

4-1-4 Serial ATA BIOS Setting Utility Introduction

RAID Levels

RAID (Redundant Array of Independent Disks) is a method of combining two hard disk drives into one logical unit. The advantage of an Array is to provide better performance or data fault tolerance. Fault tolerance is achieved through data redundant operation, where if one drives fails, a mirrored copy of the data can be found on another drive. This can prevent data loss if the operating system fails or hangs. The individual disk drives in an array are called members. The configuration information of each member is recorded in the reserved sector that identifies the drive as a member. All disk members in a formed disk array are recognized as a single physical drive to the operating system.

Hard disk drives can be combined together through a few different methods. The different methods are referred to as different RAID levels. Different RAID levels represent different performance levels, security levels and implementation costs. The RAID levels which the nVIDIA® nForce 430 chipset supports are RAID 0, RAID 1, RAID 0+1, JBOD and RAID 5.

RAID 0 (Striping)

RAID 0 reads and writes sectors of data interleaved between multiple drives. If any disk member fails, it affects the entire array. The disk array data capacity is equal to the number of drive members times the capacity of the smallest member. RAID 0 does not support fault tolerance.

RAID 1 (Mirroring)

RAID 1 writes duplicate data onto a pair of drives and reads both sets of data in parallel. If one of the mirrored drives suffers a mechanical failure or does not respond, the remaining drive will continue to function. Due to redundancy, the drive capacity of the array is the capacity of the smallest drive. Under a RAID 1 setup, an extra drive called the spare drive can be attached. Such a drive will be activated to replace a failed drive that is part of a mirrored array. Due to the fault tolerance, if any RAID 1 drive fails, data access will not be affected as long as there are other working drives in the array.

RAID 0+1 (Striping + Mirroring)

RAID 0+1 combines the performance of data striping (RAID 0) and the fault tolerance of disk mirroring (RAID 1). Data is striped across multiple drives and duplicated on another set of drives.

JBOD (Spanning)

A spanning disk array is equal to the sum of the all drives when the drives used are having different capacities. Spanning stores data onto a drive until it is full, then proceeds to store files onto the next drive in the array. When any disk member fails, the failure affects the entire array. JBOD is not really a RAID and does not support fault tolerance.

RAID 5 (Striping with Parity)

RAID 5 provides good fault tolerance and allows for overlapped I/O operations. Under a RAID 5 setup, data and parity information are equally distributed to each disk member in the array. If any one of the drives fails, the remaining drive will continue to function. After replacing the failed drive, you can rebuild the data from the remaining data and parity. Only one drive can be safely crash without any data loss.

Please follow the steps below to construct a complete RAID array:

- 1) Have ready your hard drives for RAID construction.
Note: To achieve best performance, it is recommended that the hard drives used are of similar make and storage capacity.
- 2) Please attach the hard drive connectors to their appropriate location on the motherboard ie. IDE, SCSI, or SATA.
- 3) Enter the motherboard BIOS and locate RAID setup (Please refer to the section on Integrated Peripherals).
- 4) Enter RAID setup in the BIOS and select the RAID type (For instance, enter F10 to select NVIDIA RAID; Ctrl + S to select Silicon Image).
- 5) Complete driver installation.
- 6) Complete RAID utility installation.

More information on steps 4 and 5 is provided. (For more detailed setup information, please visit "Support\ Motherboard\ Technology Guide section" on our website at <http://www.gigabyte.com.tw> to read or download the information you need.)

Configuring the Nvidia RAID BIOS

The NVIDIA RAID BIOS setup lets you choose the RAID array type and which hard drives you want to make part of the array.

Entering the RAID BIOS Setup

1. After rebooting your computer, wait until you see the RAID software prompting you to press **F10**. The RAID prompt appears as part of the system POST and boot process prior to loading the OS. You have a few seconds to press **F10** before the window disappears.

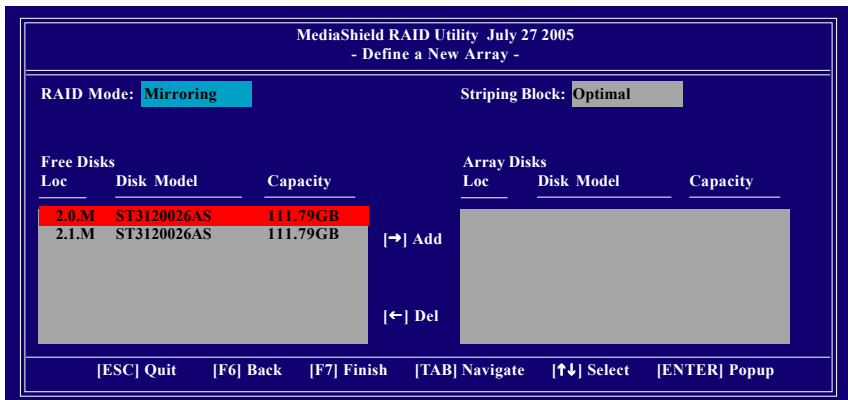
```
MediaShield IDE ROM BIOS 6.21
Copyright (C) 2005 NVIDIA Corp.

Detecting array ...

Press F10 to enter RAID setup utility ...
```

Press **F10**.

The NVIDIA RAID Utility - **Define a New Array** window appears (as Figure below).



Using the "Define a New Array" Window

If necessary, press the tab key to move from field to field until the appropriate field is highlighted.

Selecting the RAID Mode

By default, this is set to Striping. To change to a different RAID mode, press the down arrow key until the mode that you want appears in the RAID Mode box - either Mirroring, Striping, Spanning, Stripe Mirroring or RAID 5.

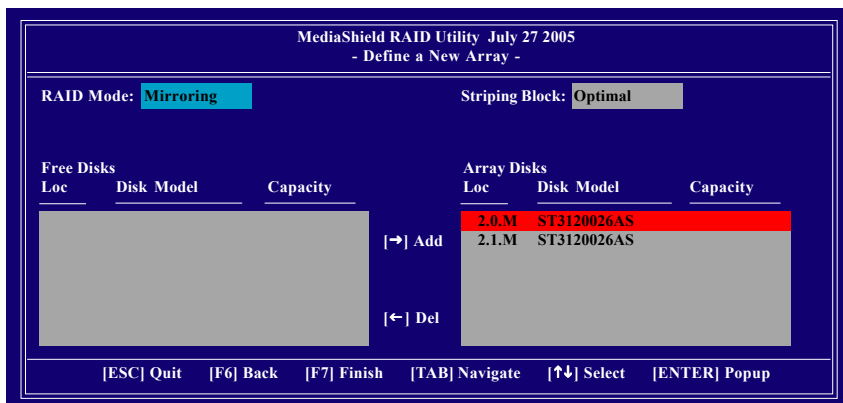
Selecting the Striping Block Size

Striping block size is given in kilobytes, and affects how data is arranged on the disk. It is recommended to leave this value at the default Optimal, which is 64KB, but the values can be between 4 KB and 128 KB.

Assigning the Disks

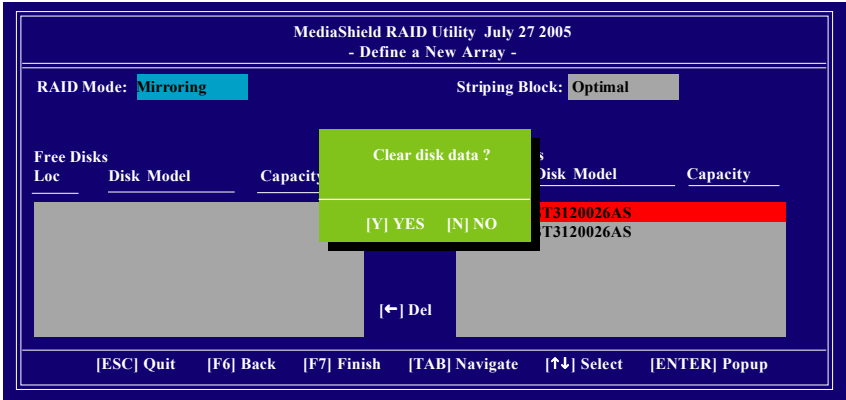
The disks that you enabled from the RAID Config BIOS setup page appear in the Free Disks block. These are the drives that are available for use as RAID array disks. To designate a free disk to be used as a RAID array disk,

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



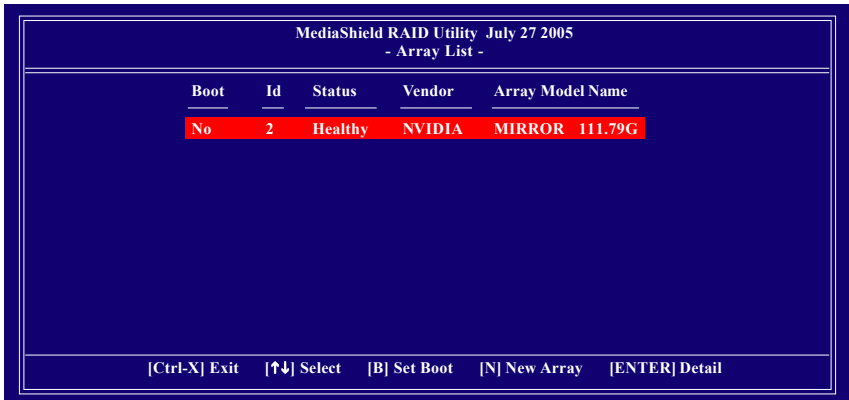
Completing the RAID BIOS Setup

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



Press **Y** if you want to wipe out all the data from the RAID array, otherwise press **N**. You must choose **Yes** if the drives were previously used as RAID drives. The **Array List** window appears, where you can review the RAID arrays that you have set up.

You can select a disk array as boot device if you want to boot operating system from an array. Use the arrow keys to select the array, then press **B** to specify the array as bootable.



Press **Enter** to view and verify details. The **Array Detail** screen appears.

The Array Detail screen shows various information about the array that you selected, such as Striping Block used, RAID Mode, Striping Width, Disk Model Name, and disk capacity.

Array 2 : NVIDIA MIRROR 111.79G - Array Detail -					
RAID Mode: Mirroring			Striping Block: 64K		
Striping Width : 1					
Adapt	Channel	M/S	Index	Disk Model	Capacity
1	0	Master	0	ST3120026AS	111.79GB
1	1	Master	1	ST3120026AS	111.79GB
[R] Rebuild [D] Delete [C] Clear Disk [ENTER] Return					

If you want to mark this disk as empty and wipe out all its contents, press **C**.

At the prompt, press **Y** to wipe out all the data, otherwise press **N**.

Press **Enter** again to go back to the previous screen and then press **Ctrl + X** to exit the RAID setup.

Now that the RAID setup has been configured from the RAID BIOS, the next step is to configure and load drivers under Windows.

Installing the RAID drivers

To install operating system onto a serial ATA hard disk successfully, you need to install the SATA controller driver during OS installation. Without the driver, the hard disk may not be recognized during the Windows setup process. First of all, copy the driver for the SATA controller from the motherboard driver CD-ROM to a floppy disk. See the instructions below about how to copy the driver in MS-DOS mode^(Note). Prepare a startup disk that has CD-ROM support and a blank formatted floppy disk.

Step 1: Insert the prepared startup disk and motherboard driver CD-ROM in your system. Boot from the startup disk. Once at the A:\> prompt, change to the CD-ROM drive (example: D:\>). At the D:\> prompt, type the following two commands. Press ENTER after each command (Fig.1):

```
cd bootdrv
menu
```

Step 2: When the controller menu (Fig.2) appears, remove the startup disk and insert the blank formatted disk. Select the controller driver by pressing the corresponding letter from the menu. Your system will then automatically zip and transfer this driver file to the floppy disk. Press 0 to exit when finished.

```
D:\DOSKZ 1 10 08 02 7:51p
DISMQL DLL 94,208 06-15-04 1:19p
DRIVERS <DIR> 11-23-04 9:24p
HISTORY TXT 7,703 05-24-04 1:56p
HIBDRP DLL 53,248 08-21-02 10:11a
IP LOG 21,072 12-01-04 11:21a
MAMQL <DIR> 11-23-04 9:24p
MCMORR <DIR> 11-23-04 9:24p
MPS <DIR> 11-23-04 9:26p
DMSETUP INF 30,852 10-08-02 7:51p
OTHER <DIR> 11-23-04 9:26p
EMSETUP <DIR> 11-23-04 9:26p
RENAME TXT 4,551 12-01-04 2:09p
SETUP EXE 421,888 11-25-04 3:32p
TESTW EXE 196,608 08-09-04 1:44p
TIP INF 2,839 09-30-04 10:01a
UTILITY <DIR> 11-23-04 9:27p
VERFILE TIC 13 03-20-03 1:45p
XMC TXT 7,820 11-24-04 1:51p
17 file(s) 860,333 bytes free
11 dir.
D:\>cd bootdrv
D:\BOOTDRU>menu
```

Fig.1

```
1)Pcmoise 20276 RAID
2)Pcmoise 20276 RAID
3)Pcmoise 20265 RAID
4)Pcmoise 20265 RAID(XP)
5)Pcmoise 20265 RAID
6)Pcmoise 20265 RAID(XP)
7)Pcmoise 20779 RAID
8)Pcmoise 20779 RAID
9)S113114 RAID
BS113114 RAID
BS113114 RAID5
CmUIDIA C804 Series Raid(XP)
DmUIDIA C804 Parallel Raid(XP)
EmUIDIA C804 Series Raid(XP)
FmUIDIA C804 Parallel Raid(XP)
GmUIDIA C19 Series Raid(XP)
HmUIDIA C19 Series Raid(XP)
ImUIDIA C51 Series Raid(XP)
JmUIDIA C51 Series Raid(XP)
0)exit
```

Fig.2

Step 3: After completing the steps, boot from the Windows installation disk to install the RAID drivers. Press **F6** as soon as you see the "Press F6 if you need to install a third party SCSI or RAID driver" message, then supply serial ATA controller driver by this floppy disk. Follow the on-screen instructions to complete the installation.

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

(Note) For users without a startup disk.

Use an alternative system and insert the GIGABYTE motherboard driver CD-ROM. From the CD-ROM drive (example: D:\) double click the **MENU.exe** file in the **BootDrv** folder. A command prompt window will open similar to that in Fig. 2.