Guide to SATA Hard Disks Installation and RAID Configuration

1. Guide to SATA Hard Disks Installation

1.1 Serial ATA (SATA) Hard Disks Installation

This motherboard adopts nVidia nForce3 chipset that supports Serial ATA (SATA) hard disks with RAID functions, including RAID 0, RAID 1, and JBOD. You may install SATA hard disks on this motherboard for internal storage devices. For SATA installation guide, please refer to Serial ATA (SATA) Hard Disks Installation of "User Manual" in the support CD. This section will guide you how to create RAID on SATA ports.

1.2 Making a SATA Driver Diskette

If you just want to install Windows 2000, Windows XP or Windows XP 64-bit on your SATA HDDs without RAID functions, there is no need to make a SATA driver diskette. However, if you want to install Windows 2000, Windows XP or Windows XP 64-bit on your SATA HDDs with RAID functions, you will need to make an SATA driver diskette before you start the OS installation.

STEP 1: Insert the Support CD into your optical drive to boot your system. (Do NOT insert any floppy diskette into the floppy drive at this moment!)

STEP 2: During POST at the beginning of system boot-up, press <F11> key, and then a window for boot devices selection appears. Please select CD-ROM as the boot device.

STEP 3: When you see the message on the screen, "Do you want to generate Serial ATA driver diskette [YN]?", press <Y>.

STEP 4: Then you will see these messages,

Please insert a diskette into the floppy drive. WARNING! Formatting the floppy diskette will lose ALL data in it! Start to format and copy files [YN]?

Please insert a floppy diskette into the floppy drive, and press <Y>.

STEP 5: The system will start to format the floppy diskette and copy SATA drivers into the floppy diskette.

Once you have the SATA driver diskette ready, you may start to install Windows 2000 / Windows XP / Windows XP 64-bit on your system directly without setting the RAID configuration on your system, or you may start to use "RAID BIOS Setting Utility" in the section 2.3 to set RAID 0 / RAID 1 / JBOD configuration before you install the OS. You may also set the RAID configuration by using "RAID Utility for Windows" in Windows environment. Please refer to the document in the Support CD, "Guide to RAID Utility for Windows", which is located in the folder at the following path:
.. \ RAID Utility for Windows

2.   Guide to RAID Configurations

2.1   Introduction of RAID

This motherboard adopts nVidia nForce3 chipset that integrates RAID controller supporting RAID 0 / RAID 1 / JBOD function with two independent Serial ATA (SATA) channels. This section will introduce the basic knowledge of RAID, and the guide to configure RAID 0, RAID 1, and JBOD settings.

RAID

The term "RAID" stands for "Redundant Array of Independent Disks", which is a method combining two or more hard disk drives into one logical unit. For optimal performance, please install identical drives of the same model and capacity when creating a RAID set.

RAID 0 (Data Striping)

RAID 0 is called data striping that optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. It will improve data access and storage since it will double the data transfer rate of a single disk alone while the two hard disks perform the same work as a single drive but at a sustained data transfer rate.

> **WARNING!!**
> Although RAID 0 function can improve the access performance, it does not provide any fault tolerance. Hot-Plug any HDDs of the RAID 0 Disk will cause data damage or data loss.

RAID 1 (Data Mirroring)

RAID 1 is called data mirroring that copies and maintains an identical image of data from one drive to a second drive. It provides data protection and increases fault tolerance to the entire system since the disk array management software will direct all applications to the surviving drive as it contains a complete copy of the data in the other drive if one drive fails.

JBOD (Spanning)

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

2.2 RAID Configurations Precautions

1. Please use two new drives if you are creating a RAID 0 (striping) array for performance. It is recommended to use two SATA drives of the same size. If you use two drives of different sizes, the smaller capacity hard disk will be the base storage size for each drive. For example, if one hard disk has an 80GB storage capacity and the other hard disk has 60GB, the maximum storage capacity for the 80GB-drive becomes 60GB, and the total storage capacity for this RAID 0 set is 120GB.

2. You may use two new drives, or use an existing drive and a new drive to create a RAID 1 (mirroring) array for data protection (the new drive must be of the same size or larger than the existing drive). If you use two drives of different sizes, the smaller capacity hard disk will be the base storage size. For example, if one hard disk has an 80GB storage capacity and the other hard disk has 60GB, the maximum storage capacity for the RAID 1 set is 60GB.

3. Please verify the status of your hard disks before you set up your new RAID array.

WARNING!!

Please backup your data first before you create RAID functions.
In the process you create RAID, the system will ask if you want to "Clear Disk Data" or not. It is recommended to select "Yes", and then your future data building will operate under a clean environment.

2.3 BIOS Setup Utility

2.3.1 Enter BIOS Setup Utility

After the system powers on, press <F2> key to enter BIOS setup utility. Highlight **Advanced** and press <Enter>, then the main interface of BIOS setup utility will appear. Please set the option **SATA Operation Mode** to [RAID].

```
                          BIOS  SETUP  UTILITY
        Advanced

  IDE  Configuration                          Config  SATA  operation
                                              mode.
  OnBoard  IDE  Controller       [Both]
  OnBoard  SATA Controller       [Enabled]
    SATA  Operation  Mode        [RAID]

  ▶ Primary  IDE  Master         [Hard  Disk]
  ▶ Primary  IDE  Slave          [Not  Detected]
  ▶ Secondary  IDE  Master       [ATAPI  CDROM]
  ▶ Secondary  IDE  Slave        [Not  Detected]
  ▶ SATA1                        [Not  Detected]
  ▶ SATA2                        [Not  Detected]      ←→      Select  Screen
                                                      ↑↓      Select  Item
                                                      +-      Change  Option
                                                      F1      General  Help
                                                      F10     Save  and  Exit
                                                      ESC     Exit

        v02.53 (C) Copyright 1985-2004. American  Megatrends, Inc.
```
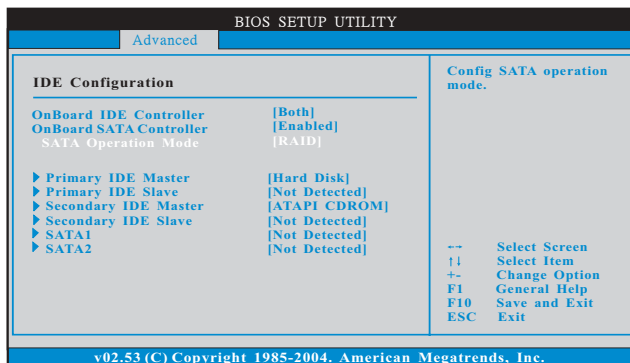
After the below window appears, please press <F10> to enter the NVIDIA RAID Utility.

```
  NVIDIA  RAID  IDE  ROM  BIOS  4.81
  Copyright  (C)  2004  NVIDIA Corp.

  Detecting  array ...

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

2.3.2 Create Disk Array

Create RAID 0

After the system powers on, press <F2> key to enter BIOS setup
utility. Highlight **Advanced** and press <Enter>, then the main interface
of BIOS setup utility will appear. Please set the option **SATA Opera
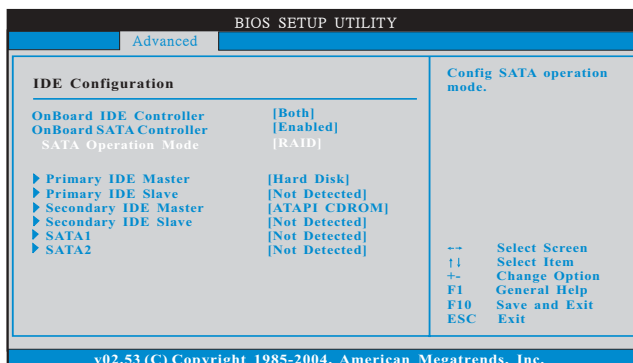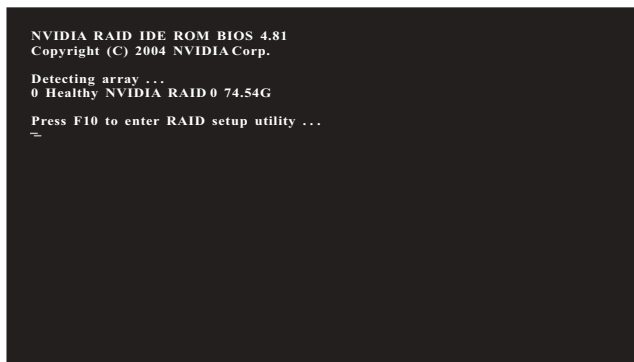tion Mode** to [RAID].

```
                          BIOS SETUP UTILITY
             Advanced

     IDE Configuration                          Config SATA operation
                                                mode.
     OnBoard IDE Controller        [Both]
     OnBoard SATA Controller       [Enabled]
      SATA Operation Mode          [RAID]

   ▶ Primary IDE Master            [Hard Disk]
   ▶ Primary IDE Slave             [Not Detected]
   ▶ Secondary IDE Master          [ATAPI CDROM]
   ▶ Secondary IDE Slave           [Not Detected]
   ▶ SATA1                         [Not Detected]
   ▶ SATA2                         [Not Detected]      ←→     Select Screen
                                                    ↑↓     Select Item
                                                    +-     Change Option
                                                    F1     General Help
                                                    F10    Save and Exit
                                                    ESC    Exit

        v02.53 (C) Copyright 1985-2004. American Megatrends, Inc.
```

Then, the below window appears.

```
   NVIDIA RAID IDE ROM BIOS 4.81
   Copyright (C) 2004 NVIDIA Corp.

   Detecting array ...
   0 Healthy NVIDIA RAID 0 74.54G

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

After rebooting your computer, wait until you see the RAID software
prompting you to press <F10>. The RAID prompt appears as a 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.

After you press <F10>, the NVIDIA RAID Utility - **Define a New Array** window appears. By default, RAID Mode is set to Mirroring, but please set it to **Striping** if you want to create RAID 0. And the Striping Block is set to Optimal as default.
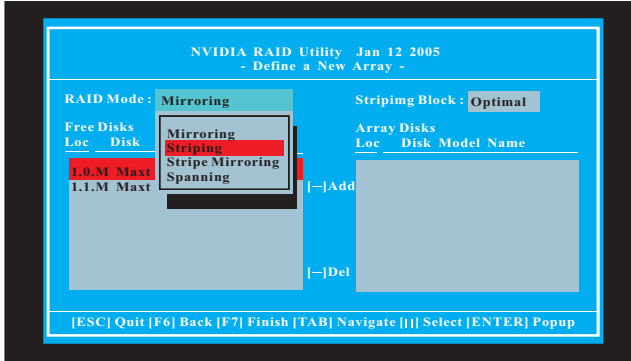
Striping block size is given in kilobytes, and affect how data is arranged on the disk. It is recommended to leave this value at the default Optimal, which is 64KB, but the values can be between 8KB and 128KB (8, 16, 32, 64, and 128KB). Then, you have to assign the disks. The disks that you enabled from the RAID Config BIOS setup page appear in the Free Disks block. These are the drives that are available for use as RAID array 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.
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.
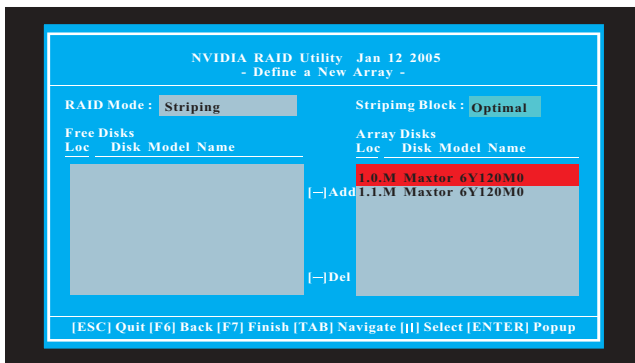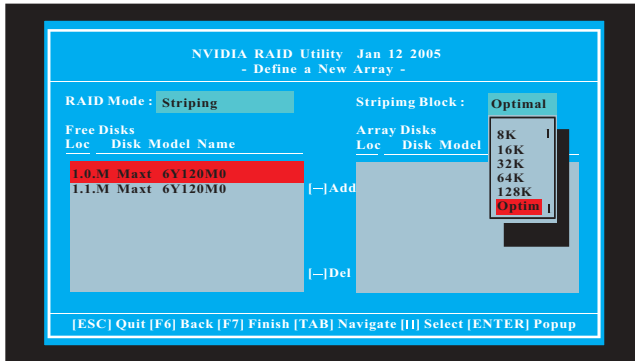
After assigning your RAID array disks, press <F7> to save your changes of RAID array disks.

Depending on the platform used, the system can have one or more channels. In a typical system there is usually one adapter and multiple channels, and each channel has a slave and a master. The adapter / channel / master / slave status of each hard disk is given in the Loc (location) columns of the Free Disks and Array Disks lists. For example:

```
1 . 0 . M
            ┌──────────  M: Master
            │            S: Slave

            └──────────  Controller

            ──────────── Channel - Typically, channel 0 is used for
                         Parallel ATA drives while channel 1 is used for
                         Serial ATA drives.
```
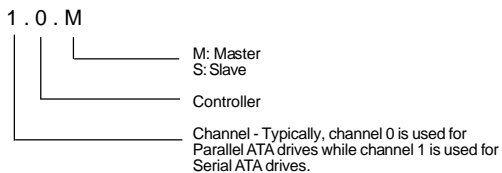
Serial ATA

1 . 0 . M   Channel 1, controller 0, Master

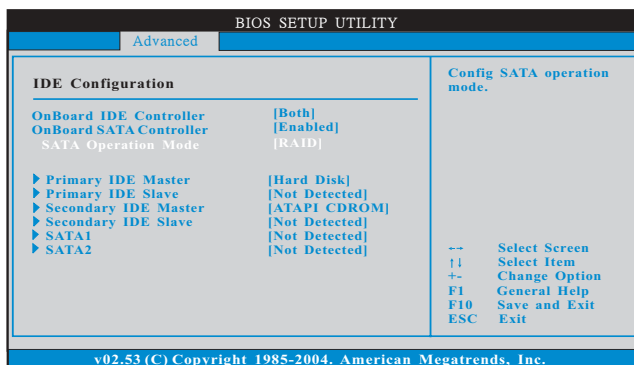1 . 1 . M   Channel 1, controller 1, Master

Finally, the **Array List** window appears, where you can review the RAID arrays that you have set up.

NVIDIA RAID Utility
- Array List -

Boot	Id	Status	Vendor	Array Model Name
Yes	2	Healthy	NVIDIA	STRIPING 74.53G

[Ctrl-X]Exit [↑↓]Select [B]Set Boot [N]New Array [ENTER]Detail

Create RAID 1

After the system powers on, press <F2> key to enter BIOS setup utility. Highlight **Advanced** and press <Enter>, then the main interface of BIOS setup utility will appear. Please set the option **SATA Opera tion Mode** to [RAID].

```
                           BIOS  SETUP  UTILITY
      Advanced

  IDE Configuration                            Config SATA operation
                                               mode.
  OnBoard IDE Controller        [Both]
  OnBoard SATA Controller       [Enabled]
    SATA Operation Mode         [RAID]

  ▶ Primary IDE Master          [Hard Disk]
  ▶ Primary IDE Slave           [Not Detected]
  ▶ Secondary IDE Master        [ATAPI CDROM]
  ▶ Secondary IDE Slave         [Not Detected]
  ▶ SATA1                       [Not Detected]
  ▶ SATA2                       [Not Detected]
                                               ←→    Select Screen
                                               ↑↓    Select Item
                                               +-    Change Option
                                               F1    General Help
                                               F10   Save and Exit
                                               ESC   Exit

      v02.53 (C) Copyright 1985-2004, American Megatrends, Inc.
```

Then, the below window appears.

```
  NVIDIA RAID IDE ROM BIOS 4.81
  Copyright (C) 2004 NVIDIA Corp.

  Detecting array ...
  0 Healthy NVIDIA RAID 1 74.54G

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

After rebooting your computer, wait until you seee the RAID software prompting you to press <F10>. The RAID prompt appears as a 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.

After you press <F10>, the NVIDIA RAID Utility - **Define a New Array** window appears. By default, RAID Mode is set to Mirroring, so you do not need to change it when setting up RAID 1. And the Striping Block is set to Optimal as default.

Then, for the following steps, please to refer to the detail description in RAID 0. And you will see the below windows.

```
NVIDIA RAID Utility   Jan 12 2005
         - Define a New Array -

RAID Mode :  Mirroring              Stripimg Block :  Optimal

Free Disks                          Array Disks
Loc   Disk Model Name               Loc    Disk Model Name

                                    1.0.M  Maxtor 6Y120M0
                         [—]Add     1.1.M  Maxtor 6Y120M0




                         [—]Del

 [ESC] Quit [F6] Back [F7] Finish [TAB] Navigate [|] Select [ENTER] Popup
```



```
              NVIDIA RAID Utility
                 - Array List -

      Boot  Id  Status    Vendor     Array Model Name

      Yes   2   Healthy   NVIDIA     MIRRORING 74.53G






 [Ctrl-X]Exit [ || ]Select [B]Set Boot [N]New Array [ENTER]Detail
```

Create JBOD

After the system powers on, press <F2> key to enter BIOS setup utility. Highlight **Advanced** and press <Enter>, then the main interface of BIOS setup utility will appear. Please set the option **SATA Operation Mode** to [RAID].
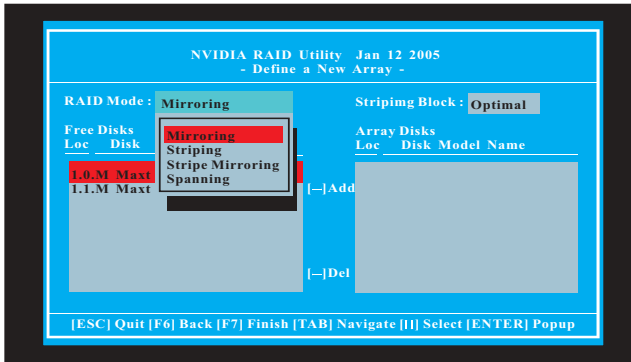
```
                         BIOS SETUP UTILITY
          Advanced

 IDE Configuration                          Config SATA operation
                                            mode.
 OnBoard IDE Controller       [Both]
 OnBoard SATA Controller      [Enabled]
    SATA Operation Mode       [RAID]

 ▶ Primary IDE Master         [Hard Disk]
 ▶ Primary IDE Slave          [Not Detected]
 ▶ Secondary IDE Master       [ATAPI CDROM]
 ▶ Secondary IDE Slave        [Not Detected]
 ▶ SATA1                      [Not Detected]
 ▶ SATA2                      [Not Detected]      ←→    Select Screen
                                                  ↑↓    Select Item
                                                  +-    Change Option
                                                  F1    General Help
                                                  F10   Save and Exit
                                                  ESC   Exit

      v02.53 (C) Copyright 1985-2004. American Megatrends, Inc.
```
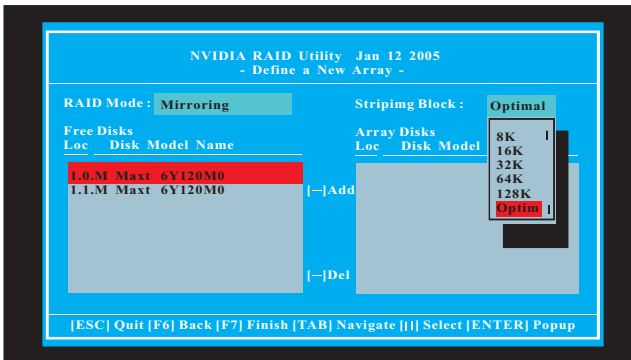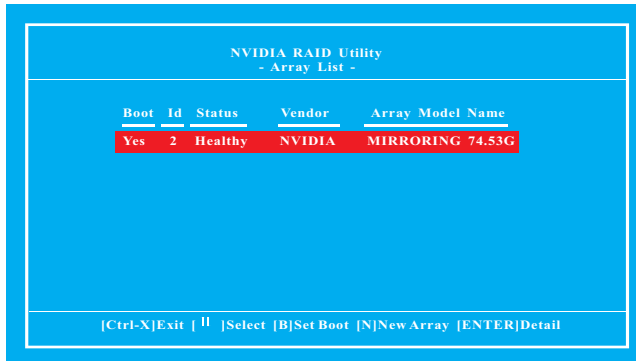
Then, the below window appears.

```
 NVIDIA RAID IDE ROM BIOS 4.81
 Copyright (C) 2004 NVIDIA Corp.

 Detecting array ...
 0 Healthy NVIDIA JBOD 74.54G

 Press F10 to enter RAID setup utility ...
 _
```
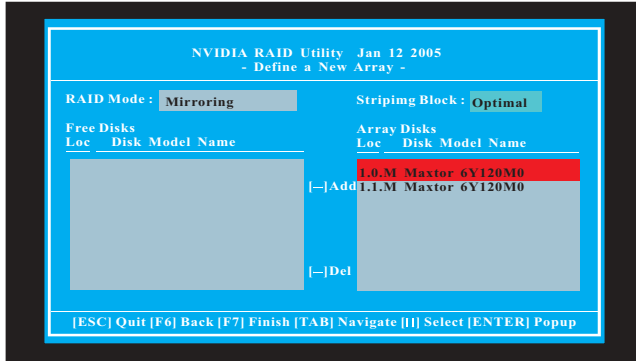
After rebooting your computer, wait until you seee the RAID software prompting you to press <F10>. The RAID prompt appears as a part of the system POST and boot process prior to loading the OS. You have a few seconds to press <F10> before the window disappears.

After you press <F10>, the NVIDIA RAID Utility - **Define a New Array** window appears. By default, RAID Mode is set to Mirroring, but please set it to **Spanning** if you want to create RAID JBOD. And the Striping Block is set to Optimal as default.
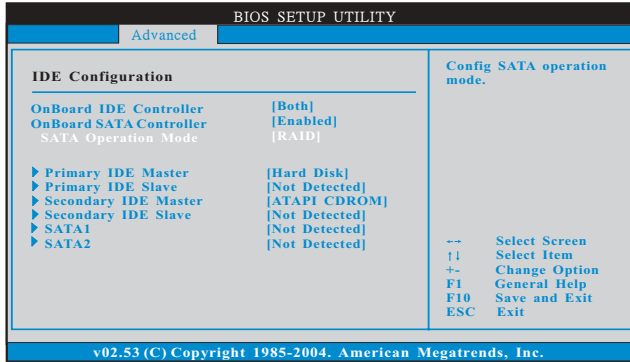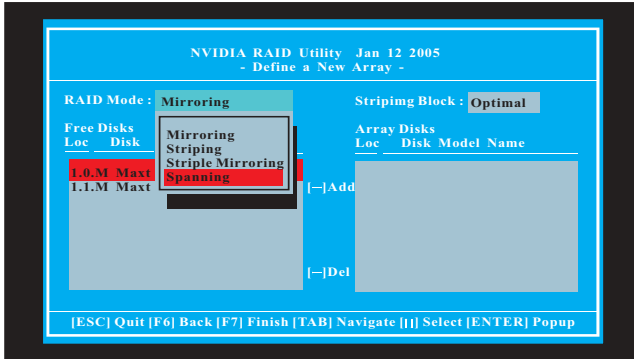

Then, for the following steps, please to refer to the detail description in RAID 0. And you will see the below windows.

```
                    NVIDIA RAID Utility   Jan 12 2005
                         - Define a New Array -

RAID Mode :  Spanning               Stripimg Block :  Optimal

Free Disks                          Array Disks
Loc    Disk Model Name              Loc    Disk Model Name

                                    1.0.M  Maxtor 6Y120M0
                              [—]Add 1.1.M  Maxtor 6Y120M0



                              [—]Del

[ESC] Quit [F6] Back [F7] Finish [TAB] Navigate [↓↑] Select [ENTER] Popup
```

```
                         NVIDIA RAID Utility
                           - Array List -

        Boot   Id   Status      Vendor        Array Model Name

        Yes    2    Healthy     NVIDIA        SPANNING 74.53G




        [Ctrl-X]Exit [ ↑↓ ]Select [B]Set Boot [N]New Array [ENTER]Detail
```