard battery
13. USB headers
14. Serial connector

15. PCI slots
16. Front Panel Audio connector
17. PCI Express x1 slot
18. PCI Express x16 slot
19. Backpanel connectors (Figure 2)
20. 8-pin ATX_12V power connector

Figure 1.   XFX nForce 650i Ultra Motherboard Layout

1. PS/2 Mouse Port
2. PS/2 Keyboard Port
3. USB 2.0 ports (two)
4. Lan Port with LEDs to indicate status.
   - Yellow/Light Up/Blink = 10 Mbps/Link/Activity
   - Yellow and Green/Light Up/Blink = 100 Mbps/link/Activity
   - Green/Light Up/Blink = 1000 Mbps/Link/Activity
5. USB 2.0 Ports (two)
6.

Port	2-Channel	4-Channel	6-Channel/8-Channel
Blue	Line-In	Line-In	Line-In
Green	Line-Out	Front Speaker Out	Front Speaker Out
Pink	Mic In	Mic In	Mic In
Orange			Center/Subwoofer
Black		Rear Speaker Out	Rear Speaker Out
Grey			

Figure 2.   Chassis Backpanel Connectors

Hardware Installation

This section will guide you through the installation of the motherboard. The topics covered in this section are:

❑ Preparing the motherboard
  ➢ Installing the CPU
  ➢ Installing the CPU fan
  ➢ Installing the memory
❑ Installing the motherboard
❑ Connecting cables and setting switches

Safety Instructions

To reduce the risk of fire, electric shock, and injury, always follow basic safety precautions.

Remember to remove power from your computer by disconnecting the AC main source before removing or installing any equipment from/to the computer chassis.

Preparing the Motherboard

The motherboard shipped in the box does **not** contain a CPU or memory. You need to purchase a CPU, a CPU fan assembly, and memory to complete this installation.

Installing the CPU

Be very careful when handling the CPU. Make sure not to bend or break any pins on the back. Hold the processor only by the edges and do not touch the bottom of the processor.

Use the following procedure to install the CPU onto the motherboard.

1. Unhook the socket lever by pushing *down* and *away* from the socket.
2. Lift the load plate. There is a protective socket cover on the load plate to protect the socket when there is no CPU installed.
3. Remove the protective socket cover from the load plate.
4. Remove the processor from its protective cover, making sure you hold it only by the edges. It is a good idea to save the cover so that whenever you remove the CPU, you have a safe place to store it.
5. Align the notches in the processor with the notches on the socket.
6. Lower the processor straight down into the socket with out tilting or sliding it into the socket

Align notches with notches on the CPU

> **Note:** Make sure the CPU is fully seated and level in the socket.

7. Close the load plate over the CPU and press down while you close and engage the socket lever.

Installing the CPU Fan

There are many different fan types that can be used with this motherboard. Follow the instruction that came with you fan assembly. Be sure that the fan orientation is correct for your chassis type and your fan assembly.

Installing Memory DIMMs

Your new motherboard has four 1.8V 240-pin slots for DDR2 memory. These slots support 256 Mb, 512 Mb and 1 Gb DDR2 technologies for x8 and x16 devices. They also support dual channel DDR2 memory technology up to 10.7GB/s. There must be at least one memory bank populated to ensure normal operation. Use the following the recommendations for installing memory. (See Figure 1 on page 9 for the location of the memory slots on the card)

❑ One DIMM: Install into slot 0. You can install the DIMM into any slot, however, slot 0 is preferred.

❑ Two DIMMs: Install into either slots 0 and 1 or 2 and 3. The idea is to not have the DIMMs in adjacent slots.

❑ Four DIMMS: Install into slots 0, 1, 2, and 3.
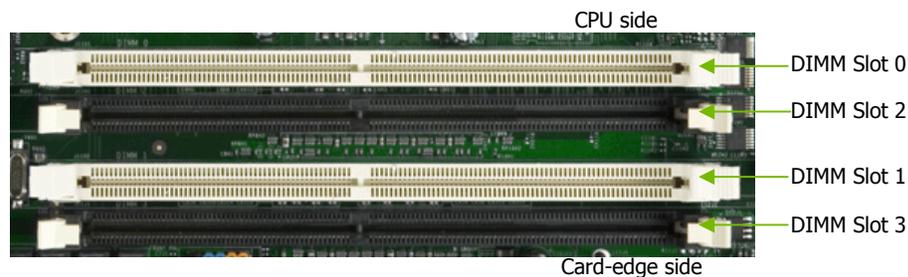
Use the following procedure to install memory DIMMs into the slots on the motherboard. Note that there is only one gap near the center of the DIMM slot. This slot matches the slot on the memory DIMM to ensure the component is installed properly.

1. Unlock a DIMM slot by pressing the module clips outward.

2. Align the memory module to the DIMM slot, and insert the module vertically into the DIMM slot. The plastic clips at both sides of the DIMM slot automatically lock the DIMM into the connector.

Installing the Motherboard

The sequence of installing the motherboard into the chassis depends on the chassis you are using and if you are replacing an existing motherboard or working with an empty chassis. Determine if it would be easier to make all the connections prior to this step or to secure the motherboard and then make all the connections. Use the following procedure to install the I/O shield and secure the motherboard into the chassis.

Note: Be sure that the CPU fan assembly has enough clearance for the chassis covers to lock into place and for the expansion cards. Also make sure the CPU Fan assembly is aligned with the vents on the covers.

Installing the I/O Shield

The motherboard kit comes with an I/O shield that is used to block radio frequency transmissions, protects internal components from dust and foreign objects, and promotes correct airflow within the chassis.

Before installing the motherboard, install the I/O shield from the *inside* of the chassis. Press the I/O shield into place and make sure it fits securely. If the I/O shield does not fit into the chassis, you would need to obtain the proper size from the chassis supplier.

Securing the Motherboard into the Chassis

Most computer chassis have a base with mounting studs or spacers to allow the mother board to be secured to the chassis and help to prevent short circuits. If there are studs that do not align with a mounting hole on the motherboard, it is recommended that you remove that stud to prevent the possibility of a short circuit.

1. Carefully place the motherboard onto the studs/spacers located inside the chassis.
2. Align the mounting holes with the studs/spacers.
3. Align the connectors to the I/O shield.
4. Ensure that the fan assembly is aligned with the chassis vents according to the fan assembly instruction.
5. Secure the motherboard with a minimum of eight-to-ten screws.

Connecting Cables and Setting Switches

This section takes you through all the connections and switch settings necessary on the motherboard. This will include:

❑ Power Connections
   ➢ 24-pin ATX power (**PWR1**)
   ➢ 8-pin ATX 12V power (**PWR2**)
❑ Internal Headers
   ➢ Front panel
   ➢ USB Headers
   ➢ Audio
   ➢ COM
❑ FDD
❑ IDE
❑ Serial ATA II
❑ Chassis Fans
❑ Rear panel USB 2.0 Adapter
❑ Expansion slots
❑ CMOS jumper settings

See Figure 1 on page 9 to locate the connectors and jumpers referenced in the following procedure.

Power Connections

This motherboard requires an ATX power supply. Make sure you have enough power to cover all the expansion cards you will be installing. To determine what you power requirements are for your specific configuration, refer to www.slizone.com.

24-pin ATX Power (PWR1)

PWR1 is the main power supply connector located along the edge of the board next to the DIMM slots. Make sure that the power supply cable and pins are properly aligned with the connector on the motherboard. Firmly plug the power supply cable into the connector and make sure it is secure.

PWR1 connector
Plug power cable from system power supply to PWR1

Card edge
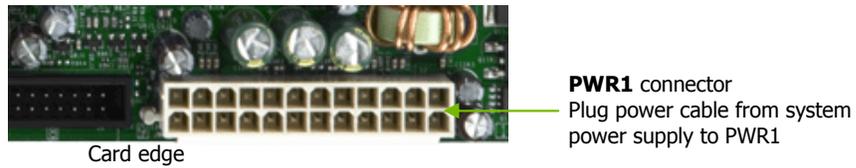
Figure 3.   PWR1 Motherboard Connector

Table 1.   PWR1 Pin Assignments

Connector	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	RSVD
	9	+5V_AUX	21	+5V
	10	+12V	22	+5V
	11	+12V	23	+5V
	12	+3.3V	24	GND

8-pin ATX 12V Power (PWR2)

PWR2, the 8-pin ATX 12V power connection, is used to provide power to the CPU. Align the pins to the connector and press firmly until seated.

Backpanel connector edge.

5　　　　1

12V　　　　GND

8　　　　4

Connect a four-pin power plug to pins 3, 4, 7, and 8.

5　　　　1
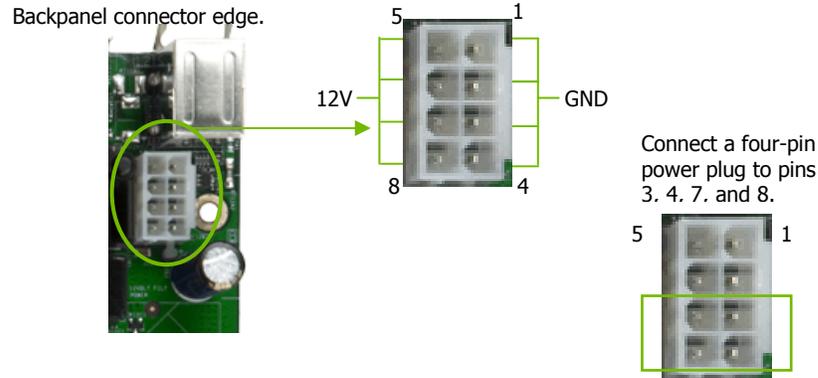
It is *strongly* recommended that you use an 8-pin ATX 12V power supply; however, if you have a four-pin power supply, plug the connector to pins 3, 4, 7, and 8 as shown.

Connecting IDE Hard Disk Drives

The IDE connector supports Ultra ATA 133/100/66 IDE hard disk drives.

1. Connect the blue connector (the cable end with a single connector) to the motherboard.
2. Connect the black connector (the cable with the two closely spaced black and gray connectors) to the Ultra ATA master device.
3. Connect the gray connector to a slave device.

If you install two hard disk drives, you must configure the second drive as a slave device by setting its jumper accordingly. Refer to the hard disk documentation for the jumper settings.

Note: If an ATA-66/100 disk drive and a disk drive using any other IDE transfer protocol are attached to the same cable, the maximum transfer rate between the drives may be reduced to that of the slowest drive.

Connecting Serial ATA Cables

The Serial ATA II connector is used to connect the Serial ATA II device to the motherboard. These connectors support the thin Serial ATA II cables for primary storage devices. The current Serial ATA II interface allows up to 300MB/s data transfer rate.

There are four serial ATA connectors on the motherboard that support RAID 0, RAID 1, RAID 5, RAID 0+1 and JBOD configurations.
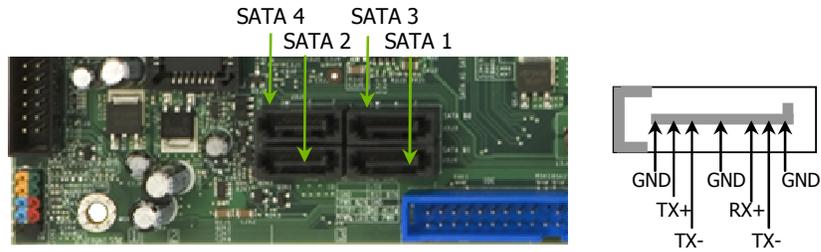
1. Connect the locking cable end to the motherboard connector.
2. Connect the end without the lock to the drive.

Connecting Internal Headers

Front Panel Header

The front panel header on this motherboard is one connector used to connect the following four cables:

❑ **PWRLED**
Attach the front panel power LED cable to these two pins of the connector.
The Power LED indicates the system's status. When the system is in S0 status, the LED is on. When the system is in S1, S3, S4, S5 status, the LED is off.

No Connect — RESET — HD_LED - +
9 ○ ○ ○ ○ ○ 1
10 ○ ○ ○ ○ ○ 2
Blank PWRSW - + PWRLED
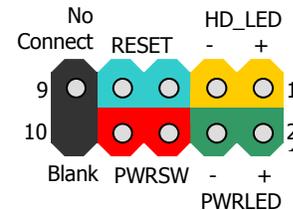
> **Note:** The power LED cable in some chassis is a three pin connector with the pins installed in positions 1 and 3. If your chassis has a three pin connector, you will need to remove pin 3 and put it into position 2 or you can use a pair of scissors to cut out position 2. Most chassis come with a two pin connector.

❑ **PWRSW**
Attach the power button cable from the case to these two pins. Pressing the power button on the front panel turns the system on off rather than using the power supply button.

❑ **HD_LED**
Attach the hard disk drive indicator LED cable to these two pins. The HDD indicator LED indicates the activity status of the hard disks.

❑ **RESET**
Attach the Reset switch cable from the front panel of the case to these two pins. The system restarts when the **RESET** switch is pressed.

Table 2.   Front Panel Header Pins

	Pin	Signal	In/Out	Description
HD_LED	1	HD_PWR	Out	Hard disk LED pull-up to +5V
	3	HDA#	Out	Hard disk active LED
PWRLED	2	HDR_BLNK_GRN	Out	Front panel green light
	4	HDR_BLNK_YEL	Out	Front panel yellow light
RESET	5	GND		Ground
	7	FP_RESET#	In	Reset switch
PWRSW	6	SWITCH_ON#	In	Power switch
	8	GND		Ground
No Connect	9	No Connect		
Empty	10	Empty		

USB Headers

This motherboard contains four (4) USB 2.0 ports that are exposed on the rear panel of the chassis. The motherboard also contains two 10-pin internal header connectors onboard that can be used to connect an optional external bracket containing four (4) more USB 2.0 ports.

1. Secure the bracket to either the front or rear panel of your chassis (not all chassis are equipped with the front panel option).
2. Connect the two ends of the cables to the USB 2.0 headers on the motherboard.
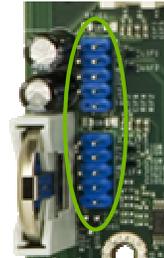
Table 3.   USB 2.0 Header Pins

Connector	Pin	Signal	Pin	Signal
USB 2.0 Header Connector	1	5V_DUAL	2	5V_DUAL
	3	D-	4	D-
9 10	5	D+	6	D+
7 8	7	GND	8	GND
5 6	9	Empty	10	No Connect
3 4				
1 2				
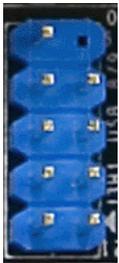
Fan Connections

There are two fan connections, the system fan and the CPU fan. The fan speed can be detected and viewed in the **System Monitor** section of the CMOS Setup. Both fans are automatically turned off after the system enters S3, S4 and S5 mode.

System fan connector

Fan Connector

3 2 1

GND
+12V
SENSE
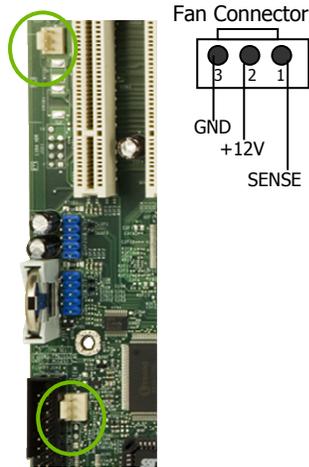
CPU fan connector

Note that the CPU fan cable can be either a 3-pin or a 4-pin connector. Connect a 3-pin connector to pins 1, 2, and 3 on the motherboard connector.

CPU Fan Connector

4 3 2 1

GND   SENSE
PWR   CONTROL
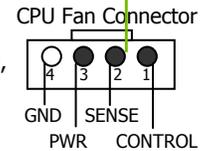
COM1

The motherboard kit provides an additional serial COM header for your machine. Connect one side of a switching cable to the header and then attach the serial COM device to the other side of the cable.

FDD Connector

The motherboard supports a standard 360K, 720K, 1.2M, 1.44m, and a 2.88M floppy disk drive (FDD).

Expansion Slots

The XFX nForce 650i Ultra motherboard contains six expansion slots, one PCI Express slot and three PCI slots. For a full list of PCI Express x16 graphics card supported by this motherboard, go to www.xfxforce.com.

1 – PCI slots
2 – x1 PCIe slots
4 – Primary PCIe x16 slot (GPU1)
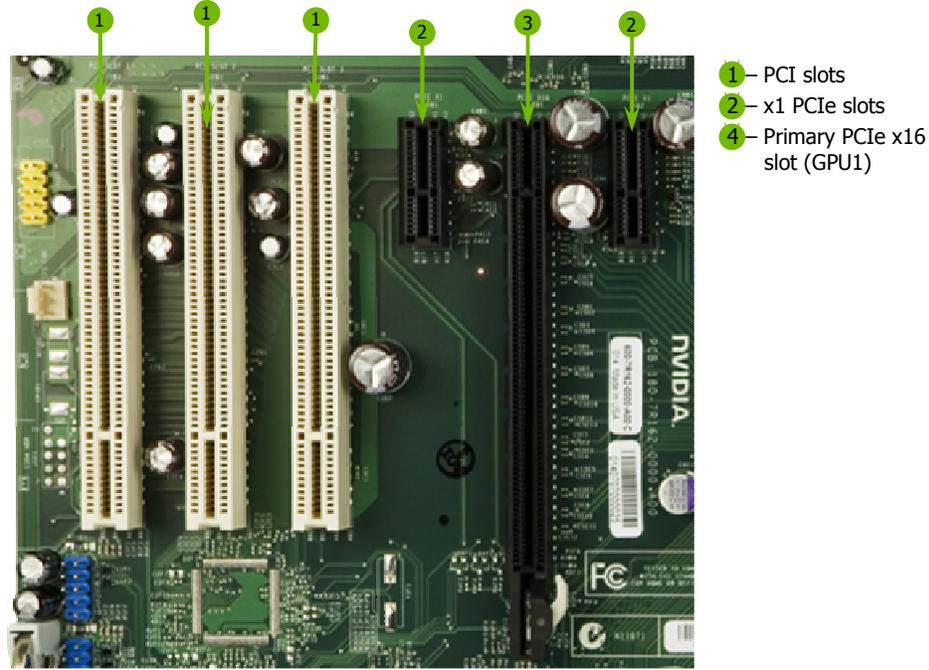
Figure 4.   Expansion Slots

PCI Slots

The three PCI slots support many expansion cards such as a LAN card, USB card, SCSI card and other cards that comply with PCI specifications. When installing a card into the PCI slot, be sure that it is fully seated. Secure the card's metal bracket to the chassis back panel with the screw used to hold the blank cover.

PCI Express x1 Slot

There are two PCI Express x1 slots that are designed to accommodate less bandwidth-intensive cards, such as a modem or LAN card. The x1 slot provides 250 MB/sec bandwidth.

PCI Express x16 Slots

There is one PCI Express x16 slot that is reserved for a graphics or video card. The bandwidth of the x16 slot is up to 4GB/sec (8GB/sec concurrent).

When installing a PCI Express x16 card, be sure the retention clip snaps and locks the card into place. If the card is not seated properly, it could cause a short across the pins. Secure the card's metal bracket to the chassis back panel with the screw used to hold the blank cover.

Jumper Settings

The motherboard contains a 3-pin BIOS configuration jumper that enables all board configurations to be done in the BIOS Setup program.

The silk screen on the motherboard shows a Δ next to pin 1.

Clear CMOS Jumper: CLR_CMOS

The motherboard uses the CMOS RAM to store all the set parameters. The CMOS can be cleared by removing the CMOS jumper.

Use the following procedure to clear CMOS:

1. Turn off the AC power supply and connect pins 1 and 2 together using the jumper cap.
2. Return the jumper setting to normal (pins 2 and
3. Together with the jumper cap).
4. Turn the AC power supply back on.

Configuring the BIOS

This section discusses how to change the system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

This section includes the following information:

❑ Enter BIOS Setup
❑ Main Menu
❑ Standard CMOS Features
❑ Advanced BIOS Features
❑ Advanced Chipset Features
❑ Integrated Peripherals
❑ Power Management Setup
❑ PnP/PCI Configurations
❑ System Monitor

Enter BIOS Setup

The BIOS is the communication bridge between hardware and software. Correctly setting the BIOS parameters is critical to maintain optimal system performance.

Use the following procedure to verify/change BIOS settings.

1. Power on the computer,
2. Press the **Del** key when the following message briefly displays at the bottom of the screen during the Power On Self Test (POST).

   `Press F1 to continue, DEL to enter Setup.`

   Pressing **Del** takes you to the Phoenix-Award BIOS CMOS Setup Utility.

Note: It is *strongly* recommended that you do not change the default BIOS settings. Changing some settings could damage your computer.

Main Menu

The main menu allows you to select from the list of setup functions and two exit choices. Use the **Page Up** and **Page Down** keys to scroll through the options or press **Enter** to display the associated submenu. Use the ↑↓ arrow keys to position the selector in the option you choose. To go back to the previous menu, press **Esc**.

Note: Note that on the BIOS screens all data in white is for information only, data in yellow is changeable, data in blue is non-changeable, and data in a red box is highlighted for selection.

```
                Phoenix - AwardBIOS CMOS Setup Utility

   ▶ Standard CMOS Features              ▶ System Monitor

   ▶ Advanced BIOS Features                Load Defaults

   ▶ Advanced Chipset Features             Set Password

   ▶ Integrated Peripherals                Save & Exit Setup

   ▶ Power Management Setup                 Exit Without Saving

   ▶ PnP/PCI Configurations


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


                  Time, Date, Hard Disk Type..,
```
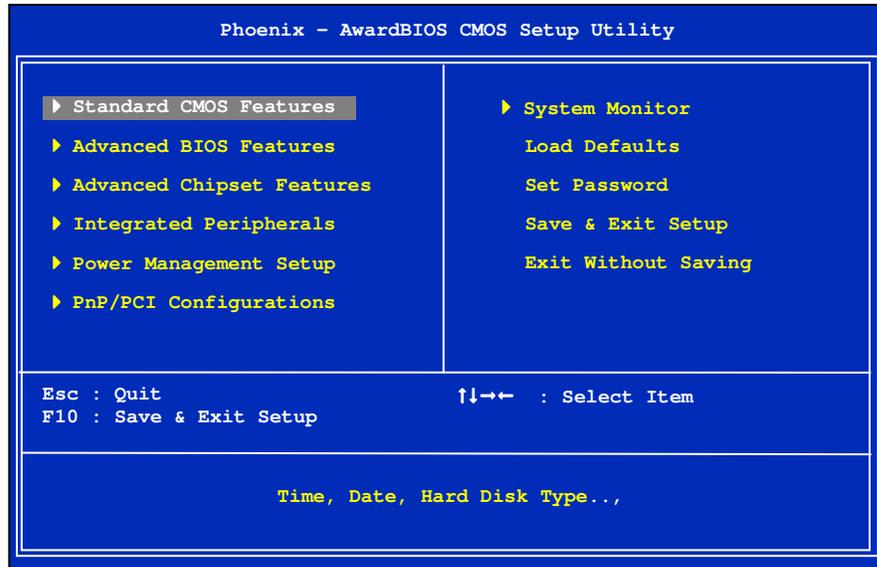
Figure 5.   BIOS CMOS Setup Utility Main Menu

❑ **Standard CMOS Features**
Use this menu to set up the basic system configuration.

❑ **Advanced BIOS Features**
Use this menu to set up the advanced system features and boot sequence.

❑ **Advanced Chipset Features**
Use this menu to optimize system performance and configure clocks, voltages, memory timings, and more.

❑ **Integrated Peripherals**
Use this menu to set up onboard peripherals such as IDE, RAID, USB, LAN, and MAC control.

❑ **Power Management Setup**
Use this menu to configure power management, power on, and sleep features.

❑ **PnP/PCI Configurations**
Use this menu to modify the system's Plug-and-Play and PCI configurations.

❑ **System Monitor**
Use this menu to monitor the real-time system status of your PC, including temperature, voltages, and fan speed.

The following items on the CMOS Setup Utility main menu are commands rather than submenus:

❑ **Load Defaults**
Load default system settings.

❑ **Set Password**
Use this command to set, change, and disable the password used to access the BIOS menu.

❑ **Save & Exit Setup**
Use this command to save settings to CMOS and exit setup.

❑ **Exit Without Saving**
Use this command to abandon all setting changes and exit setup.

The following two items on the CMOS Setup Utility main menu are status indicators:

Standard CMOS Features Menu

The Standard CMOS Features menu is used to configure the standard CMOS information, such as the date, time, HDD model, and so on. Use the **Page Up** and **Page Down** keys to scroll through the options or press **Enter** to display the sub-menu. Use the ↑↓ arrow keys to position the selector in the option you choose. To go back to the previous menu, press **Esc**.

The information shown in `Item Help` corresponds to the option highlighted.

```
                Phoenix - AwardBIOS CMOS Setup Utility
                      Standard CMOS Features

    Date (mm:dd:yy)          Sat, Jul 01 2006          Item Help
    Time (hh:mm:ss)          12 : 48:  23

  ▶ IDE Channel (.) Master   [None]                Main Level       ▶
  ▶ IDE Channel (.) Slave    [None]
  ▶ SATA Channel 1 Master    [None]
  ▶ SATA Channel 2 Master    [None]            Change the day, month,
  ▶ SATA Channel 3 Master    [None]            year and century
  ▶ SATA Channel 4 Master    [None]

    Drive A                  [1.44, 3.5 in.]
    Halt On                  [All , But Keyboard]

    Base Memory              640K
    Extended Memory          1047552K
    Total Memory             1048576K



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

Figure 6.   Standard CMOS Features Menu

Note: Note that all data in white is for information only, data in yellow is changeable, data in blue is non-changeable, and data in a red box is highlighted for selection.

Date and Time

Using the arrow keys, position the cursor over the month, day, and year. Use the **Page Up** and **Page Down** keys to scroll through dates and times. Note that the weekday (Sun through Sat) cannot be changed. This field changes to correspond to the date you enter. Note that the hour value is shown in a 24-hour clock format. Time is represented as `hour : minute : second`

```
Date (mm:dd:yy)        Sat, Jul 01 2006
Time (hh:mm:ss)        14 : 48:  43
```

IDE Channel and SATA Channel

Use these functions to detect and configure the individual IDE and SATA channels. Select a channel and press **Enter** to display the IDE/SATA sub-menu.

```
▶ IDE Channel (.) Master   [None]
▶ IDE Channel (.) Slave    [None]
▶ SATA Channel 1 Master    [None]
▶ SATA Channel 2 Master    [None]
▶ SATA Channel 3 Master    [None]
▶ SATA Channel 4 Master    [None]
```

Press ENTER to display
IDE Channel sub-menu

```
IDE HDD Auto-Detect    [Press Enter]

IDE Channel 0 Slave    [Manual}
Access Mode            [CHS]

Capacity                      0 MB

Cylinder               [     0]
Head                   [     0]
Precomp                [     0]
Landing Zone           [     0]
Sector                 [     0]
```

Press ENTER to display
SATA Channel sub-menu

```
IDE Auto-Detect        [Press Enter]

Extended IDE Drive     [None}
Access Mode             Auto

Capacity                      0 MB

Cylinder                      0
Head                          0
Precomp                       0
Landing Zone                  0
Sector                        0
```

Press **Enter** to auto-detect IDE and SATA channels in the system. Once the channel is detected, the values for Capacity, Cylinder, Heads, Precomp, Landing Zone, and Sector are automatically filled in.

❑ **None**
There is no HDD installed or set.

❑ **Auto**
The system can auto-detect the hard disk when booting up.

❑ **Manual**
When you set the channel to [Manual] and change Access Mode to [CHS], you can then enter the number of cylinders, heads, Precomp, landing zone, and sector. You can manually enter the values or you can press **Enter** to display a window that tells you the min and max values.

```
IDE HDD Auto-Detect        [Press Enter]

IDE Channel 0 Slave        [Manual}
Access Mode                [CHS]

Capacity                       0 MB

Cylinder                       0
Head                       [    0]
Precomp                    [    0]
Landing Zone               [    0]
Sector                     [    0]
```

Press ENTER to display sub-menu or enter number manually

```
Cylinder

Min=     0
Max=65535

Key in a DEC number :

↑↓:Move    ENTER:Accept    ESC:Abort
```

The BIOS supports the following HDD Access Modes:

➢ **CHS**
For HDD less than 528 MB.

➢ **LBA**
For HDD greater than 528 MB and supporting LBA (Logical Block Addressing).

➢ **Large**
For HDD greater than 528 MB but not supporting LBA.

➢ **Auto**
Recommended mode.

Drive A

The **Drive A** option allows you to select the kind of FDD to install.
Options are:

```
Drive A                  [1.44, 3.5 in.]
Halt On                  [All , But Keyboard]
```

Press ENTER to display sub-menu

- ❑ None
- ❑ 360K, 5.25 in.
- ❑ 1.2M, 5.25 in.
- ❑ 720K, 3.5 in.
- ❑ 1.44M, 3.5 in.
- ❑ 2.88M, 3.5 in.
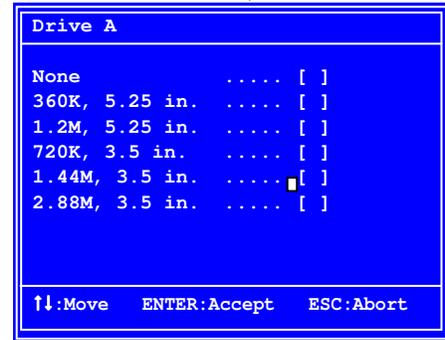
```
Drive A

None              ..... [ ]
360K, 5.25 in.    ..... [ ]
1.2M, 5.25 in.    ..... [ ]
720K, 3.5 in.     ..... [ ]
1.44M, 3.5 in.    .....  [ ]
2.88M, 3.5 in.    ..... [ ]



↑↓:Move    ENTER:Accept    ESC:Abort
```

Use the **Page Up** and **Page Down** keys to scroll
through the options or press **Enter** to display
the sub-menu. Use the ↑↓ arrow keys to
position the selector in the option you choose. Press **Enter** to accept the
changes and return to the Standard CMOS Features menu.

Halt On

Halt On determines whether or not the computer stops if an error is detected
during power on. Use the **Page Up** and **Page Down** keys to scroll through the
options or press **Enter** to display the **Halt On** sub-menu. Use the ↑↓ arrow keys
to position the selector in the option you choose. Press **Enter** to accept the
changes and return to the Standard CMOS Features menu.

```
Drive A                  [1.44, 3.5 in.]
Halt On                  [All , But Keyboard]
```

Press ENTER to display sub-menu

- ❑ **All Errors**
  Whenever the BIOS detects a nonfatal
  error, the system stops and prompts you.
- ❑ **No Errors**
  System boot does not stop for any detected
  errors.
- ❑ **All, But Keyboard**
  System boot does not stop for keyboard
  errors, but does stop for all other errors.

```
Halt On

All Errors           ..... [ ]
No Errors            ..... [ ]
All , But Keyboard   ..... [ ]
All , But Diskette   ..... [ ]
All , But Disk/Key   ..... [ ]



↑↓:Move    ENTER:Accept    ESC:Abort
```
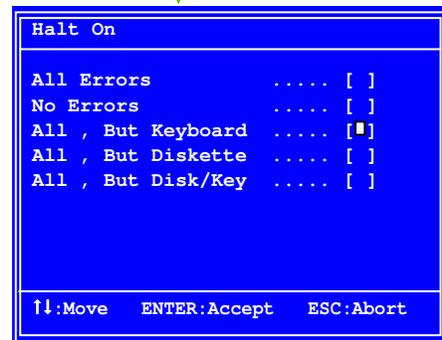
❑ **All, But Diskette**
The system boot does not stop for a diskette error but will stop for all other errors.

❑ **All, But Disk/Key**
The system boot does not stop for a keyboard or disk error, but will stop for all other errors.

Memory

These settings are *display-only values* that are determined by the BIOS POST (Power-On Self Test).

Base Memory	640K
Extended Memory	1047552K
Total Memory	1048576K

❑ **Base Memory**
BIOS POST determines the amount of base (or conventional) memory installed in the system.

❑ **Extended Memory**
BIOS determines how much extended memory is present during the POST.

❑ **Total Memory**
This value represents the total memory of the system.

Advanced BIOS Features

Access the Advanced BIOS Features menu from the CMOS Utility Setup screen. Use the **Page Up** and **Page Down** keys to scroll through the options or press **Enter** to display the sub-menu. Use the ↑↓ arrow keys to position the selector in the option you choose. To go back to the previous menu, press **Esc**.

Note: The options that have associated sub-menus are designated by a ▶, which precedes the option. Press **Enter** to display the sub-menus.

```
          Phoenix - AwardBIOS CMOS Setup Utility
                  Advanced BIOS Features

 ▶ Removable Device Priority    [Press Enter]          Item Help
 ▶ Hard Disk Boot Priority      [Press Enter]
 ▶ Network Boot Priority        [Press Enter]      Main Level      ▶
   CPU Internal Cache           [Enabled]
   Quick Power On Self Test     [Enabled]          Select Removable Boot
   First Boot Device            [Removable]        Device Priority
   Second Boot Device           [CDROM]
   Third Boot Device            [Hard Disk]
   Boot Other Device            [Enabled]
   Boot Up NumLock Status       [On]
   Security Option              [Setup]
   APIC Mode                    [Enabled]
   MPS Version Control For OS    [1.4]
   Full Screen LOGO Show        [Disabled]



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

Figure 7.   Advanced BIOS Features Menu

Note: Note that all data in white is for information only, data in yellow is changeable, data in blue is non-changeable, and data in a red box is highlighted for selection.

Removable Device Priority

Use this option to select the priority for removable device startup. Press **Enter** to see the list of removable devices in your system. Use the ↑↓ arrow keys to go to the various devices. Then use the **+** or **−** keys to move the device priority up or down in the list. To go back to the previous menu, press **Esc**.

```
1. Floppy Disks
```

Hard Disk Boot Priority

Use this option to select the priority for HDD startup. Press **Enter** to see the list of bootable devices in your system. Use the ↑↓ arrow keys to go to the various devices. Then use the **+** or **−** keys to move the device priority up or down in the list. To go back to the previous menu, press **Esc**.

```
1. Ch0.      :   ST3802110A
2. Bootable Add-in Cards
```
Use the + and − keys to move the priority of the device within the list

Network Boot Priority

Use this option to select the priority for network startup. Select `Network Boot Priority` and press **Enter** to view available networks. Use the ↑↓ arrow keys to go to the various devices. Then use the **+** or **−** keys to move the device priority up or down in the list. To go back to the previous menu, press **Esc.**

```
1. Network 0 :  <description of network>
2. Network 1 :  <description of network>
```

CPU Internal Cache

Use this option to enable or disable the CPU internal cache. Use the **Page Up** and **Page Down** keys to scroll through the options or press **Enter** to display the options in a sub-menu. Use the ↑↓ arrow keys to position the selector in the option you choose.

Quick Power On Self Test

Enabling this option allows the system to skip certain test while booting, which reduces the time needed to boot the system. Use the **Page Up** and **Page Down** keys to toggle between **Enable** and **Disable**.

First/Second/Third Boot Device

Use this option to set the priority sequence of the devices booted at power on. Use the **Page Up** and **Page Down** keys to scroll through the options or press **Enter** to display the sub-menu. Use the ↑↓ arrow keys to position the selector in the option you choose.

```
First Boot Device

Removable           ..... [█]
Hard Disk           ..... [ ]
CDROM               ..... [ ]
Network             ..... [ ]
Disabled            ..... [ ]




↑↓:Move    ENTER:Accept   ESC:Abort
```
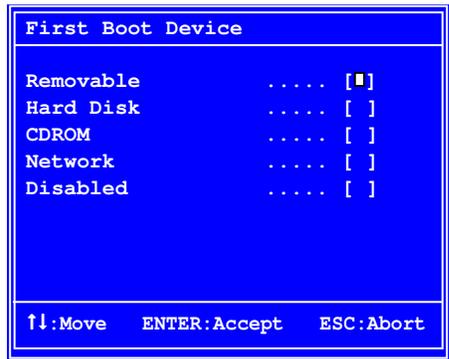
Boot Other Device

With the option set to **Enable**, the system boots from some other device if the first/second/third boot devices fail.

Boot Up NumLock Status

This option allows you to select the power-on state of **NumLock**. Select On to activate the keyboard **NumLock** when the system is started. Select Off to disable the **NumLock** key.

Security Option

The Security Options allows you to require a password every time the system boots or only when you enter setup. Select `Setup` to require a password to gain access to the CMOS Setup screen. Select `System` to require a password to access the CMOS Setup screen and when the system boots.

APIC Mode

Use this function to enable or disable the Advanced Programmable Interrupt Controller (APIC). If you disable this option, you also disable the MPS Version Control for OS option.

MPS Version Control For OS

Use this function to select the Multi-Processor Specification (MPS) version that BIOS passes to the operating system. Use the **Page Up** and **Page Down** keys to scroll through the options.

Full Screen LOGO Show

This option allows you to enable or disable the display of the full-screen logo when the system boots. Use the **Page Up** and **Page Down** keys to toggle between **Enable** and **Disable**

Advanced Chipset Features

Select Advanced Chipset Features from the CMOS Setup Utility menu and press **Enter** to display the functions of the Advanced Chipset Functions menu.

```
                  Phoenix - AwardBIOS CMOS Setup Utility
                         Advanced Chipset Features

  ▶ System Clocks                  [Press Enter]        Item Help
  ▶ FSB & Memory Config            [Press Enter]
  ▶ CPU Configuration              [Press Enter]     Main Level      ▶
  ▶ System Voltages                [Press Enter]
    NVMEM memory test              [Disable]         Voltage control

    Load timing/voltage set        [Press Enter]
    Save timing/voltage set        [Press Enter]
    System BIOS Cacheable          [Disabled]
    HPET Function                  [Enable]

    NVIDIA GPY Ex                  [Enable]




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

Figure 8.   Advanced Chipset Features

System Clocks

Select System Clocks from the Advanced Chipset Features menu and press **Enter** to display the System Clocks menu. From this menu, you are able to specify frequency settings, HT multipliers, and Spread Spectrum settings. Note that in Figure 9, all of the options are listed. On the actual BIOS screen, you will need to scroll down to see all the options.

```
              Phoenix - AwardBIOS CMOS Setup Utility
                           System Clocks

  Parameters              Settings  Current Value        Item Help
  **Frequency Settings**
  CPU Freq, MHz             2933.3    2933.3
  FSB Reference Clock, MHz  1066.7    1066.7         Main Level      ▶
  CPU Multiplier           [11 X]     11X

  PCIe x16_1, MHz          [Auto]     100            CPU frequency
  SPP<->MCP Ref Clock, MHz [Auto]     100            multiplier.
                                                     CPU core clock
  **HT Multiplier**                                  = FSB Ref Clock/4 *
  nForce SPP --> nForce MCP [5 x]                       CPU Multiplier
  nForce SPP <-- nForce MCP [5 x]

  **Spread Spectrum**
  CPU Spread Spectrum      [UP Spread]
  HT Spread Spectrum        Disabled
  PCIe Spread Spectrum(SPP) [Auto]
  PCIe Spread Spectrum(MCP) Disabled
  SATA Spread Spectrum      Disabled



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

Figure 9.   System Clocks Menu

Note: Note that all data in white is for information only, data in yellow is changeable, data in blue is non-changeable, and data in a red box is highlighted for selection.

Frequency Settings

❑ **CPU Freq, MHz**
This value is set by the CPU Multiplier (value cannot be changed by the user).

❑ **FSB Reference Clock. MHz**
This value is set by the system (value cannot be changed by the user). To change the FSB memory, and memory timing, go to the FSB & Memory screen.

❑ **CPU Multiplier**
This value changes the CPU Frequency value depending on the value you choose. Use the **Page Up** and **Page Down** keys to scroll through the options. The options are from 6 X through 60 X.

❑ **PCIe x16_1, MHz**
Use the **Page Up** and **Page Down** keys to scroll through the frequency options for the PCI Express Bus, Slot 1 (the black slot closest to the CPU). Note that as you go higher in value, `PCIe Spread Spectrum(SPP)` is disabled and cannot be changed from this status.

❑ **SPP<−>MCP Ref Clock, MHz**
Use the **Page Up** and **Page Down** keys to scroll through the frequency options for the reference clock between the SPP chip and the MCP chip.

HT Multiplier

❑ **nForce SPP ――> nForce MCP**
Use the **Page Up** and **Page Down** keys to scroll through the HT multiplier options and set the link speed from the SPP chip to the MCP chip. Values are `[1 x]` through `[5 x]`.

❑ **nForce MCP <―― nForce SPP**
Use the **Page Up** and **Page Down** keys to scroll through the HT multiplier options and set the link speed from the MCP chip to the SPP chip. Values are `[1 x]` through `[5 x]`.

Spread Spectrum

❑ **CPU Spread Spectrum**
Use the **Page Up** and **Page Down** keys to scroll through the Spread Spectrum options for the CPU. Option values are `[Disabled]`, `[UP Spread]`, and `[Center Spread]`.

❑ **HT Spread Spectrum**
Disabled

❑ **PCIe Spread Spectrum (SPP)**
Use the **Page Up** and **Page Down** keys to scroll through the Spread Spectrum options for the SPP PCIe. Option values are `[Disabled]`, `[UP Spread]`, and `[Center Spread]`. This option reverts to `Disabled` and cannot be changed when the value for PCIe x16_1 exceeds 100MHz.

❑ **PCIe Spread Spectrum(MCP)**
Disabled

❑ **SATA Spread Spectrum**
Disabled

FSB & Memory Config

Select FSB & Memory Config from the Advanced Chipset Features menu and press **Enter** to display the FSB & Memory Config menu. This menu provides the means to set FSB and memory timing.

```
              Phoenix - AwardBIOS CMOS Setup Utility
                     FSB & Memory Config

   Parameters              Settings  Current Value        Item Help
   CPU Freq, MHz             2933.3     2933.3
   CPU Multiplier            11X        11X
   FSB - Memory Clock Mode  [Auto]                   Main Level      ▶▶
 X FSB (QDR), MHz            Auto       1066.7
   Actual FSB (QDR), MHz    1066.7                   "CPUOC MAX" realizes
 X MEM (DDR), MHz            Auto        800.6       the complete optimized
   Actual MEM (DDR), MHz     800.0                   memory settings when
                                                     SLI-Ready memory is
 ▶ Memory Timing Setting    [Press Enter]            installed

                                                     Optimized memory
                                                     settings by allowing
                                                     X% CPU overclocking

                                                     CPU overclocking may
                                                     require manual
                                                     overvolting of the CPU
                                                     to improve system
                                                     stability

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

Figure 10.   FSB & Memory Config Menu

❑ **FSB and Memory Clock Mode**
Use the **Page Up** and **Page Down** keys to scroll through the FSB and Memory Clock Mode options. The options are:

➢ **Auto**
This is the optimal setting since it sets the FSB and memory speeds automatically.

➢ **Linked**
When **Link** is selected, `FSB (QDR), MHz` is changed to editable and the FSB speed can be entered manually. As the FSB speed is changed, `CPU Freq, MHz` changes proportionally.

```
   CPU Freq, MHz              2933.3    2933.3
   CPU Multiplier             11X       11X
   FSB – Memory Clock Mode [Linked]
   FSB (QDR), MHz             [1067]    1066.7
    Actual FSB (QDR), MHz   1066.7
 X MEM (DDR), MHz             Auto        800.6
    Actual MEM (DDR), MHz    800.0
```

➢ **Unlinked**
When **Unlink** is selected, `FSB (QDR), MHz` and `MEM (DDR), MHz` are changed to editable and the FSB and memory speeds can be entered manually. As the FSB speed is changed, `CPU Freq, MHz` changes proportionally.

```
   FSB – Memory Clock Mode [Linked]
   FSB (QDR), MHz             [1067]    1066.7
    Actual FSB (QDR), MHz   1066.7
   MEM (DDR), MHz             [1067]      800.6
    Actual MEM (DDR), MHz    800.0
```

❑ **FSB (QDR), MHz**
Use the **+** or **–** keys to scroll through new values for the CPU FSB frequency or type in a new value. Note that the **Actual FSB (QDR)** reflects the actual frequency that takes effect on a reboot.

❑ **MEM (DDR), MHz**
Use the **+** or **–** keys to scroll through new values for the memory frequency or type in a new value. Note that the **Actual MEM (DDR)** reflects the actual frequency that takes effect when the system reboots.

❑ **Memory Timing Setting**
Press **Enter** to display the Memory Timing Setting menu. Use this menu to set optimal timings or to manually enter timings.

```
              Phoenix - AwardBIOS CMOS Setup Utility
                       Memory Timing Setting

   Parameters              Settings Current Value      Item Help

   Memory Timing Setting    [Optimal]
 X tCL (CAS Latency)        Auto(5)        5         Main Level    ▶▶
 X tRDC                     Auto(7)        5
 X tRP                      Auto(7)        5         Select [Expert] to
 X tRAS                     Auto(23)       18        enter timings manually
 X Command Per Clock (CDM)  Auto(2T)       1T

   ** Advanced Memory Settings **
 X tRRD                     Auto(4)        3
 X tRC                      Auto(28)       22
 X tWR                      Auto(7)        5
 X tWTR                     Auto(10)       9
 X tREF                     Auto          6.1uS



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

➢ **Optimal**
Use the **Page Up** and **Page Down** keys to select **Optimal.** Optimal prohibits you from manually setting any timing. All timing is set for optimal performance.

➤ **Expert**
Use the **Page Up** and **Page Down** keys to select `Expert`. When Expert is selected, all timing categories are enabled for manual input. Note that you should set the value to Optimal to use the manufacturers' recommended values.

```
Parameters                  Settings Current Value

Memory Timing Setting     [Expert]
tCL (CAS Latency)         [Auto(5)]      5
tRDC                      [Auto(7)]      5
tRP                       [Auto(7)]      5
tRAS                      [Auto(23)]    18
Command Per Clock (CDM)   [Auto(2T)]    1T

** Advanced Memory Settings **
tRRD                      [Auto(4)]      3
tRC                       [Auto(28)]    22
tWR                       [Auto(7)]      5
tWTR                      [Auto(10)]     9
tREF                      [Auto]       6.1uS
```

✦ `tCL`: CAS# latency (options are 1 through 6).
✦ `tRDC`: RAS#-to-CAS# Delay for Read/Write commands to the same bank (options are 1 through 7).
✦ `tRP`: Row Precharge time. This is the Precharge-to-Active or Auto-to-Refresh of the same bank (options are 1 through 7).
✦ `tRAS`: This is the minimum RAS# active time (options are 1 through 31).
✦ `Command Per Clock`: This is the command timing setting on a per clock unit basis (options are 1T and 2T).
✦ `tRRD`: RAS#-to-RAS# delay of different banks (options are 1 through 15).
✦ `tRC`: RAS#-to-RAS# or auto refresh time of the same bank (options are 1 through 31).
✦ `tWR`: The Write recovery time (options are 2 through 7).
✦ `tWTR`: This is the minimum write-to-read delay with the same chip selected (options are 1 through 10).
✦ `tREF`: This is the DRAM refresh rate (options are `Auto`, `7.8uS`, and `3.9uS`).

CPU Configuration

Select CPU Configuration from the Advanced Chipset Features menu and press **Enter** to display the CPU Configuration menu.

```
            Phoenix - AwardBIOS CMOS Setup Utility
                      CPU Configuration

     Limit CPUID MaxVal        [Disabled]          Item Help
   X Intel SpeedStep            Disabled
     CPU Thermal Control       [Disabled]
     C1E Enhanced Halt State   [Enabled]       Main Level     ▶▶
     Execute Disable Bit       [Enabled]
     Virtualization Technology [Enabled]
                                               Set linit CPUID MaxVal
                                               to 3, should be
     CPU Core 0                 Enabled        "Disabled" for WinXP
     CPU Core 1                [Enabled]
   X CPU Core 2                 Disabled
   X CPU Core 3                 Disabled




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

Figure 11.   CPU Configuration Menu

❑ **Limit CPUID MaxVal**
Use this function to enable the set limit of the CPUID MaxVal to 3. Set to Disable for Win XP.

❑ **CPU Thermal Control**
Use this function to enable or disable TM1 and TM2 support. Options are:

➢ Disable
Disable support for TM1 and TM2.

➢ TM1 Only
The CPU is thermally throttled by cutting active processor clock cycles.

➢ TM2 Only
Thermal throttling is achieved by reducing the CPU multiplier and CPU core voltage.

> ➢ TM1 & TM2
> Enables support for both TM1 and TM2.

❑ **C1E Enhanced Halt State**
Enabled, this function reduces the CPU power consumption when the CPU is idle. Idle occurs when the operating system issues a halt instruction.

❑ **Execute Disable Bit**
When this function is disabled, it forces the XD feature flag to always return to zero (0).

❑ **Virtualization Technology**
When this function is enabled, it allows a VMM to utilize the additional hardware capabilities provided by Intel Virtualization Technology.

❑ **CPU Core 1**
This function allows you to enable or disable CPU Core.

System Voltages

Select `System Voltages` from the Advanced Chipset Features menu and press **Enter** to display the System Voltages menu.

```
         Phoenix - AwardBIOS CMOS Setup Utility
                    System Voltages
┌──────────────────────────────────────────┬──────────────────┐
│  Parameters          Settings Current Value│    Item Help     │
│  CPU Core               [Auto]    1.28      │                  │
│  Memory                 [Auto]    1.85V     │                  │
│  nForce SPP             [Auto]    1.20V     │  Main Level   ▶▶ │
│  CPU FSB                [Auto]    1.20V     │                  │
│                                             │                  │
│                                             │  Voltage level for CPU │
│                                             │  Core (CPU VID)  │
│                                             │                  │
│                                             │                  │
│                                             │                  │
│                                             │                  │
│                                             │                  │
│                                             │                  │
│                                             │                  │
├─────────────────────────────────────────────────────────────┤
│ ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help │
│              F5: Previous Values        F7:Defaults          │
└─────────────────────────────────────────────────────────────┘
```
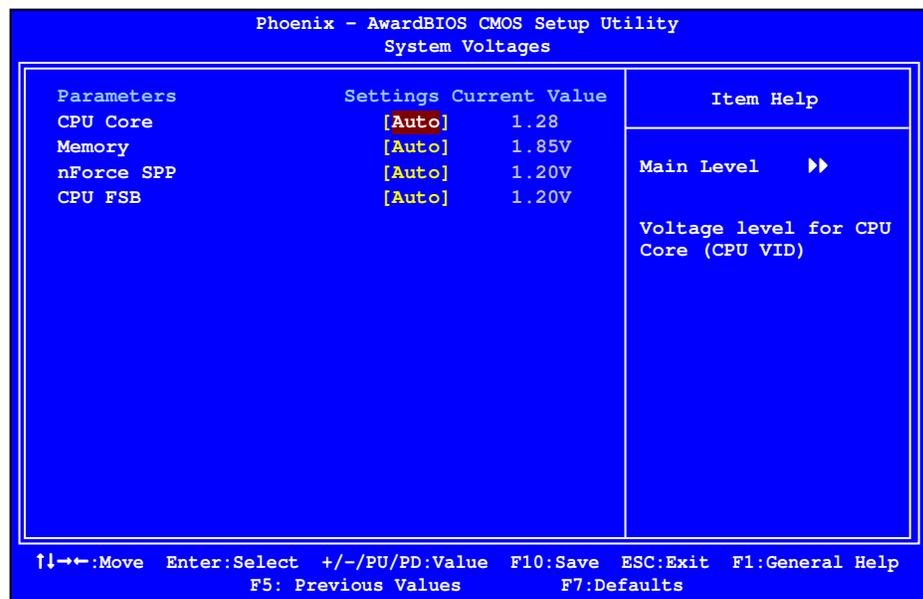
Figure 12.   System Voltages Menu

❑ **CPU Core**
Use the **Page Up** and **Page Down** keys to scroll through the voltages or select **[Auto]** to automatically set the voltage level for the CPU Core.

❑ **Memory**
This function defines the voltage level for the DRAM. Use the **Page Up** and **Page Down** keys to select a voltage or select **[Auto]** to automatically set the voltage.

❑ **nForce SPP**
This function defines the core voltage level for the NVIDIA nForce SPP chip. Use the **Page Up** and **Page Down** keys to select a voltage (1.20V, 1.30V, 1.40V, 1.50V) or select **[Auto]** to automatically set the voltage.

❑ **CPU FSB**
This function defines the CPU front-side bus (FSB) voltage level (1.20V to 1.40V). Use the **Page Up** and **Page Down** keys to select a voltage or select **[Auto]** to automatically set the voltage.

NVMEM Memory Test

This function defines whether you run the NVIDIA memory testing module during POST. The options are Fast, Medium, Slow, and Disable.

Load Timing/Voltage Set

This function loads the system voltages and timing settings that were defined in the System Voltages menu. You can set up to four profile settings using the **Save timing/voltage set** function.

There are four profile options that can be loaded. The default setting is **Auto** for all settings. Press **Enter** to see the options.

```
Load timing/voltage set

Press Enter to Exit  ..... [█]
Select Profile 1     ..... [ ]
Select Profile 2     ..... [ ]
Select Profile 3     ..... [ ]




↑↓:Move    ENTER:Accept    ESC:Abort
```
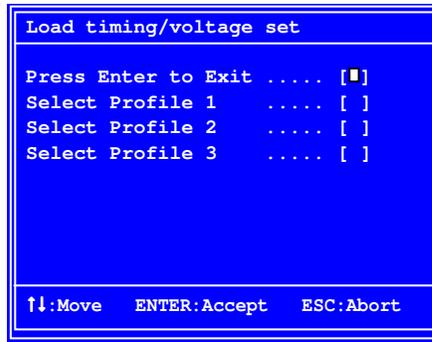
Save Timing/Voltage Set

This function saves the system voltages and timing settings that were defined in the System Voltages menu. There are four profile options that can be loaded. The default setting is **Auto** for all settings. Press **Enter** to see the options.

```
Save timing/voltage set

Press Enter to Exit ..... [█]
Select Profile 1     ..... [ ]
Select Profile 2     ..... [ ]
Select Profile 3     ..... [ ]




↑↓:Move    ENTER:Accept    ESC:Abort
```
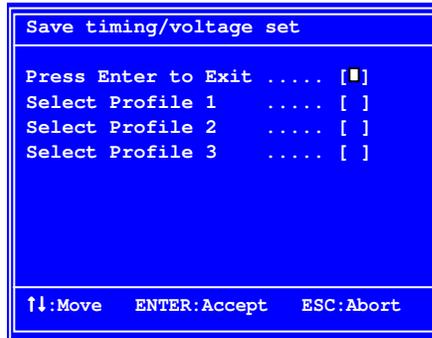
System BIOS Cacheable

This function allows you to enable or disable caching the system BIOS.

HPET Function

This function allows you to enable or disable the High Precision Even Timer (HPET). When **Enabled**, HPET is used as the timing hardware for multimedia and other time-sensitive application. When HPET is **Disabled**, the APIC timer is used.

NVIDIA GPU Ex

To enable or disable this function you need to have the NVIDIA® ForceWare® graphics driver with NVIDIA EX support. When enabled, the system uses the optimized NVIDIA EX graphics driver.

Integrated Peripherals Menu

Select `Integrated Peripherals` from the CMOS Setup Utility menu and press **Enter** to display the Integrated Peripherals menu.

```
          Phoenix - AwardBIOS CMOS Setup Utility
                   Integrated Peripherals

  ▶ IDE Function Setup        [Press Enter]          Item Help
  ▶ RAID Config               [Press Enter]
  ▶ USB Config                [Press Enter]
  ▶ MAC Config                [Press Enter]     Main Level      ▶
    IEEE1394 controller       [Auto]
    HD Audio                  [Auto]
    IDE HDD Block Mode        [Enabled]
    Onboard FDC Controller    [Enabled]
    Onboard Serial Port 1     [3FB/IRQ4]




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

Figure 13.   Integrated Peripherals Menu

IDE Function Setup

Press **Enter** to display the IDE Function Setup menu.

```
OnChip IDE Channel0        [Enabled]
Primary Master   PIO       [Auto]
Primary Slave   PIO        [Auto]
Primary Master   UDMA      [Auto]
Primary Slave   UDMA       [Auto]
IDE DMA transfer access    [Enabled]
Serial-ATA Controller      [All Enabled]
IDE Prefetch Mode          [Enabled]
```

❑ **OnChip IDE Channel0**
Use this function to enable or disable the onchip IDE Channel0. When disabled, the Primary Master/Slave functions are changed to **Auto** and cannot be changed.

```
  OnChip IDE Channel0        [Disabled]
x Primary Master   PIO        Auto
x Primary Slave   PIO         Auto
x Primary Master   UDMA       Auto
x Primary Slave   UDMA        Auto
  IDE DMA transfer access    [Enabled]
  Serial-ATA Controller      [All Enabled]
  IDE Prefetch Mode          [Enabled]
```

❑ **Primary Master/Slave PIO**
When **OnChip IDE Channel0** is set to **[Enabled]**, you can select a mode for the primary Master and Slave PIO. Select from **Auto**, or **Mode 1** through **Mode 4**.

❑ **Primary Master/Slave UDMA**
When **OnChip IDE Channel0** is set to **[Enabled]**, you can disable the primary Master and Slave UDMA or set it to **[Auto]**.

❑ **IDE DMA transfer access**
Use this function to enable or disable IDE DMA transfer access.

❑ **Serial-ATA Controller**
This function allows you to enable specific SATA controllers, enable all controllers, or disable all controllers. The options available are **[SATA-0]**, **[SATA-0+1]**, **[Enable All]**, and **[Disabled]**.

❑ IDE Prefetch Mode
Use this function to enable or disable the IDE Prefetch mode.

RAID Config

Press **Enter** to display the RAID Config menu.

```
RAID Enable                 [Enabled]
SATA 0 Primary       RAID   [Disabled]
SATA 0 Secondary     RAID   [Disabled]
SATA 1 Primary       RAID   [Disabled]
SATA 1 Secondary     RAID   [Disabled]
SATA 2 Primary       RAID   [Disabled]
SATA 2 Secondary     RAID   [Disabled]
```

❑ **RAID Enable**
   Use this function to enable or
   disable RAID. When RAID is
   set to [Disabled], all SATA
   functions are changed to
   Disabled and cannot be
   changed.

```
RAID Enable                   [Disabled]
x SATA 0 Primary       RAID    Disabled
x SATA 0 Secondary     RAID    Disabled
x SATA 1 Primary       RAID    Disabled
x SATA 1 Secondary     RAID    Disabled
x SATA 2 Primary       RAID    Disabled
x SATA 2 Secondary     RAID    Disabled
```

❑ **SATA x Primary/Secondary**
   When **RAID Enable** is set to **[Enabled]**, you can enable or disable the
   various SATA functions.

USB Config

Press **Enter** to display the USB Config menu.

```
OnChip USB              [Enabled]
USB Keyboard Support    [Disabled]
USB Mouse Support       [Disabled]
```

❑ **OnChip USB**
   Use this function to enable
   specific versions of the USB
   or disable the onchip USB.

```
OnChip USB                    [Disabled]
x USB Keyboard Support         Enabled
x USB Mouse Support            Enabled
```

   When the onchip USB is set to **[Disabled]**, the keyboard and mouse
   support functions are set to **Enabled** and cannot be changed. Versions that
   can be selected are **[V1.1+V2.0]** or **[V1.1]**.

❑ **USB Keyboard/Mouse Support**
   Use these function to enable or disable the onchip WSB support of the
   keyboard and/or mouse.

MAC Config

Press **Enter** to display the MAC Config menu.

```
MAC0 LAN                    [Enabled]
MAC1 LAN                    [Disabled]
```

❑ **MACx LAN**
Use these functions to set the MAC0 and/or MAC1 LANs to **Auto** or disable their functions.

HD Audio

This function on the Integrated Peripherals menu allows you to enable or disable the hard disk audio function.

IDE HDD Block Mode

Using this function on the Integrated Peripherals menu allows your IDE hard drive needs to support block mode. Select **[Enabled]** to automatically detect the optimal number of block read/writes per sector the drive can support. Select **[Disabled]** if your drive does not support block mode.

Onboard FDC Controller

This function on the Integrated Peripherals menu allows you to enable or disable the onboard FDC controller function.

Onboard Serial Port 1

This function on the Integrated Peripherals menu allows you to select the onboard serial port 1 function. Options are **[3F8/IRQ4]**, **[2E8/IRQ3]**, **[3E8/IRQ4]**, **[Auto]**, and **[Disabled]**.

Power Management Setup Menu

Select Power Management Setup from the CMOS Setup Utility menu and press **Enter** to display the Power Management Setup menu.

```
            Phoenix - AwardBIOS CMOS Setup Utility
                     Power Management Setup

   ACPI function               [Enabled]              Item Help
   APCI Suspend Type           [S1&S3]
   Soft-Off by PBTN            [Instant-Off]
   WOL(PME#) From Soft-Off     [Disabled]        Main Level       ▶

   Power-on by Alarm           [Disabled]
 x Day of Month Alarm            0
 x Time (hh:mm:ss) Alarm        0 : 0 : 0

   POWER ON Function           [BUTTON ONLY]
 x KB Power ON Password        Enter
 x Hot Key Power On            Ctrl-F1




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

Figure 14.   Power Management Setup Menu

ACPI Function

This function on the Power Management Setup menu allows you to enable or disable the ACPI function.

ACPI Suspend Type

This function on the Power Management Setup menu allows you to select an ACPI Suspend Type. Types to select from are **[S1&S3]**, **[S1(POS)]**, and **[S3(STR)]**.

Soft-Off by PBNT

This function on the Power Management Setup menu allows you to set Soft-Off by PBNT to **[Instant-Off]** or **[Delay 4 Sec]**.

WOL(PME#) From Soft-Off

This function on the Power Management Setup menu allows you to enable or disable WOL(PMW#) from soft-off.

Power On by Alarm

This function on the Power Management Setup menu allows you to enable or disable the Power-on by alarm function. Set to **[Disable]** to prevent power-on by alarm. When set to **[Enable]**, you can manually put in the day of the month and the time of the alarm.

```
   Power-on by Alarm          [Disabled]
   Day of Month Alarm         [ 0]
   Time (hh:mm:ss) Alarm      [0 : 0 : 0]
```

To enter a day or time, use the **Page Up** and **Page Down** keys to scroll through numbers or enter the number using the keyboard number or the **+** and **–** keys.

POWER ON Function

This function on the Power Management Setup menu allows you to define the power-on function. Options for this function are:

❑ BUTTON ONLY

❑ Keyboard 98

❑ **Password**
When **[Password]** is selected, the **KB Power ON Password** function is enabled so that you must enter a password.

```
   POWER ON Function          [Password]
   KB Power ON Password       [Enter]
 x Hot Key Power On            Ctrl-F1
```

❑ **Hot Key Power On**

When **[Hot Key]** is selected, the **Hot key Power On** function is enabled so that you must select a keyboard key as the hot key. To select a hot key use **Ctrl+F1** though **Ctrl+F12**.

```
   POWER ON Function          [Hot key]
 x KB Power ON Password         Enter
   Hot Key Power On           [Ctrl-F1]
```

❑ **Mouse Left**

❑ Mouse Right

❑ Any Key

PnP/PCI Configuration Menu

Select PnP/PCI Configuration from the CMOS Setup Utility menu and press **Enter** to display the PnP/PCI Configuration menu.

```
            Phoenix - AwardBIOS CMOS Setup Utility
                     PnP/PCI Configuration

   Init Display First        [PCI Slot]          Item Help
   Reset Configuration Data  [Disabled]

   Resources Controlled By   [Auto(ESCD)]      Main Level    ▶
 x IRQ Resources              Press Enter

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




↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
               F5: Previous Values         F7:Defaults
```
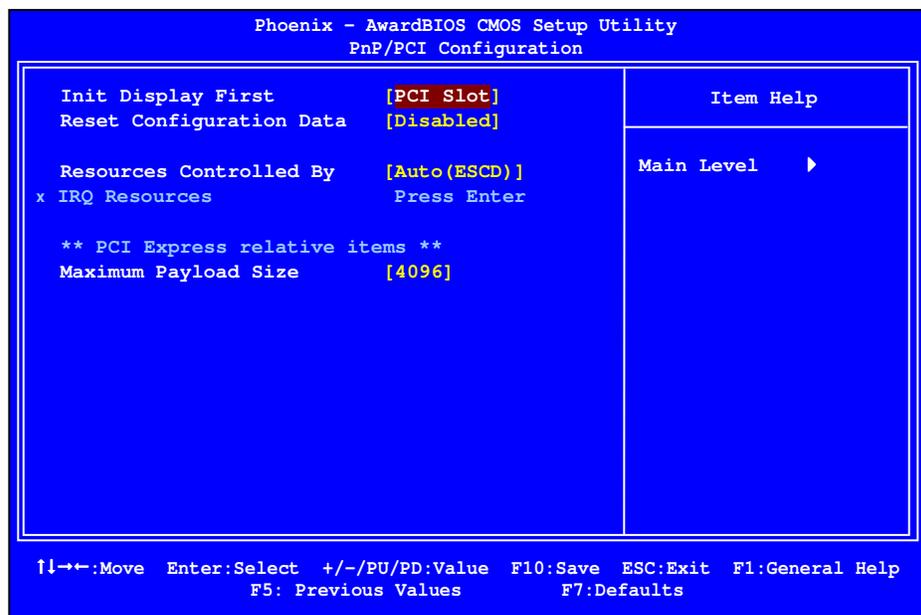
Figure 15.   PnP/PCI Configuration Menu

Init Display First

This function on the PnP/PCI Configuration menu allows you to define if the initial display is in the PCI slot or in the PCI Express slot. Options are **[PCI Slot]** and **[PCIEx]**.

Reset Configuration Data

This function on the PnP/PCI Configuration menu allows you to enable or disable the resetting of Extended System Configuration Data (ESCD) when you exit Setup. Set this to **[Enabled]** if you have installed a new add-on and the system reconfiguration has caused a serious conflict that prevents the OS from booting. The default setting is **[Disabled]**.

Resources Controlled By

This function on the PnP/PCI Configuration menu allows you to define if the BIOS can automatically configure all the boot and plug-and-play compatible devices or if you can manually select IRQ, DMA, and memory base address fields. Select **[Auto(ESCD)]** if you want the BIOS to automatically populate these fields. If you select **[Manual]** so you can assign the resources, **IRQ Resources** is enabled for input.

```
   Resources Controlled By  [Auto(ESCD)]
 x IRQ Resources            Press Enter
```

```
   Resources Controlled By  [Manual)]
   IRO Resources            [Press Enter]
```

IRQ Resources

To enable this field for input, set **Resources Controlled By** to **[Manual]**. With this field enabled, press **Enter** to see options.

```
IRQ-5  assigned to     [PCI Device]
IRQ-9  assigned to     [Reserved]
IRQ-10 assigned to     [PCI Device]
IRQ-11 assigned to     [PCI Device]
IRQ-14 assigned to     [PCI Device]
IRQ-15 assigned to     [PCI Device]
```

Use Legacy ISA for devices compliant with the original PC AT Bus specification. Use PCI/ISA PnP for devices compliant with the plug-and-play standard, whether designed for PCI or ISA Bus architecture.

PCI/VGA Palette Snoop

This function on the PnP/PCI Configuration menu allows you to enable or disable the Palette Snoop function.

Maximum Payload Size

This function on the PnP/PCI Configuration menu allows you to set the maximum TLP payload size (in bytes) for the PCI Express devices. Use the **Page Up** and **Page Down** keys to scroll through sizes or enter the number using the keyboard numbers or use the **+** and **−** keys to go up and down the list of sizes.

System Monitor Menu

Select `System Monitor` from the CMOS Setup Utility menu and press **Enter** to display the System Monitor menu.

```
                    Phoenix - AwardBIOS CMOS Setup Utility
                                System Monitor
 ▶ Dynamic Fan Control          [Press Enter]
   CPU                          47ºC/ 117ºF               Item Help

   CPU Core                     1.28V
   CPU FSB                      1.19V              Main Level       ▶
   Memory                       1.81V
   +3.3V                        3.16V
   +3.3V Dual                   3/16V
   +12V                        11.92V
   +5V                          4.99V
   +Vbat                        3.00V

   CPU Fan Speed          4272 RPM
   Aux Fan Speed          4891 RPM
   nForce Fan Speed          0 RPM
   Chassis Fan Speed         0 RPM
   Chassis Fan2 Speed        0 RPM


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

Figure 16.   System Monitor Menu

All of the values shown in `Blue` are dynamic and change as the speed and voltages of the various components change with system usage.

Dynamic Fan Control

Press **Enter** to display the Dynamic Fan Control menu.

```
   CPU Fan Speed Control        [SmartFan]
   If temp > 70ºC, Set Fan Speed 100%
   If temp < 30ºC, Set Fan Speed   0%
 x Manual Fan Speed, %           100

   AUX Fan Speed Control, %  [100]
   nForce Fan Speed Control, %  [100]
   Chassis Fan Speed Control, %  [100]
```

Use this menu to control the speed of the various fans on the motherboard. Set CPU fan speed to **[SmartFan]** when you want the speed of the fans automatically controlled based on temperature. To set the fan speed to a constant rate, select **[Manual]** and then enter the speed from 0% to 100%.

Set the desired speed for the Aux, nForce, and Chassis fans from 0% to 100%. The system defaults to 100%.

Software Installation

The kit comes with a CD that contains utility drivers and additional NVIDIA software.

The CD that has been shipped with your XFX motherboard contains the following software and drivers:

❑ NVIDIA nForce drivers
❑ RealTek Audio drivers
❑ Microsoft DirectX 9.0C
❑ NVIDIA nTune
❑ Adobe Acrobat Reader
❑ NVIDIA MediaShield RAID Manager
❑ NVIDIA Networking (FirstPacket)
❑ Norton Internet Security

Windows XP Drivers Install

> **Note:** When installing the graphics drivers, the resolution defaults to the lowest setting (typically 800 x 600), making your display very large. Adjust accordingly.

1. Insert the XFX nForce 650i Ultra installation CD for the graphics drivers included in the kit.

> **Note:** If you have multiple graphics cards installed, you will be asked multiple times for all events once the drivers are installed.

2. Run **setup.exe**.

Depending on your system setup, the install disk may automatically run the install **setup.exe**. If it does not run, go to My Computer and click on the CD to open.

Using the
NVIDIA Software

This section describes how to configure the following NVIDIA software that is included on the CD in the kit from the NVIDIA Control Panel:

❑ NVIDIA Monitor

❑ Performance (NVIDIA nTune)

❑ Storage (NVIDIA MediaShield RAID Manager)

❑ Networking (NVIDIA FirstPacket)

❑ System Update
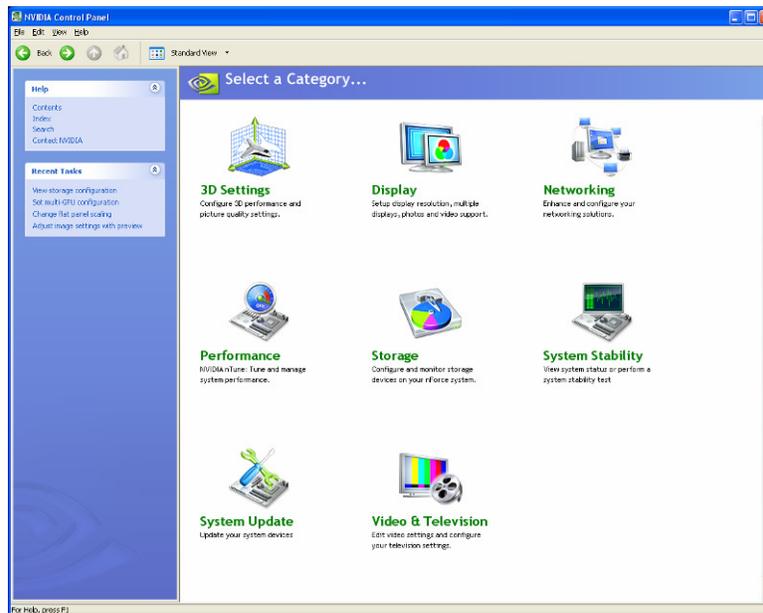
Figure 17.   NVIDIA Control Panel, Select a Category

NVIDIA Monitor

The NVIDIA Monitor application can be used at any time with any applications to view the real-time status of various system components. To display the NVIDIA Monitor, select **Start➢All Programs➢NVIDIA Corporation➢NVIDIA Monitor**. This display shows the performance (usage) of the CPU, disk, memory, and network. It also monitors the Bus speeds and voltages.
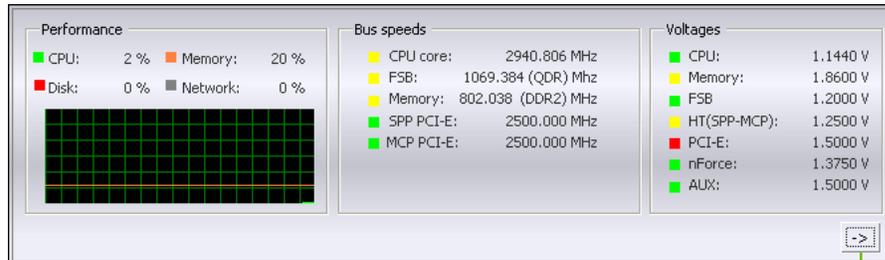
To view temperatures and fans, click the [->] button.
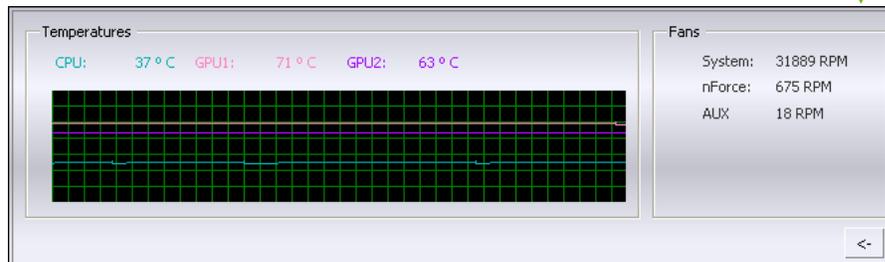
NVIDIA nTune 5.0

The Performance category is used to configure and manage NVIDIA nTune. The NVIDIA nTune program is a full-featured application for accessing, monitoring, and adjusting your system components (including bus speeds and voltages) with clear, user-friendly control panels.

Overclock your system for the highest performance, or underclock it for a nearly silent operation. All changes are performed within the Microsoft Windows interface, enabling full functionality without the need to make changes in the BIOS and reboot your system.

Use the following procedure to access nTune:

1. From the desktop, select **Start**➢**All Programs**➢**NVIDIA Corporation**➢**NVIDIA Control Panel.**

2. Select **Performance** to display Performance Control Panel Categories.

Performance
NVIDIA nTune: Tune and manage system performance.
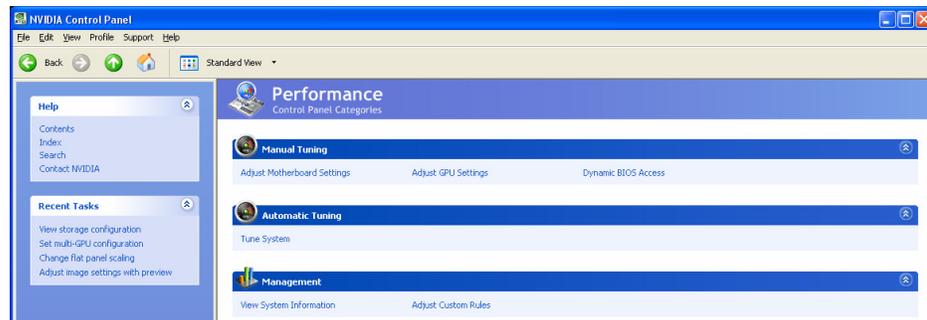
Figure 18.   Performance Control Panel Categories (nTune)

The **Performance** menu provides the following options:

➢ Manual Tuning
  ↳ Adjust motherboard settings
  ↳ Adjust GPU settings
  ↳ Dynamic BIOS access
➢ Automatic Tuning
  ↳ Tune system

➢ Management
   ✍ View system information
   ✍ Adjust custom rules

Manual Tuning

The Manual Tuning option provides the ability to adjust motherboard settings, adjust CPU settings, and make changes to the BIOS.
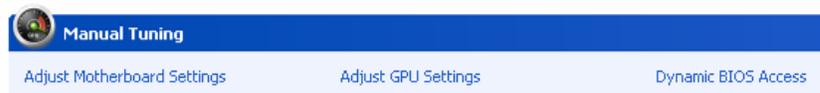
Adjust Motherboard Settings

The controls in the **Adjust Motherboard Settings** screen let you adjust the performance of the system clocks, system voltages, memory controller timings, and system fans. By manually adjusting these speeds you are able to either increase performance for gaming, or reduce performance to conserve power and create a quieter environment.

Figure 19 shows the Adjust Motherboard Settings screen. Note that as you pass the cursor over the various adjustments, notes display at the bottom of the screen to explain each setting.

The number to the *right* of the slider is the new bus speed that will be applied. Make adjustments by using the mouse to drag the slider. All changes take effect immediately after selecting **Apply**; however, these setting only remain active for the current Windows session. This allows you to safely return to Windows if a crash occurs, with no possibility of boot issues since the changes are not made directly to the BIOS settings.

Note: All changes on **Adjust Motherboard Settings** are dynamically made when you apply them, and only remain active for the current Windows session. You can save these settings as a profile for use later by using the **Profile** menu item. If a setting does not allow a change, it probably requires a reboot and should be changed in the BIOS or from the **Dynamic BIOS Access** page (if available).
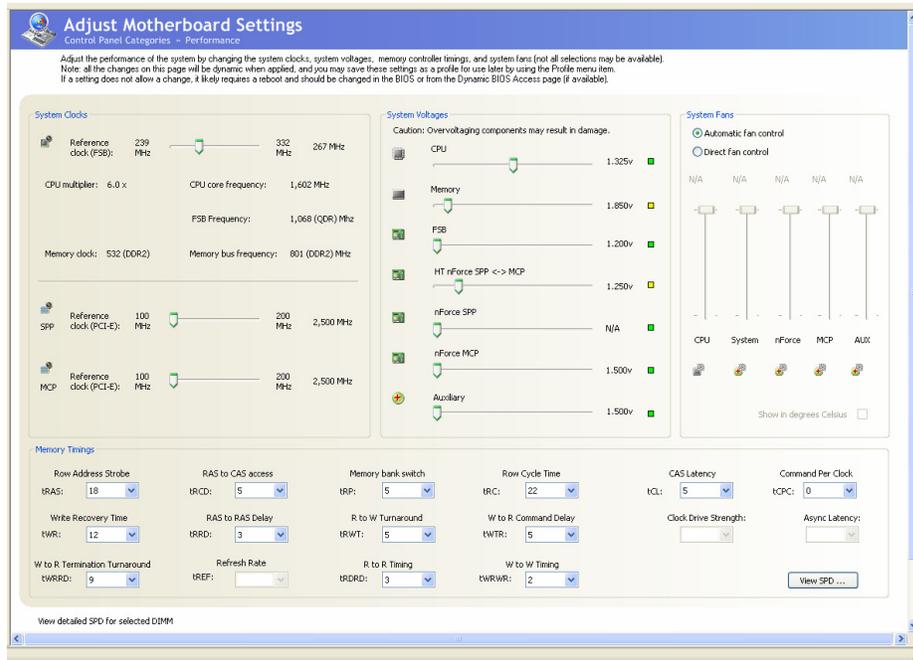
Figure 19.   Adjust Motherboard Settings (nTune)

CAUTION: **Increasing the voltage or the clock speed of a component may void its warranty due to exceeding recommended specifications. NVIDIA and the board manufacturer are not responsible for damage that may occur when component tolerances are exceeded.**

System Clocks

This section of the Adjust Motherboard Settings allows you to adjust the reference clocks for the FSB, the SPP PCI Express, and the MCP PCI Express.

Note that as you change the slider for the FSB reference clock, the CPU core frequency, the FSB Frequency and the memory bus frequency are dynamically changed.
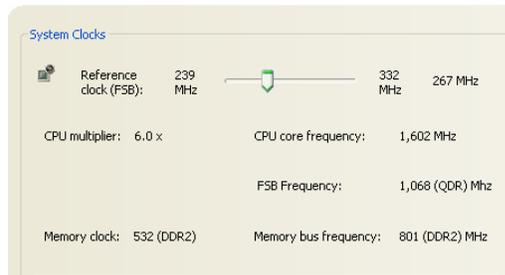
System Voltages

CAUTION: **Overvoltaging any component can result in damage.**

In this section of the Adjust Motherboard Settings you must understand what you are changing. Overvoltaging any of the components can result in damage to the components. From this menu, you can adjust the following voltages:

- ❑ CPU
- ❑ Memory
- ❑ FSB
- ❑ HyperTransport SSP↔MCP
- ❑ nForce SPP
- ❑ nForce MCP
- ❑ Auxiliary

Always note the color of the indicator square to the right of each slider. Green indicates the voltage is within range and will not damage any components. Yellow means to proceed with caution; you are no longer in the safe range. If the indicator square is red, you are possible overvoltaging the component and could be causing damage.
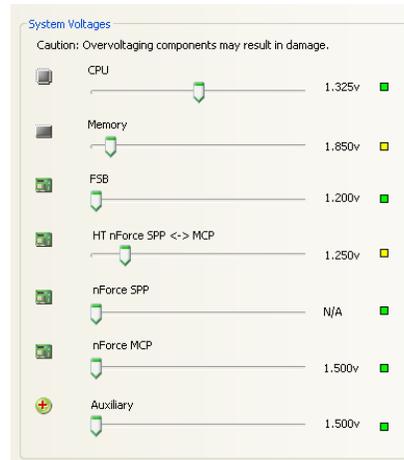
System Fans

This section of the Adjust Motherboard Settings menu allows you to control the CPU, System, nForce, MCP, and the auxiliary fans. You can either set all the fans to automatic control or you can manually control each fan.

When in manual control, you can specify to show the temperatures in Celsius or Fahrenheit.
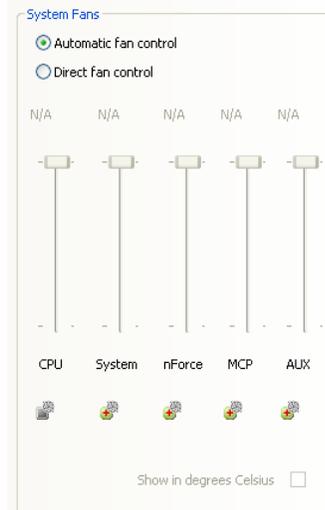
Memory Timing

This section of the Adjust Motherboard Settings allows you to adjust various memory timings and cycles.

When you select an option, information explaining the selection is displayed in the area below the Memory Timing box.

Clicking on **View SPD...** displays a memory information window. This is for information only and is not editable.
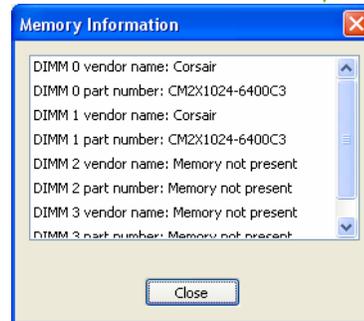
- ❑ **Row Address Strobe**
  Adjusts the minimum RAS active time. This is the amount of time between a row being activated by Precharge and deactivated. A row cannot be deactivated until tRAS has completed. The lower this value, the faster the performance. However, if it is set too low it can cause data corruption by deactivating the row to soon. Adjustable from 1 to 63.

- ❑ **Write Recovery Time**
  Memory timing that determines the delay between a write command and a Precharge command is set to the same bank of memory. Adjustable from 1 to 15.

- ❑ **W to R Termination Turnaround**
  The Write-to-Read time is the number of clock cycles between the last write data pair and the subsequent READ command to the same physical block. Adjustable from 1 to 15.

- ❑ **RAS to CAS access**
  The RAS-to-CAS access (tRCD) is the amount of time in cycles for issuing an active command and the read/write commands. Adjustable from 1 to 15.

❑ **RAS to RAS Delay**
The RAS-to-RAS delay (tRRD) is the is the amount of cycles it takes to activate the next bank of memory (this is the opposite of tRAS). The lower the timing the better the system performance. However, this scenario can cause instability. Adjustable from 1 to 15.

❑ **Refresh Rate**
This value is filled in by the system and can not be changed by the user.

❑ **Memory bank switch**
The row Precharge time (tRP) is the minimum time between active commands and the read/writes of the next bank on the memory module. Adjustable from 1 to 15.

❑ **R to W Turnaround**
The Read-to-Write turnaround (tRWT) is a the amount of cycles for the command to be executed when a Write command is received. Adjustable from 1 to 15.

❑ **R to R Timing**
the Read-to-Read time (tRDRD) is the number of clock cycles between the last read and the subsequent READ command to the same physical bank. Adjustable from 1 to 15.

❑ **Row Cycle Time**
The Row Cycle Time is the minimum time in cycles it take a row to complete a full cycle. This can be determined by tRC=tRAS+tRP. If this value is set too short, it can cause corruption of data. If this value is set too high, it causes a loss in performance but an increase in stability. Adjustable from 1 to 63 cycles

❑ **W to R Command Delay**
The Write-to-Read (tWRD) command delay is the amount of cycles required between a valid write command and the next read command. A lower cycle time results in better performance but is can instability. Adjustable from 0 to 6 cycles.

❑ **W to W Timing**
The Write-to-Write (tWRWR) timing is the number of clock cycles between the last write and the subsequent Write command to the same physical bank. Adjustable from 2 to 15 cycles.

❑ **CAS Latency**
The CAS Latency (tCL) is the time (in number of clock cycles) that elapses after the memory controller sends a request to read a memory location and before the data is sent to the module's output pins. The value shown cannot be changed.

❑ **Clock Drive Strength**
This value is filled in by the system and can not be changed by the user.

❑ **Command Per Clock**
The Command Per Clock (tCPC) sets the Command Rate for the memory controller. The value shown cannot be changed

❑ **Async Latency**
This value is filled in by the system and can not be changed by the user.

Adjust GPU Settings

Use this interface to adjust the graphics processing unit (GPU) on your video card(s). You can override the shipped clock frequencies of your GPU and GPU memory and set the GPU fan speed. Increasing the clock speeds increases your GPU performance and may require adjusting cooling to maintain the same level of reliability.

When this option is checked, all temperatures are shown in Celsius. When this option is not check, temperatures are shown in Fahrenheit.
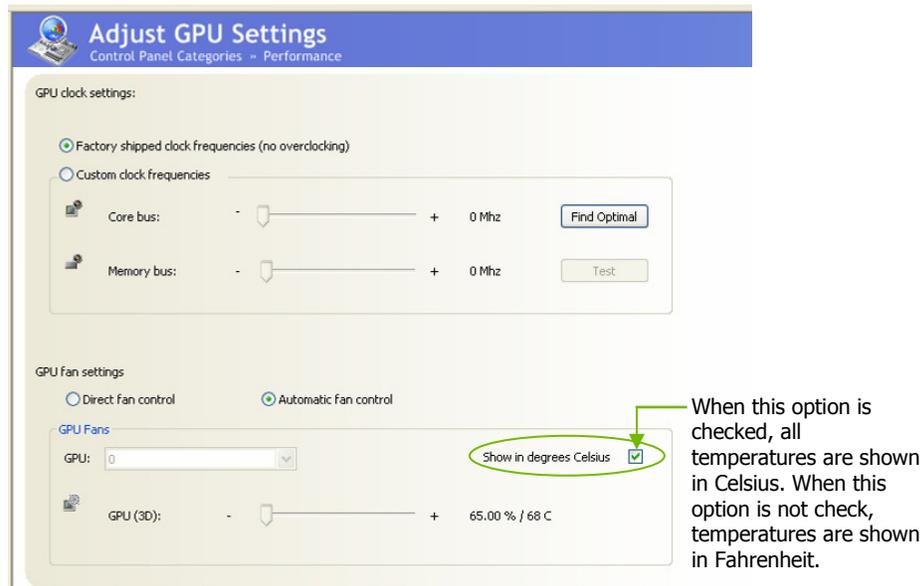
Figure 20.   Adjust GPU Settings (nTune)

Dynamic BIOS Access

Dynamic BIOS Access allows you to change some of your system BIOS settings. The changes do not go into effect until you reboot your system. Since these changes are made to actual BIOS settings in the CMOS, the settings remain active until you change them again or restore the CMOS to the default settings.
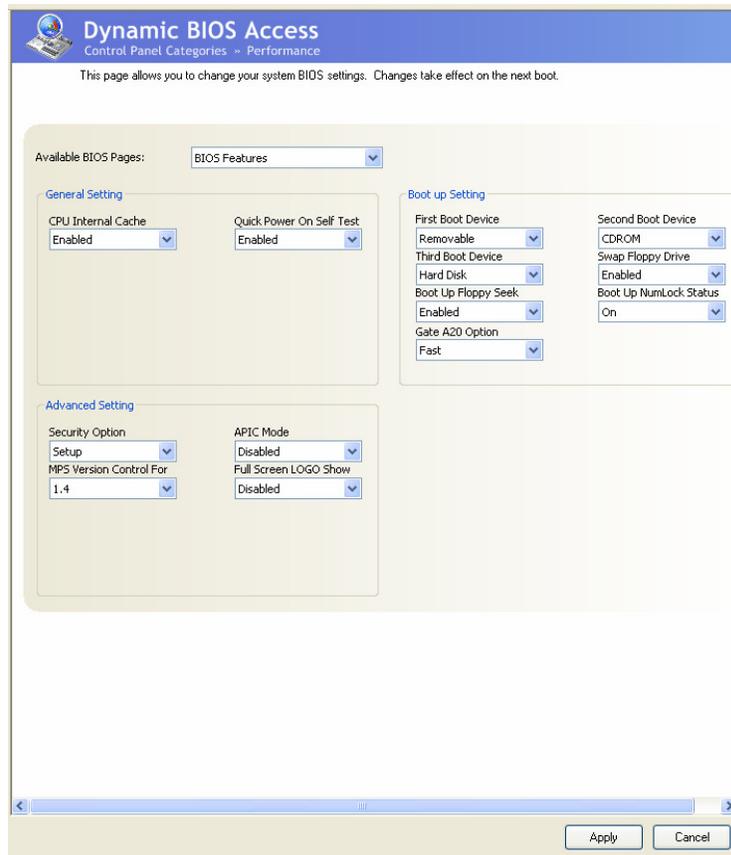
Figure 21.   Dynamic BIOS Access (nTune)

Available BIOS Pages

In the Dynamic BIOS Access page, select a BIOS page that you want to edit from the **Available BIOS Pages** drop-down menu The BIOS page you select determines which items on the Dynamic BIOS Access menu are available for changing. To edit an item, select an option from the drop-down menus associated with each item. When finished making your changes, click **OK** or **Apply**.

Note: This feature is available only with BIOS support from the motherboard manufacturer.

General Settings

This section of the Dynamic BIOS Access menu allows you to Enable or Disable the CPU Internal Cache and the Quick Power on Self Test (POST).

Advanced Settings

This section of the Dynamic BIOS Access menu allows you to set the following options:

❑ Security options

➢ Setup

➢ System

❑ MPS Version Control For

➢ 1.1

➢ 1.4

❑ APIC Mode

➢ Disabled

➢ Enabled

❑ Full Screen LOGO Show

➢ Disabled

➢ Enabled
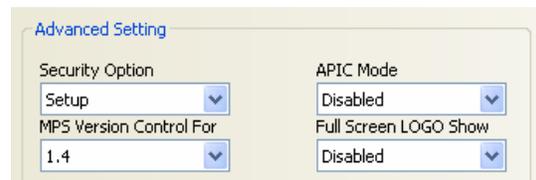
Boot up Setting

This section of the Dynamic BIOS Access menu allows you to set the following options:

❑ First/Second/Third Boot Device

➢ Removable

➢ Hard Disk

➢ CDROM

➢ Legacy LAN

➢ Disable

❑ Swap Floppy Drive

➢ Enable

➢ Disable

❑ Boot Up Floppy Seek

➢ Enable

➢ Disable

❑ Boot UP NumLock Status

➢ On

➢ Off

❑ Gate A20 Option

➢ Normal

➢ Fast
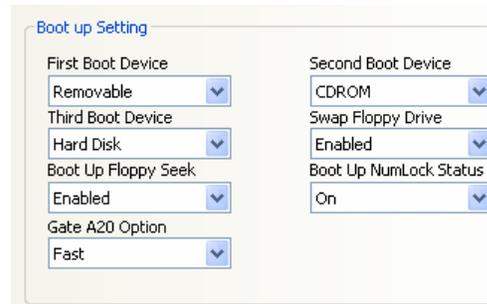
Automatic Tuning

The NVIDIA nTune performance manager uses a complex searching algorithm to determine the best possible and most stable performance for you system. The nTune tuning engine pushes your system to the limits to test the highest possible performance settings. Because of this, there may be instances of system hangs during the testing. When you restart the system, nTune continues its tuning process until the process is complete. It is highly recommended that you check the **Select to continue the tuning process upon reboot** box at the bottom of the Tune System screen. The effects of the tuning process apply to the current Windows session only.

The nTune tuning engine runs internal benchmark tests on your system and creates performance profiles and rules.

CAUTION: Make sure to save and close all work prior to running the Tune System function. Close all applications and do not perform other tasks during the tuning session.

Three tuning options are available on the Tune System menu:

❑ **Course tuning** takes approximately 20 minutes to run while it adjusts system bus speeds and parameters. It first saves current bus speeds as two profiles: the `Default.npe` file with current bus speeds and `Bestsystem.npe` with the highest passing settings.

❑ **Fine tuning** takes approximately three (3) hours and performs a more complex tuning on bus speeds, memory timings, and voltages. This more complex testing achieves maximum performance.

❑ **Tuning using custom settings** allows you to select specific areas to test and the duration of the tests. Remember that a longer tuning session results in more precise and stable settings. The progress of your test and the results upon completion are displayed when the benchmarks are being executed. You can cancel the tests at any time.
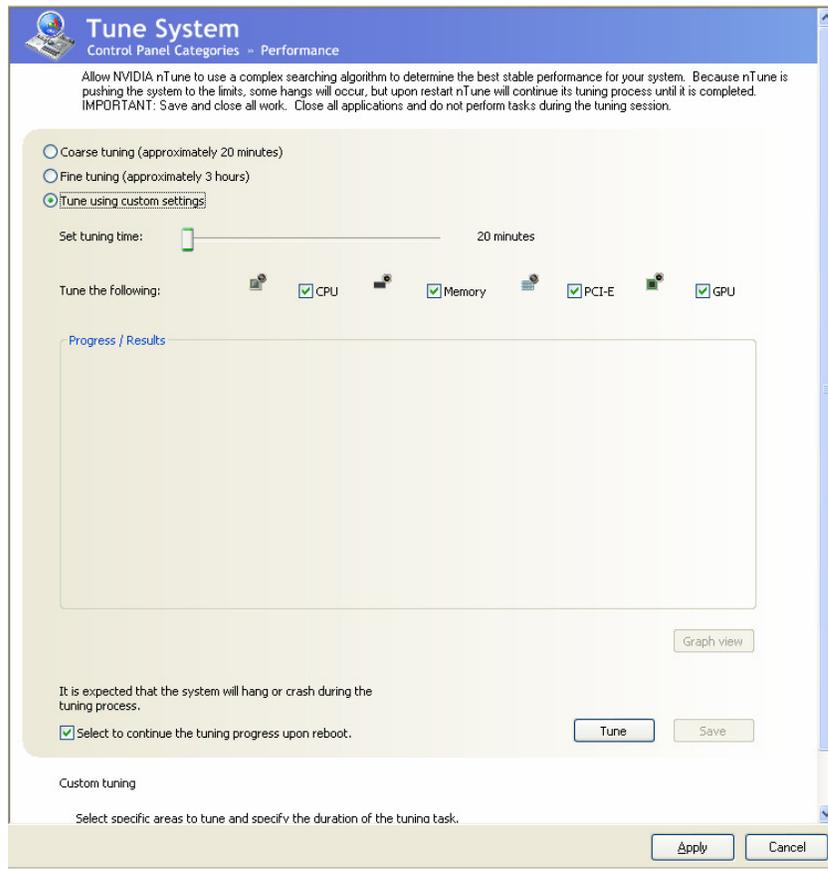
Figure 22.   Tune System Menu (nTune)

Management

The Management option on the View System Information screen allows you to view hardware, software, and system information and adjust profiles.

View System Information

This screen is for information purposes only (you cannot make any changes to the information). The View System Information screen provides hardware, software, and system information that you can save to a log file to assist customer support or for your own uses.
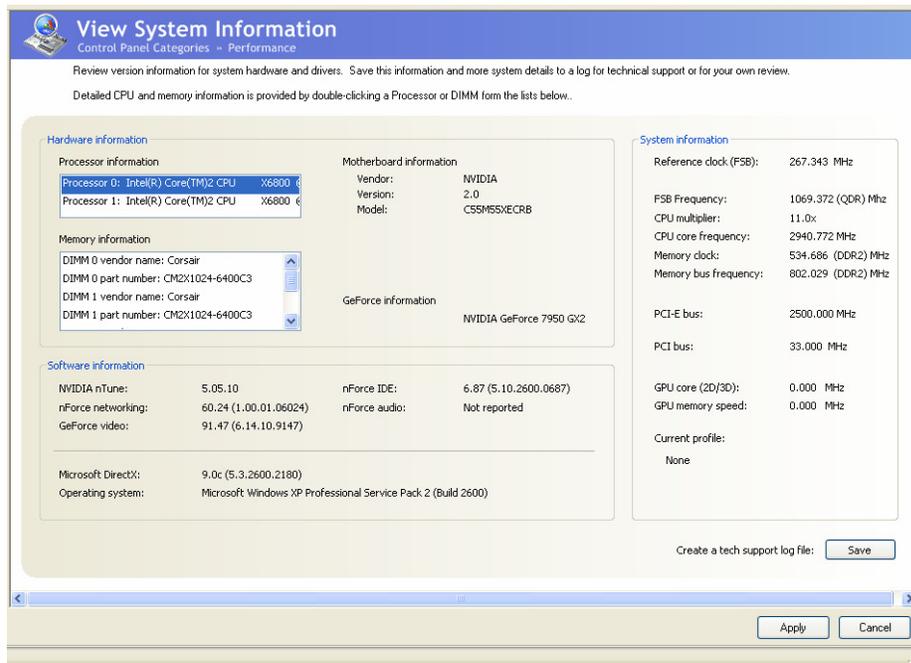
Figure 23.   View System Information (nTune)

Hardware and driver version information can be viewed and saved using this interface. The status of the system, including current system clock speeds, system temperatures, memory timings, and system voltages can be logged. Versions of NVIDIA software and other system software are listed under Software information.

Detailed CPU and memory information is displayed when you double-click on a processor or DIMM listed under Hardware information.

Double-click a processor to display information

Double-click a DIMM to display information
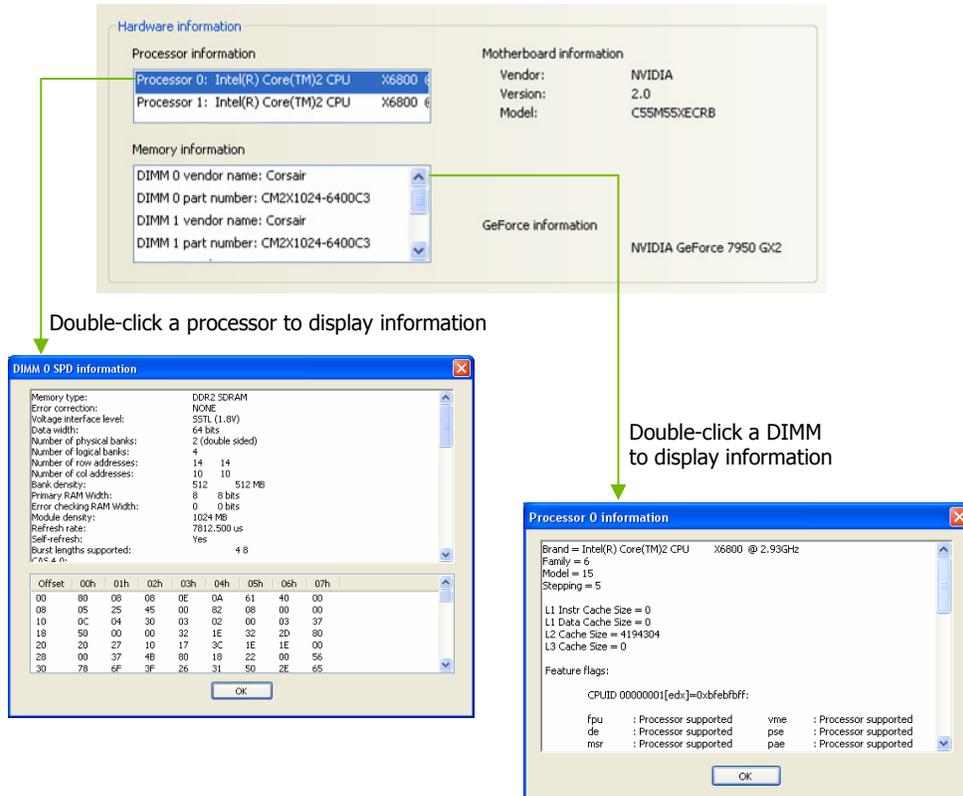
Adjust Custom Rules

The Adjust Custom Rules selection provides you with the ability to create a rule to define when the system should use a particular profile (`.nsu` files or `.npe` files) that was created from a manual or automatic tuning session.

With custom rules, you can make your system run faster when you are playing games or make it run quieter when you are surfing the Internet.
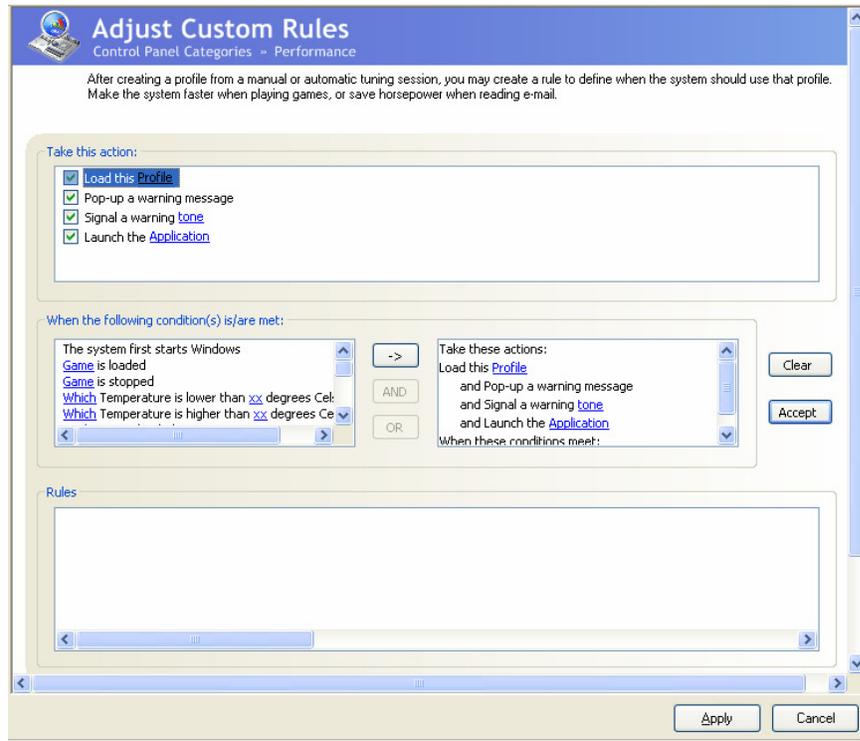
Figure 24.   Adjust Custom Rules (nTune)

System Stability

System Stability lets you view your system's status and perform system stability testing. To access the System Stability menu, select **Start➤All Programs➤NVIDIA Corporation➤NVIDIA Control Panel** and select **System Stability**.

Perform Stability Test

Use **Perform Stability Test** to quickly diagnose potential system performance issues and to gather troubleshooting data.

Stability Test performs a series of stress test to identify probable causes of performance issues, creates a list of the results, and provides recommendations for improvements. You can test the entire system (check **All system components**) or check individual components.
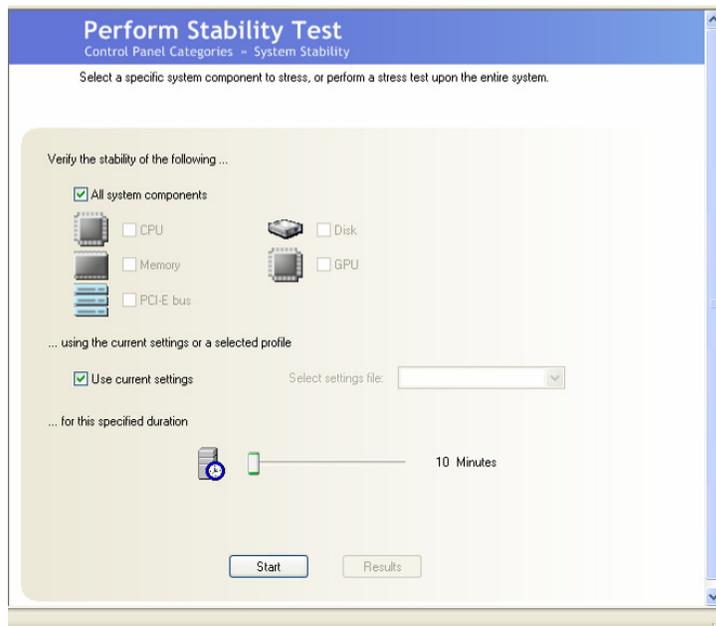
Figure 25.   Perform Stability Test

You can designate a specific settings profile to use or check **Use current settings** for the tests. You can indicate the duration of the test by changing the slider (slider values are from 10 minutes to 48 hours). Click **Start** to begin testing and display the NVPerformance Benchmark display. Click Results to view a pop-up window containing the testing results.

Note that when you click start to begin the testing, Clicking Stop does not immediately stop the action in the NVPerformance Benchmark window. The cycle completes before the test is actually stopped.

Storage

The Storage application uses the NVIDIA MediaShield RAID Manager technology to configure and control NVIDIA storage hardware integrated into the NVIDIA MCP. NVIDIA RAID technology can protect data from hardware failure and provide increased file system performance.

To launch MediaShield, select **Start➢All Programs➢NVIDIA Corporation➢ NVIDIA Control Panel** and select **Storage** to displays the Storage Control Panel Categories screen.

Storage
Configure and monitor storage devices on your nForce system.
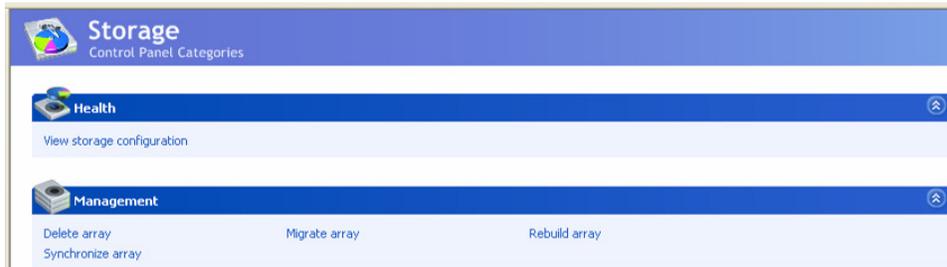
Figure 26.　Storage Control Panel Categories (MediaShield)

Health

The Health option on the Storage menu provides the ability for you to view the current storage configuration.

View Storage Configuration

The View Storage Configuration screendisplays the current configuration of your storage devices. Check this screen prior to doing any management function. The View Storage Configuration screen provides status and capacity for all the storage disks on your system.
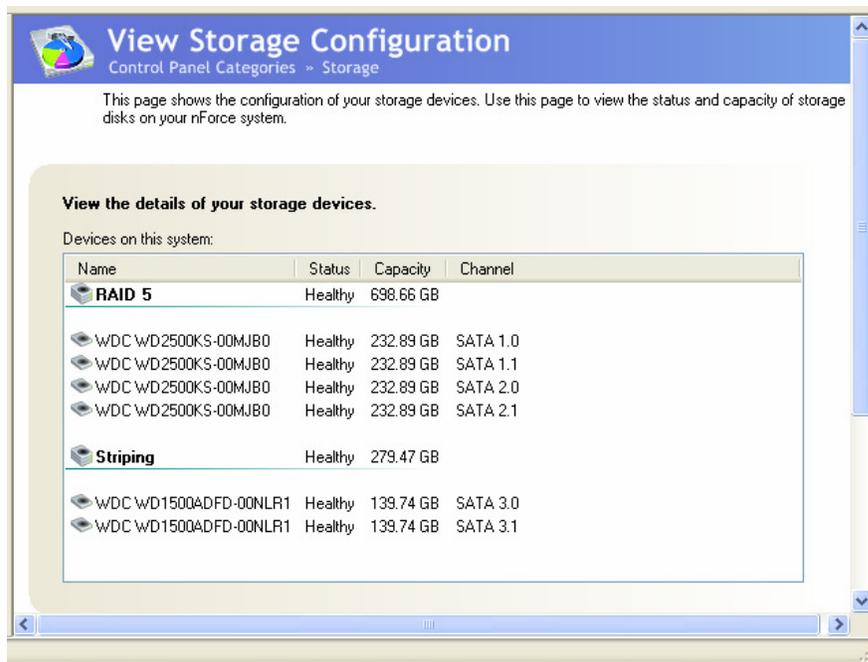
Figure 27.   View Storage Configuration (MediaShield)

Management

The Management options on the Storage menu provides you with the ability to delete, rebuild, migrate, and synchronize arrays.

Delete Array

Use the following procedure to delete an array:

1. Click on **Delete Array** under Management to launch the NVIDIA Delete Array Wizard.
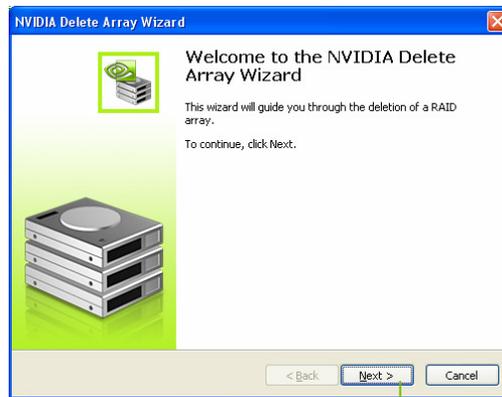
2. Click **Next** to continue with the wizard and display the RAID Array Selection menu.
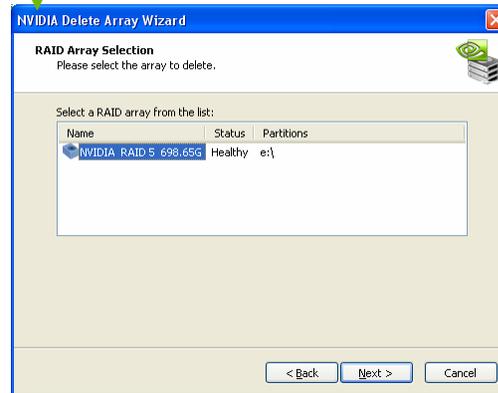
3. Select an array you want to delete and press **Next**.

   The Completing the NVIDIA Delete Array Wizard screen displays to verify that you still want to delete the array selected.

CAUTION: **Be sure you are deleting the correct array. Once you click Finish, you no longer have access to any of the data on this array. The data may be permanently destroyed in the process. If you do not want to delete this array, click Cancel**

---
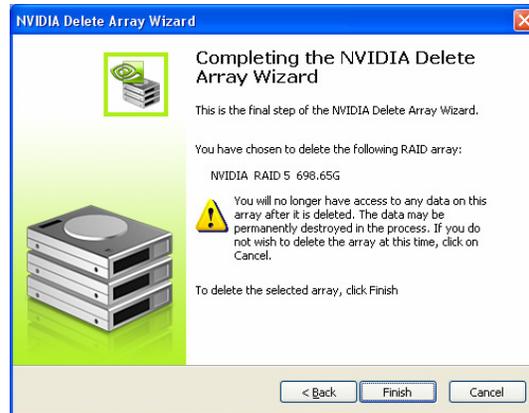
4. Click **Finish** to delete the selected array.

Rebuild Array

The Rebuild Array option allows you to rebuild a disk in the array while the system is running without disrupting user or application access to the data set.

Note: Rebuilding an array can take up to a full day to complete. This operation occurs in the background and does not impede any work being done. If you need to shutdown, the rebuild operation continues upon restart.

Use the following procedure to rebuild an array:

1. Identify the affect disk in the array and replace it.
2. Click on **Rebuild Array** under Management to launch the NVIDIA Rebuild Array Wizard.
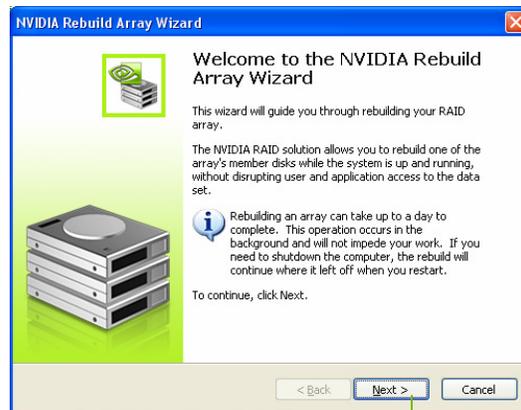
3. Click **Next** to continue with the wizard and display the RAID Array Selection menu.

4. Select the array with that had the affected disk and click **Next**. Rebuilding a degrading array adds a new disk to that array. Data from the healthy disk is rebuilt onto a new disk.

Note: Rebuilding a healthy RAID array resynchronizes the data set onto a disk.
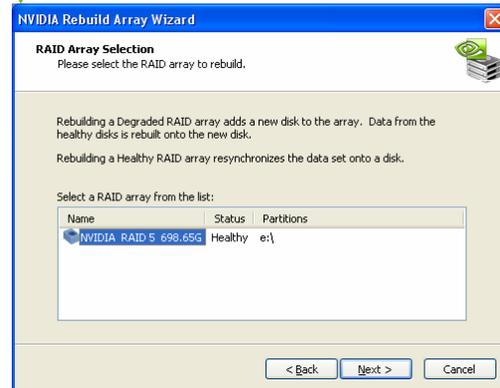
5. Select the disk in the array that was replaced and needs to be rebuilt.
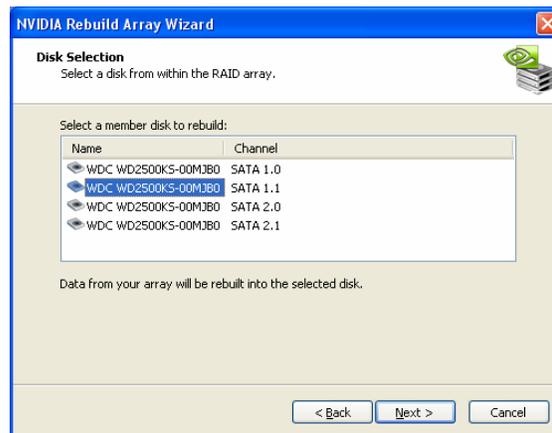
6. Click **Next**.

   The **Completing the NVIDIA Rebuild Array Wizard** screen displays to verify that you still want to rebuild the array selected.
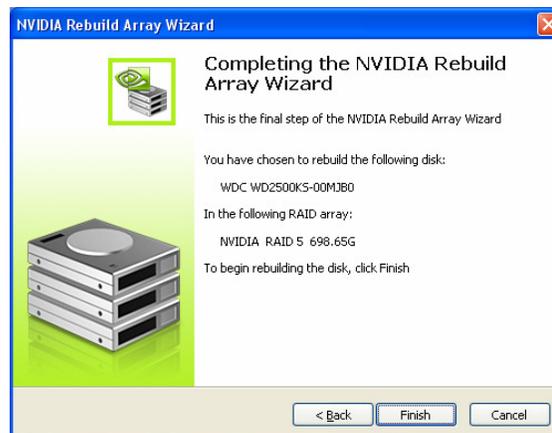
7. Click **Finish** to begin the rebuild of the selected disk in the array. (Remember that rebuilding a disk can take up to a full day.)

Migrating Array

The Migrating Array option allows you to migrate a RAID array from one arry type to another.

There are two reasons to use the Migrating Array option:

❑ Adding disks to an existing RAID array
An example would be to change a 2-disk Striping array to a 3-disk Striping array.

❑ Changing a RAID array to a different array type
An example would be to change a Mirroring array to a Strip Mirroring array.

Use the following procedure to rebuild an array:

1. Click on **Migrate Array** under Management to launch the NVIDIA Migrate Array Wizard.

2. Click **Next** to continue with the wizard and display the RAID Array Selection window.
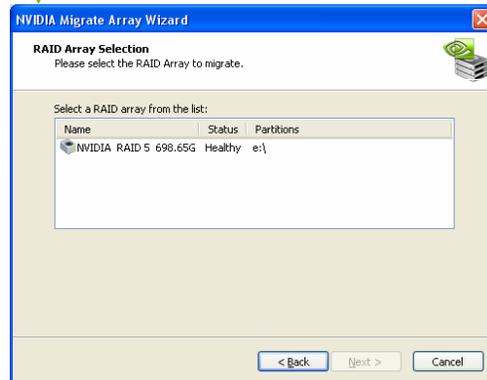
3. Select the array to migrate and click **Next** to display the RAID Mode Selection window.
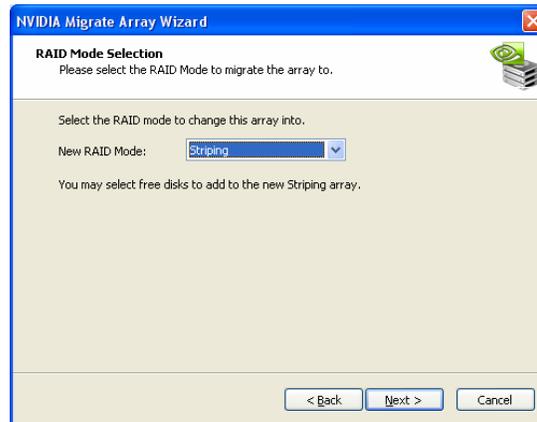
4. Select the RAID mode you want to migrate to and click **Next**.

   The Completing the NVIDIA Migrate Array Wizard screen displays to verify that you still want to migrate the array selected.

   CAUTION: **Note that this migration is not reversible. Be sure you want to migrate this array before continuing.**
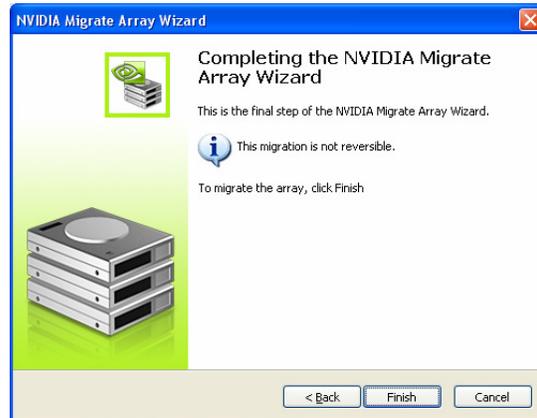
5. Click **Finish** to begin the migration of the selected array.

Synchronize Array

This option is used to synchronize a selected array.

Use the following procedure to rebuild an array:

1. Click on **Synchronize Array** under Management to launch the NVIDIA Synchronize Array Wizard.
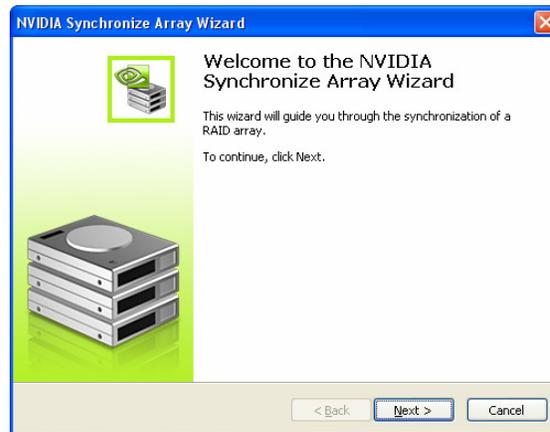
2. Click **Next** to continue with the wizard and display the RAID Array Selection window.
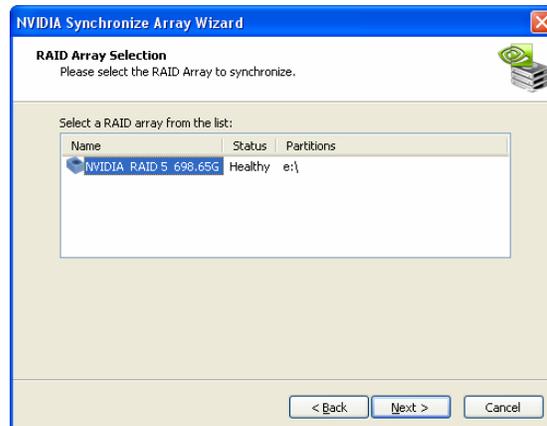
3. Select the array to synchronize and click **Next**.

   The Completing the NVIDIA Synchronize Array Wizard screen displays to verify that you still want to synchronize the array selected.
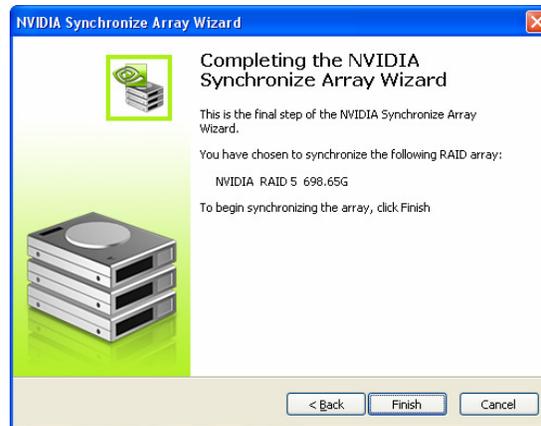
4. Click **Finish** to begin synchronizing the array.

NVIDIA Networking

The NVIDIA Networking function configures and controls NVIDIA networking hardware integrated into the NVIDIA MCP. In addition to the typical network configuration functions that are controlled using the Windows Network Connections panel, the NVIDIA networking solution includes several key features that are accessed using the NVIDIA control panel.

❑ **FirstPacket**
FirstPacket provides a better gaming experience over a broadband connection when multiple applications on the same PC are simultaneously transmitting data to the Internet

❑ **TCP/IP Acceleration**
When TCP/IP acceleration is enabled, it lowers the CPU utilization and provides overall better system performance when the networking traffic is mainly TCP/IP.

To launch the NVIDIA Control Panel, select **Start➤All Programs ➤NVIDIA Corporation➤NVIDIA Control Panel.** Click on the **Networking** icon**.**

Performance

The Performance option on the Networking Control Panel Categories screen provides the means to configure FirstPacket settings and to set TCP/IP acceleration configuration.

Figure 28.   Networking Control Panel Categories

First Packet

NVIDIA FirstPacket offers a new way to manage the traffic on your personal computer, allowing you to more effectively manage and improve the performance of networked games and other applications that are sensitive to network delay (latency), such as Voice-over-IP (VoIP).

FirstPacket creates an additional transmit queue in the network driver so that network applications can share a limited resource. Based on user preference, FirstPacket can expedite transmission for user-approved network applications.

For example, when FirstPacket is enabled:

❑ A game that was previously unplayable can be completely usable

❑ VoIP connections will not be dropped due to the network traffic on a local computer.

Use the following procedure to enable or disable the ability to have network traffic to prioritized for optimal performance:

1. Select **Configure FirstPacket Settings** under Performance on the Networking Control Panel Categories screen to display the Configure FirstPacket Settings screen.

2. Click the **Settings** tab.

3. Click **Enable FirstPacket (recommended)** to enable the options that define the speed of the broadband connection. This information is needed by the FirstPacket software to appropriately prioritize network traffic.
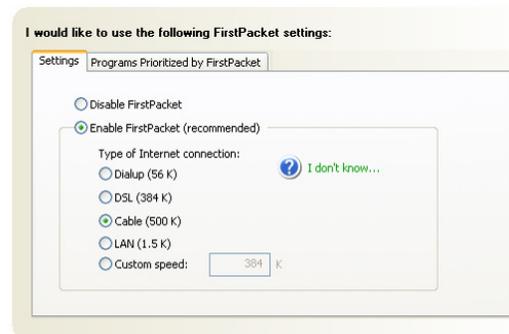
Select the appropriate speed for your network. For example, if your broadband connection is a cable connection, click the **Cable** button.
Custom bandwidth connections can be directly configured in the provided text box.

4. Define the applications to accelerate by clicking **Program Prioritized by FirstPacket.**
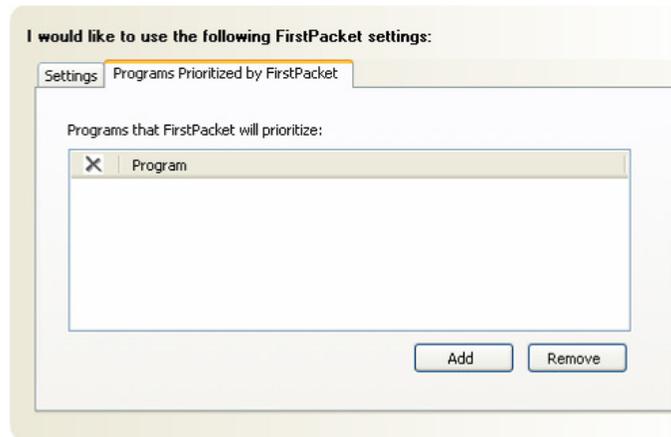
5. Click **Add** to browse for an executable gamming applications. For example, if you want to accelerate a game such as Serious Sam 2, look for the `Sam2.exe` and add it.

6. Click **Apply**.

> **Note:** Only applications that are added to the Programs Prioritized by FirstPacket section are prioritized and benefit from FirstPacket technology

TCP/IP Acceleration

> **Note:** Enabling TCP/IP acceleration enhances your network performance but can cause your network traffic to bypass the firewall because all processes are off-loaded to the hardware.

NVIDIA TCP/IP Acceleration technology is a networking solution that moves the processing of TCP/IP network traffic from your computer's CPU to its nForce hardware resulting in greatly improved system performance.

NVIDIA TCP/IP Acceleration provides deep levels of networking and traffic inspections at full-duplex gigabit Ethernet speeds. Overall system performance is greatly improved because the CPU is not tied up processing network traffic, especially at gigabit Ethernet speed.

In traditional networking environments, inspecting packets is laborious and affects CPU overhead, memory bandwidth, and overall system latency. In comparison, the NVIDIA TCP/IP Acceleration engine discards bad packets before the CPU detects them. In addition, good packets take an "express lane" and bypass the traditional "network stack" process, improving overall throughput and lowering CPU utilization.

T configure TCP/IP acceleration, select **Set TCP/IP Acceleration configuration** from the Networking screen. Note that by default, TCP/IP acceleration is turned *off* (the **Not be hardware-accelerated** radio button is checked). Click the **Use hardware-acceleration (recommended)** radio button to enable TCP/IP acceleration. Click **Apply** to save changes.
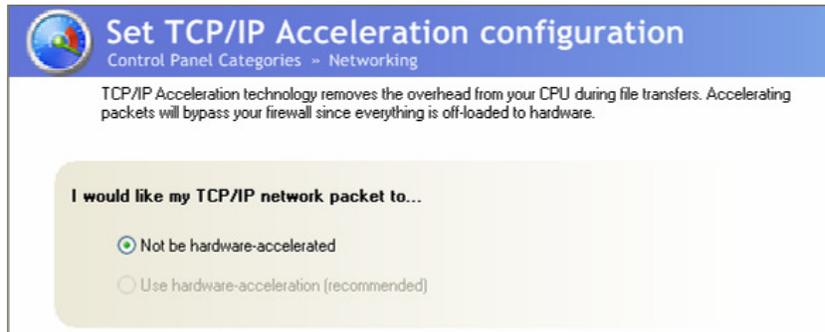
System Update

The System Update application is accessible from the NVIDIA Control Panel and is used to manage the system BIOS without having to go into the BIOS.

To launch the NVIDIA Control Panel, select **Start➢All Programs ➢NVIDIA Corporation➢NVIDIA Control Panel.** Click on the **System Update** icon**.**
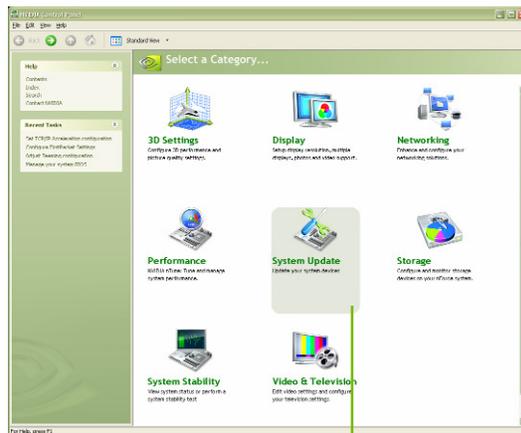
Figure 29.   System Update Application on the NVIDIA Control Panel

Motherboard Updates

Currently, there is one selection under **Motherboard updates**. Selecting **Manage your system BIOS** displays a screen that allows you to backup the existing settings stored in the ROM file or load a new ROM file onto your system.
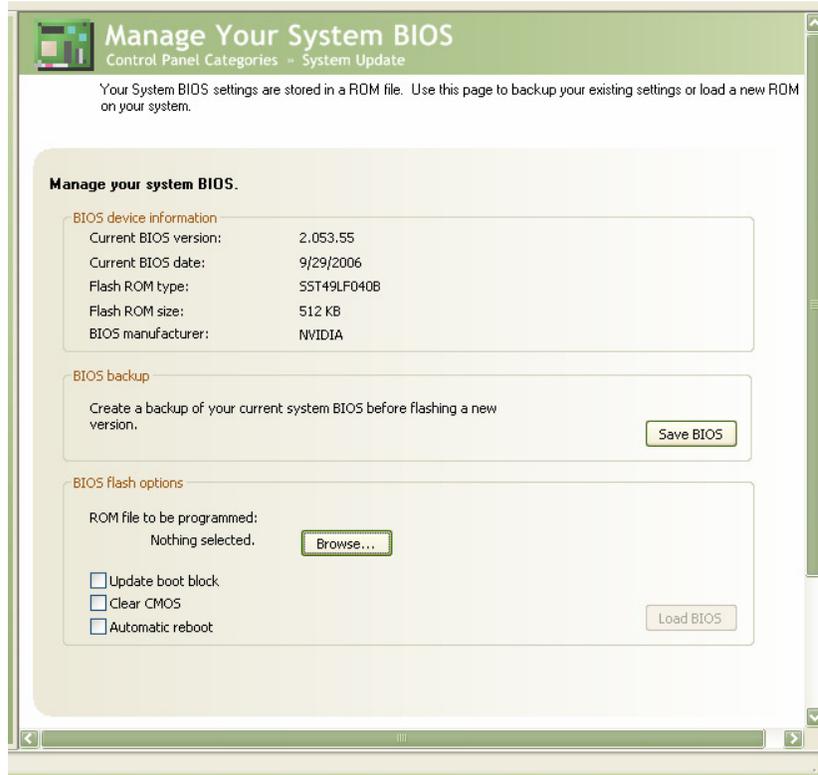
Figure 30.   Managing Your System Bios Screen

Manage Your System BIOS

This section of the screen shows your current BIOS device information. This is a read-only section.

Manage your system BIOS.	
BIOS device information	
Current BIOS version:	2.053.55
Current BIOS date:	9/29/2006
Flash ROM type:	SST49LF040B
Flash ROM size:	512 KB
BIOS manufacturer:	NVIDIA

BIOS Backup

This section of the screen allows you to create a backup of the current BIOS before flashing a new version. Click on the **Save BIOS** button and save the BIOS version to a location on your drive.

BIOS backup	
Create a backup of your current system BIOS before flashing a new version.	Save BIOS

BIOS Flash Options

This section of the screen has three options:

❑ **Update boot block**
Select this option to overwrite the BIOS boot block during flash. It is not recommended to use this option unless specified by the provider of the BIOS Update.

❑ **Clear CMOS**
Select this option to clear the CMOS on the next reboot. Use this option when BIOS updates require that the CMOS be cleared after the update is performed.

❑ **Automatic reboot**
Select this option to automatically reboot after the flash update is completed.

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