RocketRAID 133

User's Manual

HighPoint

Table of Contents

Chapter 5
Trouble Shooting

Appendix A
Glossary

Appendix B
Contact Technical Support

HighPoint

Chapter 1
Introduction

This chapter will give a brief introduction on the RAID-related background knowledge, as well as a brief introduction on RocketRAID 133 ATA RAID solution.

HighPoint

1.1 RAID Basics

RAID (Redundant Array of Independent Disks) is a method of combining several hard disks (physical disks) into one logical unit (logical disk). Such combining can offer either or both fault tolerance and higher data throughput than a single hard disk system.

There are usually a few methods through which hard disks can be combined together. The different methods referred as different RAID Levels, and different RAID levels represent different performance level, security level and implementation cost.

The most frequently used RAID levels include RAID 0, 1 and 5. Also there are some combined RAID levels, for example, RAID 0/1 is the combination of RAID 0 and RAID 1. Here is a briefing table of these popular RAID levels:

	Description	Minimum # of Drives	Benefits
RAID 0	Data striping	2	Highest Performance without data protection
RAID 1	Disk mirroring	2	Data protection through 100% data duplication
RAID 0/1	Data striping and mirroring	4	Highest performance with data protection
JBOD	Disk Spanning	2	No data protection and performance improving, but full usage of disk capacity

1.2 IDE RAID

For quite some time before, RAID technology has been based on SCSI hard disk's bus interface, and mainly focuses on high-end application system. PC users and low-end business application has been excluded from the RAID benefits due to the high cost of SCSI RAID.

It is very lucky that, as the IDE RAID (also known as ATA RAID) technology emerges recently, people now can enjoy the RAID technology's benefits at a pretty low cost.

IDE is another computer hard disk bus interface widely used by PCs. Due to the great development of the PC market in the recent a few years, the IDE hard disk's price has dramatically dropped, while at the same time, its performance has greatly improved. Below is a performance & implementation cost brief comparison between IDE RAID and SCSI RAID:

		IDE RAID	SCSI RAID
Interface		PCI to ATA133	PCI to Ultra 160 SCSI
Controller Card	Number of Channel	2	1
	Maximum number of Drives	4	15
	Maximum Data Throughput	133x2MB/s	160MB/s
	Supported RAID Levels	0,1,0/1,JBOD	0,1,0/1,3,5,JBOD
	Price	100$	499$
Hard Drive	Spin(rpm)	7200	10000
	Capacity	40G	33G
	Price	120$	500$

Note: The price may vary depending on different period and different market.

Due to the high rate of performance/cost and character/cost, IDE RAID has been widely accepted by the market as cost-effective RAID solution, and RocketRAID 133 is one of the best ATA RAID solutions.

1.3 RocketRAID 133

RocketRAID xxx is a series of ATA RAID solution contributed by HighPoint Technologies, Inc., and it mainly consists two parts: the RAID adapter and the RAID management software.

RocketRAID 133 adapter, using HPT372A chip as RAID controller, is a 2-channel ATA133 RAID solution. ATA RAID Management software is a Windows-based software utility with graphical user interface, and provides users an easy-operation software tool to configure and manage disks or disk arrays connected to RocketRAID 133 adapter.

Below are the main features and benefits of RocketRAID 133:

(1) Supports ATA133 high performance hard disk
(2) Dual independent ATA channels and maximum 4 hard disks allowed connection
(3) Supports RAID 0, 1, 0/1 and JBOD
(4) Supports hot-swapping failed disk in RAID 1 and 0/1 array
(5) Supports hot spare disk for RAID 1 array
(6) Bootable disk or disk array support
(7) Supports OSs like: Windows95/98/Me, NT4.0, 2000, XP and Linux
(8) Windows-based RAID configuration & management software tool (compatible with BIOS)
(9) Real-time monitoring of device status and error alarm with popup message box and beeping
(10) Event log for easy trouble shooting

Chapter 2
Adapter Installation

This chapter will tell you how to install RocketRAID 133 adapter onto your computer and connect hard disks to the adapter correctly. Please make sure to read this chapter carefully before starting your installation procedures.

Contents of this Chapter:

If you have any question during installation, please contact our technical support.

HighPoint

2.1 Adapter Layout
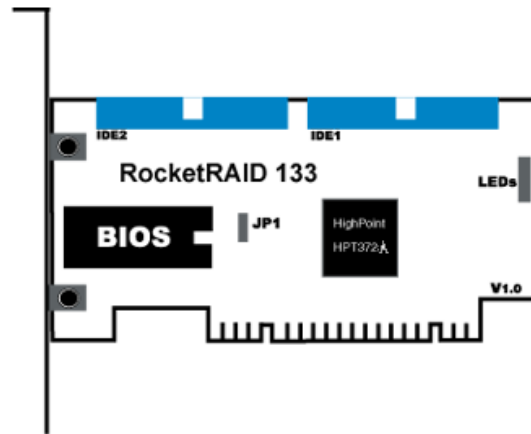
LEDs connection:
The 4-pins LED connector are for LED connecting. From the top to the bottom there are 4 pins, 1-2 for IDE 1, 3-4 for IDE 2.

2.2 Hard Disk Connection

We suggest the following connection way depending on disk numbers:

Number of Disks	IDE 1		IDE 2	
	Primary	Slave	Primary	Slave
1	✓			
2	✓		✓	
3	✓	✓	✓	
4	✓	✓	✓	✓

Note:

1. " ✓ " means it is better to connect hard disk at this position.
2. When connecting hard disk, pay much attention to its Master -Slave jumper setting: if two hard disks are connected onto one IDE cable, then one disk must be set as master while the other as slave.
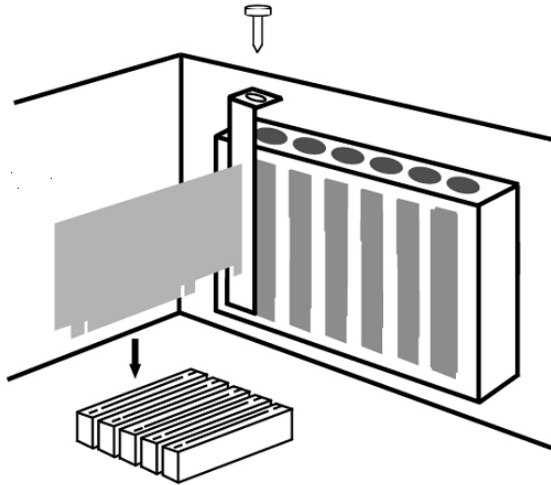
2.3 Adapter Installation

Follow these steps to install the RAID adapter and connect hard disks onto the adapter:

1. Shut down the computer and unplug the power supply;
2. Please discharge static electricity from your body by touching a conductor;
3. Remove the corresponding card bracket from the back of the computer chassis;
4. Insert the RocketRAID 133 adapter steadily into a PCI slot on motherboard and then settle it with screw (see up picture);
5. Set jumper of hard disks and settle them inside the computer chassis;
6. Connect hard disks to RAID adapter with IDE cable (see page2-3 picture);
7. Connect power supply connector to hard disk;
8. Replace the cover of computer chassis.

Blue Connector
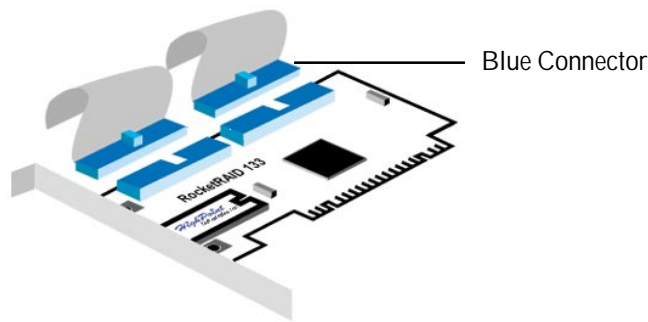
Cable Connection

Note:
1. If multiple hard disks to be used, user will need a powerful power supply in order to provide enough electricity to the system.

2.4 Verify Adapter's Installation

After installed RocketRAID 133 adapter and connected hard disks as required above, now user can turn on the computer. Please pay attention to the screen display while starting computer. If the following information appear, it indicates that the RocketRAID 133 adapter has been successfully installed and recognized by the computer.

```
HighPoint Technologies, Inc. HPT372/372A BIOS Setting Utility v2.1
(c) 1999-2001. HighPoint Technologies, Inc. All rights reserved

Press <Ctrl><H> to run BIOS Setting Utility
Scan Devices. Please wait ...
```

Next, RocketRAID 133 adapter's BIOS will scan the connected hard disks. Please pay attention to the screen display (See next page screen shot). If all connected hard disks are correctly detected out, it indicates that all the hard disks have been connected correctly and recognized by the computer.

Note:
1. If adapter or hard disk is not recognized, please refer the Trouble Shooting chapter for how to solve the problem.

HighPoint

```
HighPoint Technologies, Inc. HPT372/372A BIOS Setting Utility v2.1
(c) 1999-2001. HighPoint Technologies, Inc. All rights reserved

Press <Ctrl><H> to run BIOS Setting Utility
Scan Devices. Please wait ...
Primary Master:   Maxtor 5T020H2
Primary Slave:    ST320414A
Secondary Master: Maxtor 5T020H2
Secondary Slave:  MAXTOR 6L040J2
```

2.5 Driver Installation

After the RocketRAID 133 adapter is installed and recognized by computer, user can start the installation of driver.

● Windows 98/Me

Installation

After Windows 98/Me is start-up, Windows system will automatically find the newly installed adapter and prompt user to install its driver. Follow these steps to install the driver:

1. After the Add New Hardware Wizard window appears, press Next button until the following window appears:

2. Insert the driver diskette, then select the Specify a location item and type in the driver location: A:\Win98_ME, then click on Next button to continue;(If users install driver from CD make sure input the correct path, for example D: \RR133\Windows\Driver\Win98_ME)
3. Confirm the following dialogue windows, and restart the computer when the system prompt user to restart;
4. After rebooting, Windows will automatically find HighPoint RCM Device and install its drivers.

Verify Installation
After the driver installation finished and the computer restarted:
1. Right-click on My Computer icon on desktop, and then select Properties item from the popup menu;
2. From the popup window, activate Device Manager item, see below:
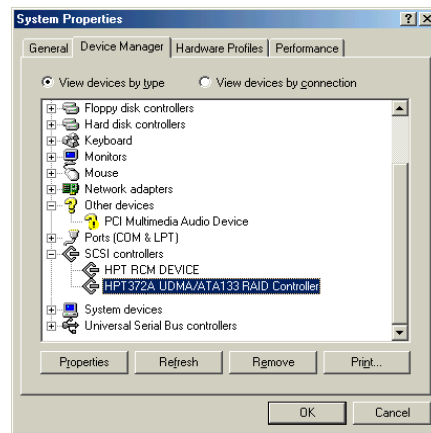
If there are the two device items under SCSI Controllers tree as shown above, it indicates that the driver has been installed correctly.
If user cannot find these two device items, or there is ? or ! markings on device icon, it indicates that the driver has not been correctly installed and user need to delete the devices and reinstall the drivers.

Note:
1. If user do not restart the computer after installation, then there may have ! on the device items. User only need to reboot to make the devices normal.

● Windows NT4.0
Install driver under existing Windows NT4.0
1. Click Start-->Settings-->Control Panel, then double-click on the SCSI Adapters icon;
2. Within the follow-up window, select Driver item, then click on Add button;
3. Within the follow-up window, click on Have Disk... button, the following window will appear, see below;

HighPoint

Install From Disk

Insert the manufacturer's installation disk into the drive selected, and then click OK.

OK

Cancel

Copy manufacturer's files from:

A:\

Browse...

4. Insert the driver diskette, and type in the path of driver location: A :\Win_NT in the above window, then click OK; (If users install driver from CD make sure to input the correct path, for example D:\RR133\Windows\Driver\Win_NT)

5. Within the follow-up window, select HPT372A UDMA/ATA133 RAID Controller item, then click OK;

6. Confirm the follow-up system prompts to finish the driver installation. When installation finished, restart the computer.

Install driver during WindowsNT4.0 installation

1. Press F6 key when the installation program prompts Setup is inspecting your computer's hardware configuration;

2. The installation will continue. Later, installation program will prompt user to press S key to specify other devices, then please press S key;

3. Within the follow-up device type window, select Other, then press ENTER to confirm;

4. Installation program will prompt user to insert the driver diskette. Please insert the driver diskette and then press ENTER to confirm;

5. Within the follow-up window, select HPT370/372/372A UDMA/ATA133 RAID Controller for WinNT4.0, then press ENTER to confirm;

6 The follow-up window will list out the devices to be installed, in which HPT370/372/372A UDMA/ATA133 RAID Controller item should be included (If user want to install other devices, please operate at this time. If all devices have been installed, please go to next step);

7. Press ENTER to confirm the devices to be installed and continue the installation of Windows NT4.0.

Verify Installation

After the driver has been installed and the computer is restarted:

1. Click Start-->Settings-->Control Panel, and then double-click on SCSI Adapters icon;

2. Within the SCSI Adapters window, see below:
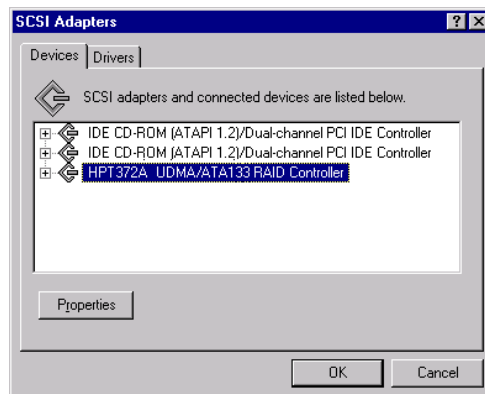
If there is HPT372A UDMA/ATA133 RAID Controller item, it indicates that the driver has been successfully installed.

Otherwise, if user cannot find the device items,or there is ? or ! markings on device icon, it indicates that the driver has not been correctly installed and user need to delete the devices and reinstall the drivers.

● Windows 2000

Install driver under existing Windows 2000

After Windows 2000 is start-up, Windows system will automatically find the newly installed adapter and prompt user to install its driver. Please follow these steps to install the driver:

1. When the Found New Hardware Wizard window appears, click Next button to continue, in the follow-up window, please select Display a list ... and then click Next to continue;
2. In the follow-up window, select SCSI and RAID Controllers and then click Next to continue;
3. In the follow up window, click Have Disk..., then Insert the driver diskette and type in the driver location: A:\Win_2000, then click OK to continue;(If users install driver from CD make sure input the correct path, for example D:\RR133\Windows\Driver\Win_2000)
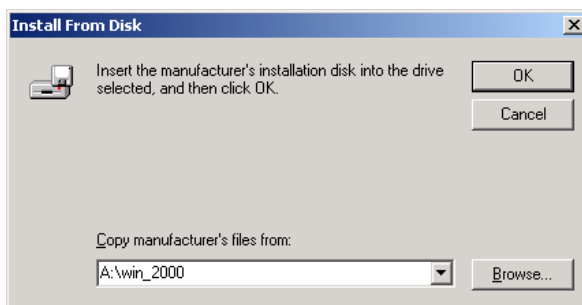
4. In the follow-up window, select HPT372A UDMA/ATA133 RAID Controller, then click Next to continue;
5. Confirm the followup windows and click the Finish button to continue;
7. Next, Windows will find HighPoint RCM device, please confirm the Digital Signature Not Found window when it appear, when finished, please restart the computer;

Install driver during Windows 2000 installation
(Recommend users copy the driver to a floppy diskette's root directory)

1. Booting from CD-ROM, when the Windows 2000 Setup blue screen appear and prompt user to Press F6 if you need to install a third part SCSI or RAID driver, please press F6 key;
2. The setup program will continue, later when the setup program prompt user if to specify additional adapters, please press S key;
3. Then the setup program will prompt user to insert the driver diskette. Please insert the driver diskette, then press ENTER to continue;
4. The follow-up window will list out the installation choices, please select HPT370/372/372A UDMA/ATA133 RAID Controller for Windows 2000 and press ENTER to continue;
5. The follow-up window will list out the devices to be installed, in which HPT370/372/372A UDMA/ATA133 RAID Controller item should be included; (If user want to install other devices, please operate at this time. If all devices have been successfully installed, please go to next step.)
6. Press ENTER to continue Windows 2000 setup.

Verify Installation
After the driver has been installed and the computer restarted:

1. Right-click My Computer icon, then select Properties item from the popup menu;
2. In the popup window, select Hardware item and then click Device Manager button.

If HPT372A UDMA/ATA133 RAID Controller and HighPoint RCM Device items exists in the popup Device Manager window (see above), it indicates that the driver has been successfully installed.

Otherwise, if user cannot find these two device items, or there is ? or ! markings on device icon, it indicates that the driver has not been correctly installed and user need to delete the devices and reinstall the drivers.

● Windows XP

Install driver under existing Windows XP

After Windows XP is start-up, Windows system will automatically find the newly installed adapter and prompt user to install its driver.   Please follow these steps to install the driver:

1. When the Found New Hardware Wizard window appears, select Install from a list or specify location(Advanced), and click Next to continue;

2. In the follow-up window, please select Don't search, I will choose the driver to install, then click Next to continue;

3. In the follow-up window of device list, please select SCSI and RAID controllers, and then click Next to continue;

4. In the next window, click on Have Disk..., then type in the driver location: A:\Win_XP into the follow-up window, then click OK to continue;(If users install driver from CD make sure input the correct path, for example D:\RR133\Windows\Driver\Win_XP)
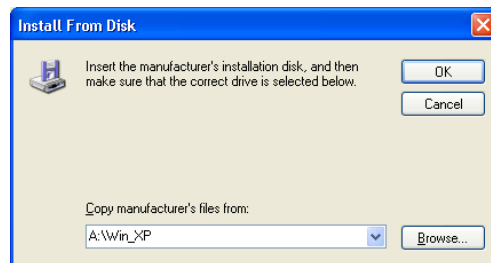
5. In the follow-up window, select HPT372A UDMA/ATA133 RAID Controller, then click Next to continue;

6. In the follow-up window, click on Continue Anyway, then click Finish in the follow-up window;

7. Next, Windows will find HighPoint RCM device, please confirm the Digital Signature Not Found window when it appears, when finished, please restart the computer.

Install driver during Windows XP installation
(Recommend users copy the driver to a floppy diskette's root directory)

1. Booting from CD-ROM, when the Windows XP Setup blue screen appears and prompt user to press F6 key to install third party SCSI or RAID driver, please press F6 Key.
2. The setup program will continue, later when the setup program prompt user if to specify additional adapters, please press S key;
3. Then the setup program will prompt user to insert the driver diskette. Please insert the driver diskette, then press ENTER to continue;
4. The follow-up window will list out the installation choices, please select HPT370/372/372A UDMA/ATA133 RAID Controller for Windows XP and press ENTER to continue;
5. The follow-up window will list out the devices to be installed, in which HPT370/372/372A UDMA/ATA133 RAID Controller item should be included; (If user want to install other devices, please operate at this time. If all devices have been successfully installed, please go to next step.)
6. Press ENTER to continue Windows XP setup.

Verify Installation

After the driver has been installed and the computer restarted:

1. Right-click My Computer icon, then select Properties item from the popup menu;
2. In the popup window, select Hardware tab and then click Device Manager button.

If HPT372A UDMA/ATA133 RAID Controller and HighPoint RCM Device items exist in the popup Device Manager window (see above), it indicates that the driver has been successfully installed.
Otherwise, if user cannot find these two device items, or there is ? or ! markings on

device icon, it indicates that the driver has not been correctly installed and user need to delete the devices and reinstall the drivers.

Chapter 3
BIOS Configuration Utility

RocketRAID 133 provided on-card BIOS configuration utility, through which, user can configure and manage disks or disk arrays connected to RocketRAID 133 adapter. BIOS configuration utility is especially useful when user wanted to create a disk array before an OS is installed.

Contents of this Chapter:

HighPoint

3.1 Enter BIOS Configuration Utility

When the following information appears on screen during the computer is starting, press CTRL+H key to enter BIOS configuration utility.

```
HighPoint Technologies, Inc. HPT372/372A BIOS Setting Utility v2.1
(c) 1999-2001. HighPoint Technologies, Inc. All rights reserved

Press <Ctrl><H> to run BIOS Setting Utility
Scan Devices. Please wait ...
```

The main interface of BIOS configuration utility is as below:

```
        HighPoint Technologies, Inc. HPT372/372A < BIOS Setting Utility>
 ─Create RAID ─────────────────────────────  ─ Help ──────────────────
  1. Array Mode     RAID 0 (Striping)         Select the RAID level that
  2. Array Name     RAID_0_0                   you would like to create an
  3. Select Disk Drives                        array with.
  4. Block Size     64K
  5. Start Creation Process

                                              ↑, ↓:  Move to next item
                                              Enter: Select options
                                              ESC:   Abort to main menu

  ─ Channel Status ──────────────────────────────────────────────────
       Channel          Drive Name      Array Name   Mode Size(GB) Status
     Primary Master:    Maxtor 5T020H2              ATA/100  19.08  HDDE
     Primary Slave:     ST320414A                  ATA/100  18.64  HDDF
     Secondary Master:  Maxtor 5T020H2             ATA/100  19.08  HDDG
     Secondary Slave:   MAXTOR 6L040J2             ATA/133  37.27  HDDH


  (c) 1999-2001. HighPoint Technologies, Inc.        HighPoint
     All rights reserved                         www.highpoint-tech.com
```

Main Menu:	This column lists all currently available operation commands.
Help:	This column gives help information about the current selected item and the prompts on available operations.
Status:	This column lists all the hard disks and disk arrays connected to the adapter. When this column is activated, user can select the target device to perform a specific operation.

3.2 Create Disk Array

Follow these steps to create a disk array:
   1. Within the Menu column of main interface, use the arrow key to highlight the Create Array command and press ENTER to call out the list of creation steps:
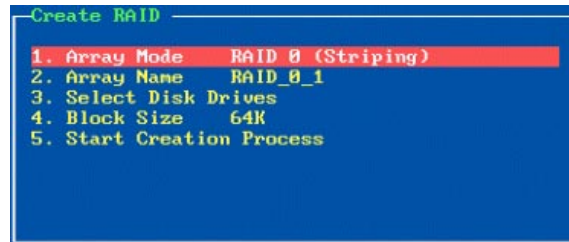
2. Highlight the Array Mode and press ENTER, then a list of array modes will appear, see below:
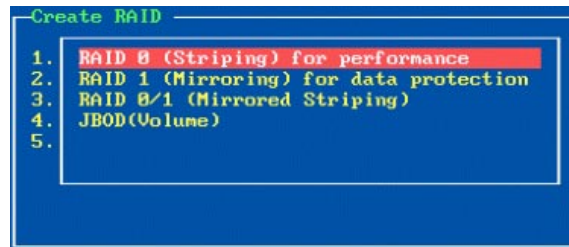
Just highlight the target array mode that you want to create, and then press ENTER to confirm the selection;

If user selected RAID 1 (mirror) array, then an option list will popup to enable user selecting Duplication or Create Only. Duplication will let BIOS reserve the data on source disk (the first selected disk) and copy them onto the mirror disk (the second selected disk) when creating mirror array; But Create Only will let BIOS destroy all data on all the selected disks and create a clean mirror array without any data on it.

(Creation steps may be different depending on what array mode has been selected)

3. Within the Menu column of main interface, use the arrow key to highlight the Array Name, and then press ENTER. Then the array name dialogue box will appear, see below:
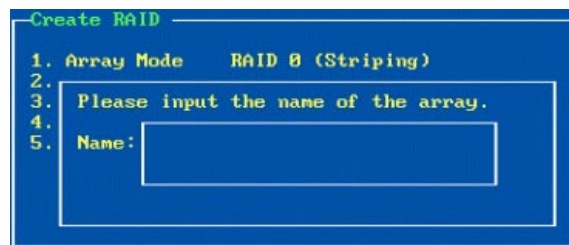
Just type in the name that you want to name the array, then press ENTER to continue;

4. Within the Menu column of main interface, use the arrow key to highlight the Select Disk Drives and press ENTER, the Status column will be activated, see below:

Just highlight the target disks that you want to use and press ENTER to select them respectively; After all disks have been selected, press ESC to go back to the creation steps menu;

5. If user selected a RAID 0 or 0/1 array in step 2, then now, user needs to select a block size for the array. Within the Menu column of main interface, use the arrow key to highlight the Block Size and press ENTER, then select a block size from the popup list, see below;
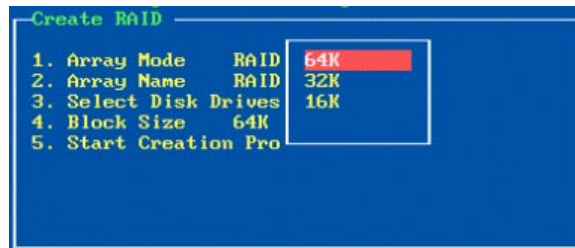
6. Within the Menu column of main interface, use the arrow key to highlight the Start Creation Process and press ENTER, then some warning messages will appear, see below:
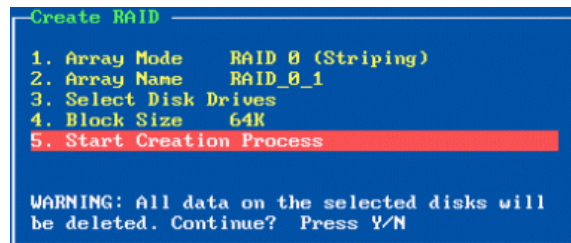
Please pay attention to the warning message, and then press Y to finish the creation, or press N to cancel the creation.

(The warning message may be different depending on what array mode that user is creating)

Warning:

1. Please pay attention to the warning message at Step 6:
   Creating RAID 0 array, JBOD array or RAID 0/1 array will destroy all data on all the selected disks.
   When creating mirror array, Duplication operation will reserve the data on source disk (the firs selected disk) and copy them onto the mirror disk (the second selected disk) when creating mirror array; But Create Only operation will destroy all data on all the selected disks and create a clean mirror array without any data on it.

3.3 Delete Disk Array

Follow these steps to delete a disk array:

1. Within the Menu column of main interface, use the arrow key to highlight Delete Array item, and then press ENTER, then the Status column will be activated, see below:

```
— Channel Status —
      Channel          Drive Name        Array Name    Mode  Size(GB) Status
( ) Primary Master:    Maxtor 5T020H2      ffg        ATA/100  19.08  HDDE
    Primary Slave:     ST320414A           ffg        ATA/100  18.64  Hidden
    Secondary Master:  Maxtor 5T020H2      ffg        ATA/100  19.08  Hidden
    Secondary Slave:   MAXTOR 6L040J2      ffg        ATA/133  37.27  Hidden


(c) 1999-2001. HighPoint Technologies, Inc.                HighPoint
    All rights reserved                               www.highpoint-tech.com
```

   highlight the target disk array and then press ENTER to delete it;
   (User can select a disk array by selecting its first member disk)

2. Then a warning message will appear as below:

```
— Main Menu —

  1. Create Array
  2. Delete Array
  3. Create/Delete Spare
  4. Select Boot Disk


  WARNING:All data on the array will be deleted
  Continue?  Press Y/N
```

   Pay attention to the warning message, and then press Y to delete the selected disk array, or press N to cancel.

Warning:

1. Deleting a disk array will destroy all the data on the disk array.

3.4 Add/Delete disks into/from spare pool

Follow these steps to add disks into spare pool or delete disks from spare pool:

1. Within the Menu column of main interface, use the arrow key to highlight Create/Delete Spare item and press ENTER, then the Status column will be activated, see below:

```
 — Channel Status —
        Channel          Drive Name      Array Name   Mode Size(GB) Status
( ) Primary Master:   Maxtor 5T020H2                 ATA/100  19.08  HDD5
    Primary Slave:    ST320414A          ffg         ATA/100  18.64  HDD6
    Secondary Master: Maxtor 5T020H2     ffg         ATA/100  19.08  Hidden
( ) Secondary Slave:  MAXTOR 6L040J2                 ATA/133  37.27  HDD7


(c) 1999-2001. HighPoint Technologies, Inc.
    All rights reserved                           HighPoint
                                          www.highpoint-tech.com
```

Just use the arrow key to highlight the target disk and press ENTER to add it into spare pool, or highlight a spare disk and press ENTER to delete it from spare pool.

2. After a disk is added into the spare pool, its status will be marked as Hidden, see below:

```
 — Channel Status —
        Channel          Drive Name      Array Name   Mode Size(GB) Status
    Primary Master:   Maxtor 5T020H2     ffg         ATA/100  19.08  Hidden
    Primary Slave:    ST320414A          ffg         ATA/100  18.64  HDDF
    Secondary Master: Maxtor 5T020H2     ffg         ATA/100  19.08  Hidden
    Secondary Slave:  MAXTOR 6L040J2                 ATA/133  37.27  HDDG


(c) 1999-2001. HighPoint Technologies, Inc.
    All rights reserved                           HighPoint
                                          www.highpoint-tech.com
```

3. If user want to add another disk into spare pool or delete another spare disk from the spare pool, please repeat step 1 to operate.

Warning:

1. Adding a disk into spare pool will destroy all the data on that disk.

3.5 Set Boot Device

Follow these steps to select a disk or disk array as boot device:

1. Within the Menu column of main interface, use the arrow key to highlight Select Boot Disk item, and then press ENTER; then the Status column will be activated, see below:

HighPoint

```
    HighPoint Technologies, Inc. HPT372/372A < BIOS Setting Utility>
┌ Main Menu ──────────────────────────────┐┌ Help ─────────────────────
│                                          ││
│  1. Create Array                         ││
│  2. Delete Array                         ││
│  3. Create/Delete Spare                  ││
│  4. Select Boot Disk                     ││
│                                          ││
│                                          ││
│                                          ││  ↑, ↓:  Move to next item
│                                          ││  Enter: Confirm the selection
│                                          ││  ESC:   Abort to main menu
│                                          ││
└──────────────────────────────────────────┘
┌ Channel Status ──────────────────────────────────────────────────────
│     Channel          Drive Name      Array Name    Mode Size(GB) Status
│   Primary Master:  Maxtor 5T020H2        ffg      ATA/100  19.08  Hidden
│ ( ) Primary Slave:   ST320414A           ffg      ATA/100  18.64  HDDH
│   Secondary Master: Maxtor 5T020H2       ffg      ATA/100  19.08  Hidden
│ ( ) Secondary Slave: MAXTOR 6L040J2               ATA/133  37.27  HDDI
│
│
│ (c) 1999-2001. HighPoint Technologies, Inc.
│    All rights reserved                              HighPoint
│                                              www.highpoint-tech.com
```
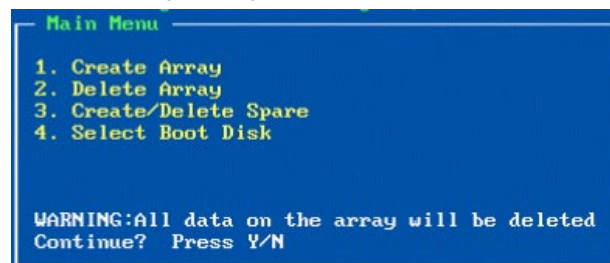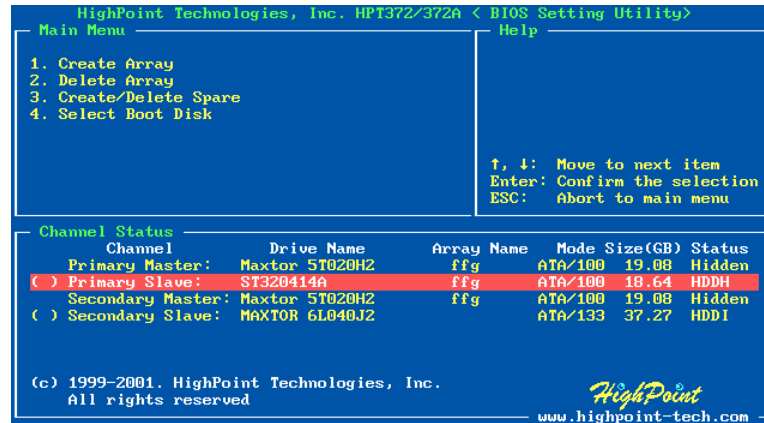
Just use the arrow key to highlight the target disk or disk array, then press ENTER to select it as boot device.
If user select a disk or disk array which has a boot mark and press ENTER, then its boot setting will be canceled.

2. After the disk or disk array is selected, its status will be marked as BOOT, see below:

```
┌ Channel Status ──────────────────────────────────────────────────────
│     Channel          Drive Name      Array Name    Mode Size(GB) Status
│   Primary Master:  Maxtor 5T020H2        ffg      ATA/100  19.08  Hidden
│   Primary Slave:     ST320414A           ffg      ATA/100  18.64  BOOT
│   Secondary Master: Maxtor 5T020H2       ffg      ATA/100  19.08  Hidden
│   Secondary Slave:  MAXTOR 6L040J2                ATA/133  37.27  HDD1
│
│
│ (c) 1999-2001. HighPoint Technologies, Inc.
│    All rights reserved                              HighPoint
│                                              www.highpoint-tech.com
```

3.6 Duplicate Critical RAID 1 or 0/1 array

When booting computer, if BIOS detect a RAID 1 or 0/1 array duplication has been canceled or any reasons that may cause the inconsistency between user data and backup data on the disk array, then the disk array will be marked as critical status, and BIOS will automatically prompt user to duplicate the RAID 1 or 0/1 array to make the backup data consist with the user data again, see below:

```
┌─ Critical RAID 1 ─────────────────────┐  ┌─ Critical Status ─────────┐
│                                       │  │                           │
│ 1. Duplicate now                      │  │ The RAID 1 array needs to │
│ 2. Continue to boot                   │  │ be duplicated to ensure   │
│                                       │  │ data consistency.         │
│                                       │  │                           │
│                                       │  │                           │
│                                       │  │                           │
│                                       │  └───────────────────────────┘
│                                       │
├─ Array members ───────────────────────┴──────────────────────────────┐
│        Channel          Drive Name    Array Name  Mode Size(GB)       │
│   Primary Master:   Maxtor 5T020H2       ffg      ATA/100  19.08      │
│   Secondary Master: Maxtor 5T020H2       ffg      ATA/100  19.08      │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
└───────────────────────────────────────────────────────────────────────┘
```
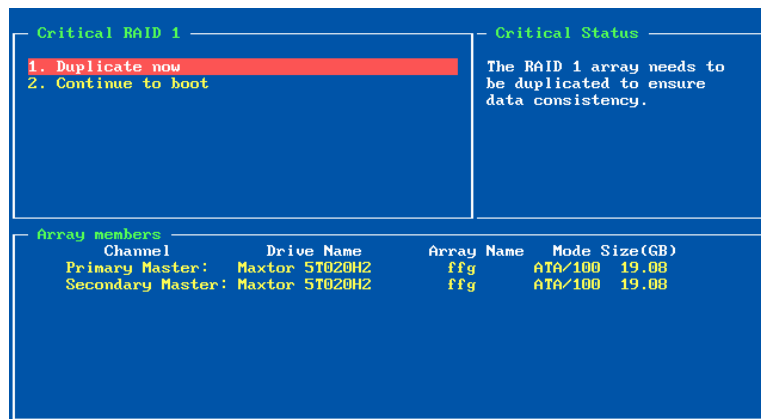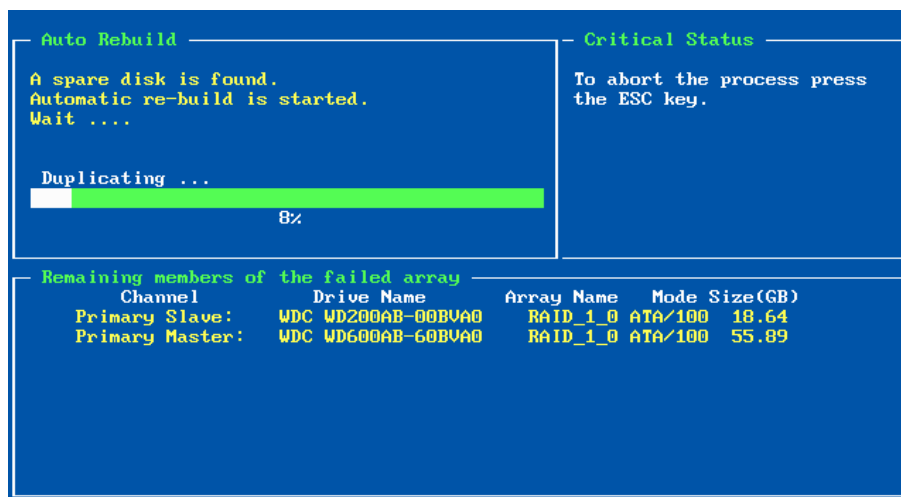
Just select Duplicate Now to duplicate, or select Continue to Boot to skip. If user selects Continue to Boot, user still can duplicate the array after booting into the OS.
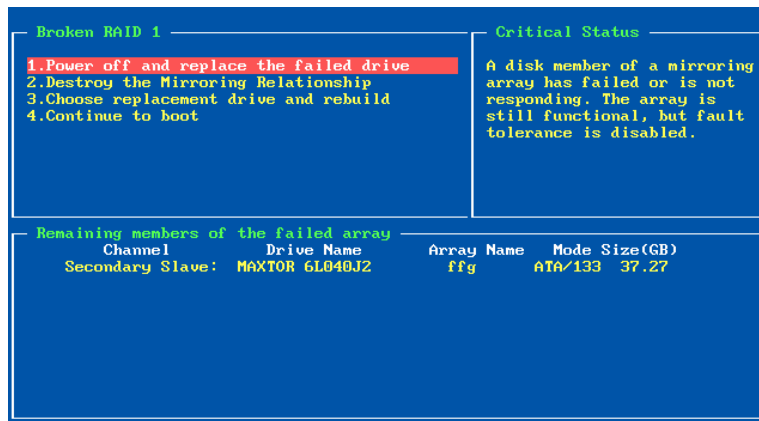
3.7 Rebuild Broken RAID 1 or 0/1 array

When booting computer, if BIOS detects one member disk of RAID 1or 0/1 array is failed, the array will be marked as broken status.
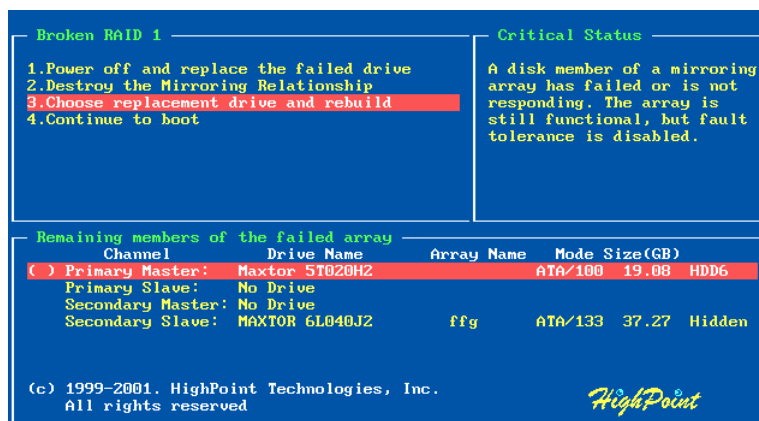If BIOS detect a RAID 1 array is broken, and there is a spare disk can be used to rebuild the broken array, then BIOS will automatically use the spare disk to rebuild the broken RAID 1 array and then replace data to the target disk, see below:

```
┌─ Auto Rebuild ────────────────────────┐  ┌─ Critical Status ─────────┐
│                                       │  │                           │
│ A spare disk is found.                │  │ To abort the process press│
│ Automatic re-build is started.        │  │ the ESC key.              │
│ Wait ....                             │  │                           │
│                                       │  │                           │
│                                       │  │                           │
│ Duplicating ...                       │  │                           │
│ ┌─────────────────────────────────┐   │  └───────────────────────────┘
│ │█████                            │   │
│ └─────────────────────────────────┘   │
│               8%                      │
│                                       │
├─ Remaining members of the failed array ─┴──────────────────────────────┐
│        Channel          Drive Name      Array Name  Mode Size(GB)       │
│   Primary Slave:    WDC WD200AB-00BVA0   RAID_1_0 ATA/100   18.64       │
│   Primary Master:   WDC WD600AB-60BVA0   RAID_1_0 ATA/100   55.89       │
│                                                                         │
│                                                                         │
│                                                                         │
│                                                                         │
└─────────────────────────────────────────────────────────────────────────┘
```

If BIOS detects either a RAID 1 or 0/1 array is broken, but no spare disk can be used to rebuild, then BIOS will prompt users with a few operations to solve the problem, see below:
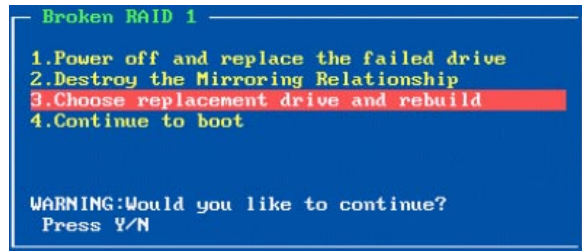
```
┌─ Broken RAID 1 ──────────────────────────┐  ┌─ Critical Status ─────────┐
│                                          │  │                            │
│ 1.Power off and replace the failed drive │  │ A disk member of a mirroring│
│ 2.Destroy the Mirroring Relationship     │  │ array has failed or is not │
│ 3.Choose replacement drive and rebuild   │  │ responding. The array is   │
│ 4.Continue to boot                       │  │ still functional, but fault│
│                                          │  │ tolerance is disabled.     │
│                                          │  │                            │
│                                          │  └────────────────────────────┘
│                                          │
│ ┌─ Remaining members of the failed array ──────────────────────┐
│ │     Channel        Drive Name      Array Name   Mode Size(GB) │
│ │ Secondary Slave:  MAXTOR 6L040J2      ffg       ATA/133  37.27│
│ │                                                               │
│ └───────────────────────────────────────────────────────────────┘
└──────────────────────────────────────────────────────────────────┘
```

1. Power off and replace the failed drive
    This command enables user to power off the computer and replace the failed
    disk with a good one. If your computer does not support APM, you must turn
    off your computer manually. After replacement, user can boot into BIOS and
    select the 3. Choose replacement drive and rebuild to rebuild the broken array.
2. Destroy the mirroring relationship
    This command enables user to cancel the broken array's data mirroring
    relationship. For broken RAID 1 array, the data on the remained normal disk
    will be reserved after the destroy operation. For broken RAID 0/1 array, all
    data on the array will be lost after destroy operation!
3. Choose replacement drive and rebuild
    This command enables user to select an already-connected disk to rebuild the
    broken array and replace the data to that disk.
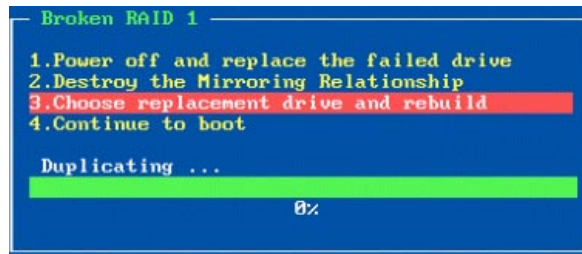   1. After chosen this command line, the Status column will be activated, see
        below:

```
┌─ Broken RAID 1 ──────────────────────────┐  ┌─ Critical Status ─────────┐
│                                          │  │                            │
│ 1.Power off and replace the failed drive │  │ A disk member of a mirroring│
│ 2.Destroy the Mirroring Relationship     │  │ array has failed or is not │
│ 3.Choose replacement drive and rebuild   │  │ responding. The array is   │
│ 4.Continue to boot                       │  │ still functional, but fault│
│                                          │  │ tolerance is disabled.     │
│                                          │  └────────────────────────────┘
│                                          │
│ ┌─ Remaining members of the failed array ───────────────────────────┐
│ │     Channel         Drive Name      Array Name   Mode Size(GB)     │
│ │ ( ) Primary Master:  Maxtor 5T020H2              ATA/100  19.08 HDD6│
│ │     Primary Slave:   No Drive                                       │
│ │     Secondary Master: No Drive                                      │
│ │     Secondary Slave:  MAXTOR 6L040J2    ffg      ATA/133  37.27 Hidden│
│ │                                                                    │
│ │ (c) 1999-2001. HighPoint Technologies, Inc.                        │
│ │     All rights reserved                          HighPoint         │
│ └────────────────────────────────────────────────────────────────────┘
└──────────────────────────────────────────────────────────────────────┘
```

Just highlight the target disk and press ENTER to select it;

2. Then the warning message will appear, see below:

```
— Broken RAID 1 ——————————————

1.Power off and replace the failed drive
2.Destroy the Mirroring Relationship
3.Choose replacement drive and rebuild
4.Continue to boot



WARNING:Would you like to continue?
 Press Y/N
```

Please pay much attention to the warning message, and then press Y to use that disk to rebuild, or press N to cancel. If user press Y, then all the data on all the selected disk will be destroyed;

3. Next, BIOS will replace data onto the newly added disk, see below:

```
— Broken RAID 1 ——————————————

1.Power off and replace the failed drive
2.Destroy the Mirroring Relationship
3.Choose replacement drive and rebuild
4.Continue to boot

Duplicating ...


                  0%
```

User can press ESC to cancel the duplicating process at anytime.

4. Continue to Boot
This command will let BIOS to skip the problem and boot into OS.

Chapter 4
ATA RAID Software

This chapter introduces for using HighPoint ATA RAID Management software in detail.

Contents of this chapter:

HighPoint

4.1 Installation

Follow these steps to install the ATA RAID software:

1. Browse the software installation CD or diskettes, and double click on the setup.exe file to begin the software installation,(if user installs the software from CD-ROM please select the correct path, for example, D:\RR 133\Windows\ GUI\setup.exe;);
2. Confirm the follow-up dialogue windows to finish the installation;
3. When installation completed, restart the computer.

With the default option, the setup program will create program group: Start--> Program-->HighPoint. This program group contains the following items:

HighPoint ATA RAID Management software	Main Program
Read Me	Software Information
Uninstall...	Uninstall the Program

4.2 Getting Start

After installed ATA RAID software, it will be automatically started every time when your Windows OS is started, and the small icon " " will appear in the system tray of the tool bar to indicate that ATA RAID software is currently running:

Just double click on the small icon to call out the main interface of the software:
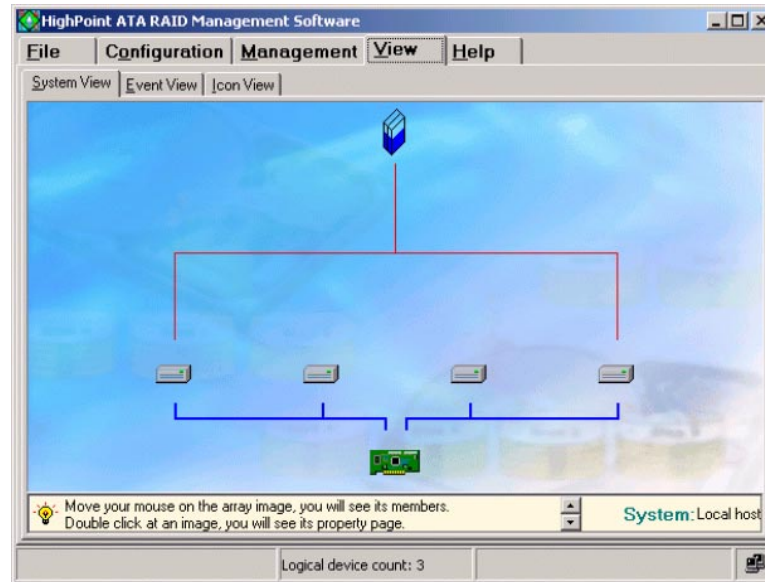
The main interface has five tabs: File, Configuration, Management, View and Help. You can switch to different tabs by clicking on it.

File: This tab displays welcome information. Click the Exit button to exit ATA RAID software.

Configuration: This tab includes four sub-tabs, they are: Create RAID, Delete RAID, Spare Pool Management and Duplicate. These sub-tabs will be introduced later.

Management: This tab includes two sub-tabs: Event Notification and Refresh. The Event Notification enables users to set automatic email notification when specified events occur. When user click the Refresh sub-tab, the software will rescan the devices that connected to the adapter, and the screen will jump directly to the View tab.

View: This screen includes three sub-tabs: System View, Event View and Icon View. The System View screen will display all disks and arrays connection status. The Event View window will list all the recorded events during the software is running. The Icon View window will show the meaning of different icons in the software.

Help: This tab contains the help information for this software.

4.3 Configuration Functions

Create Disk Array

Follow these steps to create a disk array:

1. Click the tab Configuration --> Create Raid, the following window will appear:
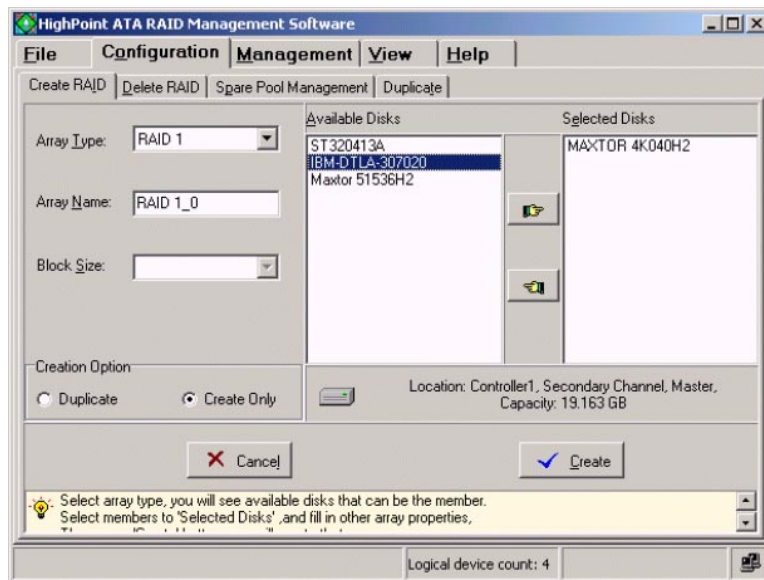

Within this interface:

Array Type: This drop-down box enable user to select disk array type. There are four array types user can select: RAID 0, RAID 1, RAID 0/1 and JBOD.

Array Name: User can type in a name for identifying the array to be created. A good name will make it easy to distinguish different arrays.

Block Size: If user selected RAID 0 or RAID 0/1 array in the Array Type box, then the Block Size selection drop-down box will be available and user must select a block size here. If user selected RAID 1 or JBOD, then the Block Size selection drop-down box will become disable .

Available Disks:	This pane will list out all the disks that currently can be used to create disk array.
Selected Disks:	This pane will list out the disks that have been selected to create the disk array. User can highlight the specific disk in Available Disks pane and click the corresponding hand icon to select that disk into the Selected Disks pane.
Creation Option:	This option is only available after user selects RAID 1 array in the Array Type box . Duplicate means reserve the data on the source disk (first selected disk) when creating RAID 1 array. Create Only means destroy all data on the selected disks and create a clean RAID 1 array with no data on it.

2. When the disk array's configuration is finished, click the Create button, then a warning message will popup, see below:
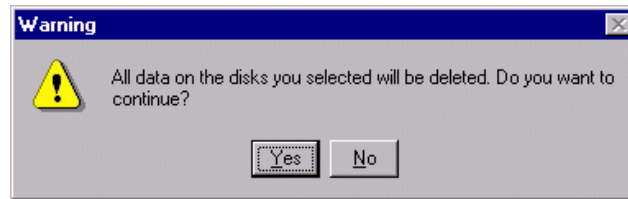
Pay attention to the warning message, and then click Yes to finish the creation of disk array, or click No to cancel;

3. Next, a message box will popup to prompt user that disk array has been created successfully and whether to restart the computer, see below:
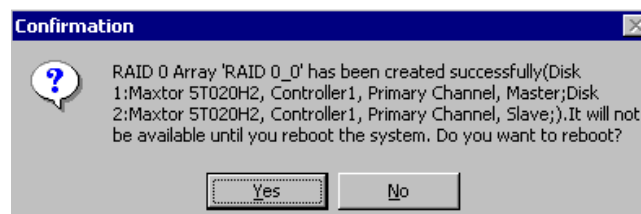
Please click Yes to restart the computer or click No to skip restarting;
(New setting will take effect only after restarting)

Warning:

1. Please pay attention to the warning message at Step 2:
   Creating stripe array, JBOD array or 0/1 array will destroy all the data
   that already on the selected disks.
   When creating mirror array, Duplicate operation will reserve the data on
   source disk (the first selected disk) and copy them onto the mirror disk(the
   second selected disk); But Create Only operation will destroy all data on all
   the selected disks and create a clean mirror array without any data on it.

Delete Disk Array

Follow these steps to delete a disk array:

1. Click the tab Configuration --> Delete RAID, the following window will
   appear:
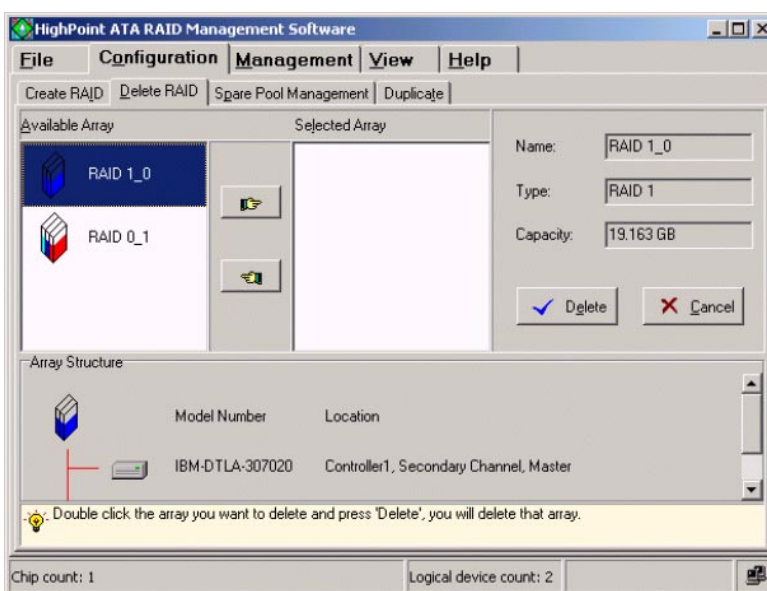
Within this interface:

Available Array: All arrays that can be deleted will be listed in this pane.
The bootable array will not appear here and can not be
deleted, user must delete it in BIOS.

Selected Array: Disk array in the Selected Array pane will be deleted after
clicking the Delete button.

Array Structure: This area will display the member disks' information of
the highlighted array.

2. Highlight the disk array in the Available Array pane, and then click on the corresponding hand icon to add it into the Selected Array pane, then click on the Delete button;

3. Next, the warning message will popup, see below:
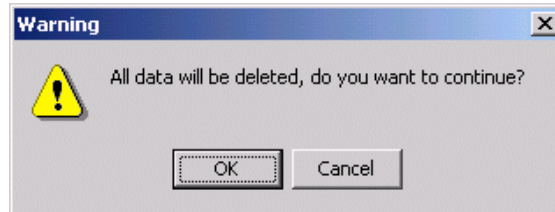
Please pay much attention to the warning message, and just click OK to delete the selected disk array, or click Cancel to give up deletion;

4. Next, a message box will prompt user that array has been deleted and whether to restart the computer, see below:
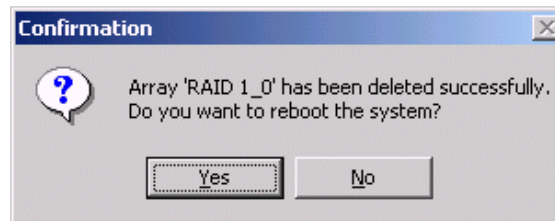
Just click Yes to restart the computer, or click No to skip restarting; (New setting will take effect only after rebooting)

Warning:

1. Deleting a disk array will destroy all the data on the disk array.

Spare Pool Management

When a disk fails in RAID 1 array, the spare disk (disks in the spare pool) will be automatically used as a replacement for the failed disk, and then rebuild the broken RAID 1 array and replace data to the target disk. With setting a spare disk, you can enhance security of RAID 1 array.

Follow these steps to add/remove a disk into/from the spare pool:

1. Click the tab Configuration --> Spare Pool Management, the following window will appear:
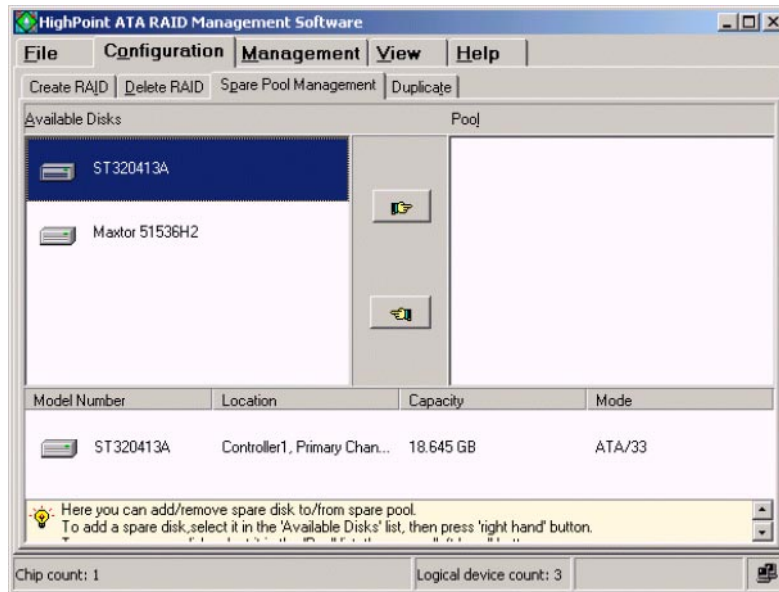
Within this interface:

Available Disks: All available disks that can be added into the spare pool
                    will be listed in this pane.
        Pool: Spare disks will be listed in this pane.

2. Within the Available Disks pane, highlight a disk and then click the
    corresponding hand icon to add it into the spare pool, or within the Pool pane
    highlight a spare disk and then click the corresponding hand icon to remove
    it from spare pool;

3. Then a confirmation dialogue box will appear, the confirmation window for
    adding disk into spare pool will be as below:
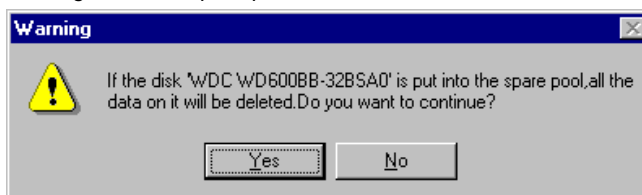
The dialogue window for removing spare disk will be as below:

Warning

If the disk 'WDC WD600BB-32BSA0' is removed from the spare pool,it will weaken the security of RAID 1 (Mirroring) array.Do you want to continue?

[Yes] [No]
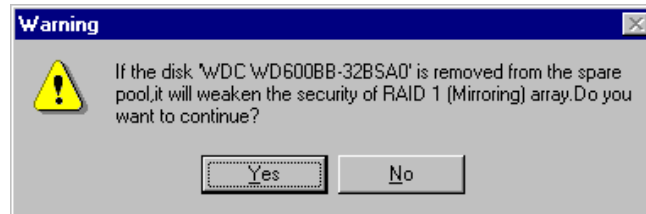
Please pay attention to the warning message, and then click Yes to add/ remove the disk into/from the spare pool, or click No to cancel;

4. Restart the computer when completed.

Warning:
1. Adding a disk into spare pool will destroy all the data on that disk.

Duplicate RAID 1 or 0/1 array

When a RAID 1 or 0/1 array is in critical status, software will prompt user to duplicate that RAID 1 or 0/1 array.

Also, software provides a way for manually duplicate a RAID 1 or 0/1 array, this duplication way enables users to duplicate a RAID 1 or 0/1 array whether in critical status or not. Follow these steps to manually duplicate a RAID 1 or 0/1 array:

1. Click the tab Configuration --> Duplicate, the following window will appear:
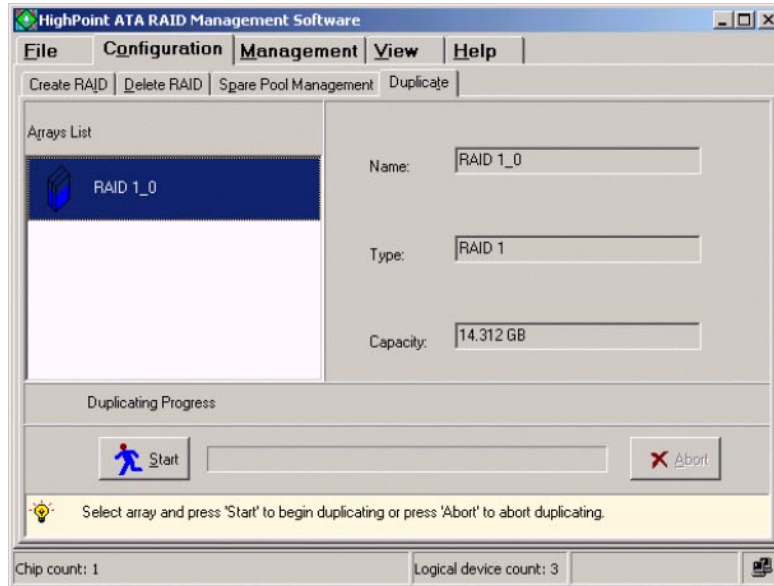
Within this interface:

Arrays List: All RAID 1 and 0/1 arrays that can be duplicated will be listed
                in this pane.

2. Highlight a disk array within the Arrays List pane, then the array's
   information will be shown on the right side (see above picture), then click on
   the Start button to start duplication, the progress bar will show the
   duplication progress. User can cancel the duplication by clicking the Abort
   button while it is going.

4.4 Management Functions

Event Notification

Event notification will enable users to set the software to notify relative
administrator by email when specified events or errors occur. In order to use this
function, the computer must can access a SMTP server.
Follow these steps to set event notification:

1. Click the tab Management --> Event Notification, the following window will
   appear:
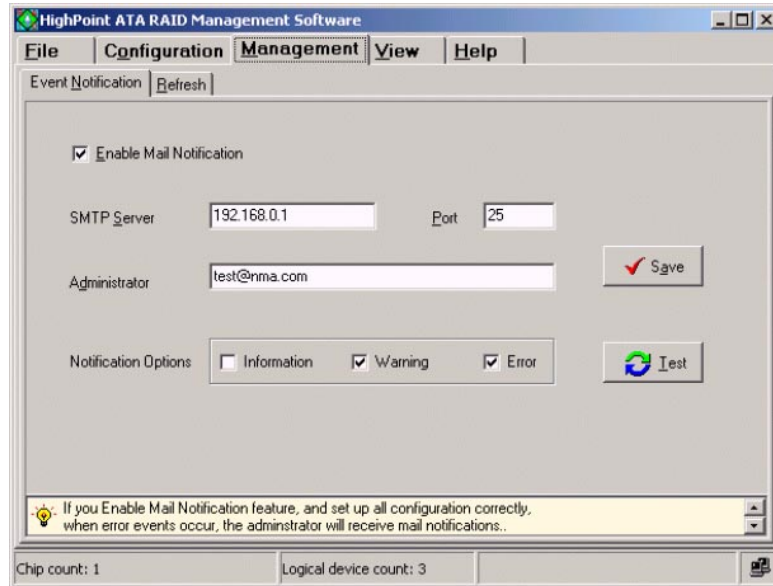
Within this interface:

SMTP Server: Type in the domain name or IP address for the SMTP
                server that you will use to send email.

Port: Type in the port of the SMTP service on the email server.

Administrator: Type in the email address where the notification
                information will be sent to.

Notification Option: Select what kind of events that you want the software to
                      notify.

2. Make sure the Enable mail Notification item is checked, then type in the
    required information and set the notification option, then press the Save
    button to finish.
    User can test if the setting is correct by clicking the Test button before
    saving the setting.

Refresh

When user click on this tab, the software will scan the computer system for any
updated system information, like if there is any new hard disk plugged, or if there is
any connected disk is failed.
After clicking on this tab, the software will automatically switch to the System View
screen, here user can find the updated system information after scanning.

4.4 View Information

System View

All devices will be shown in this window, including the disk arrays (Logical Devices), the hard disks (physical devices) and the controller.

Click the tab View --> System View, the following window will appear:
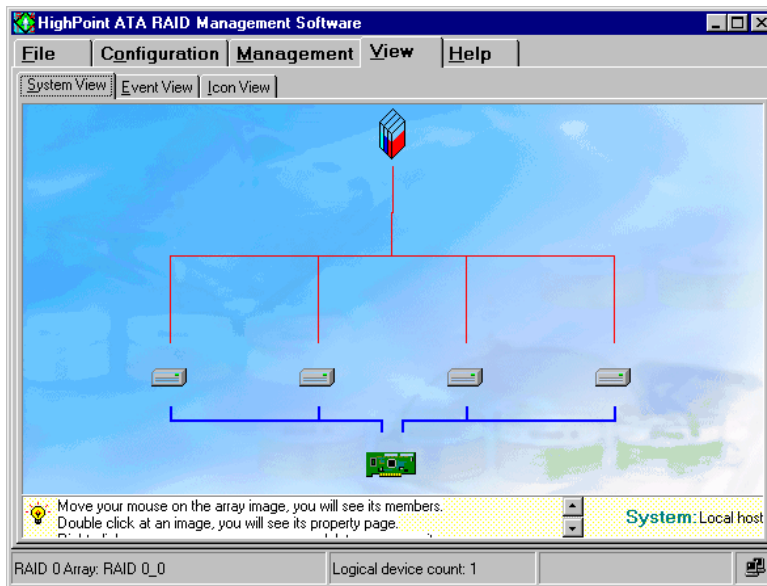
Within this interface, user can perform the following operations:

 (1) Viewing Device Relationship

When you move your mouse on a disk array, a red line between the array and some hard disks will appear. This means these hard disks constructed that disk array.

The blue lines between controller icon and hard disk icons represent the different ATA channels and the hard disks connected to these channels.

 (2) Viewing disk array information

Double-click on the disk array icon which you want to view, then the information table about that array will pop up as below:
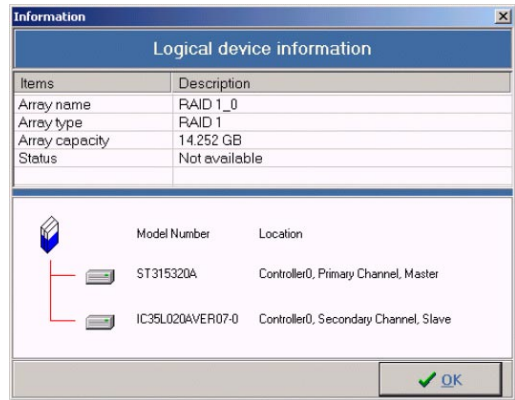
(3) Viewing Physical Device Information

Double-click on the hard disk icon that you want to view, then information table about that hard disk will popup as below:
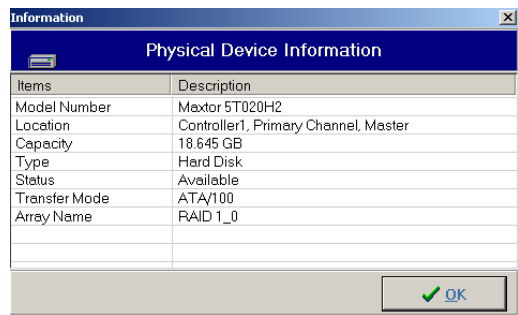
(4) Viewing Controller Information
Double-click on the controller icon, and then the information table about the controller will popup as below:
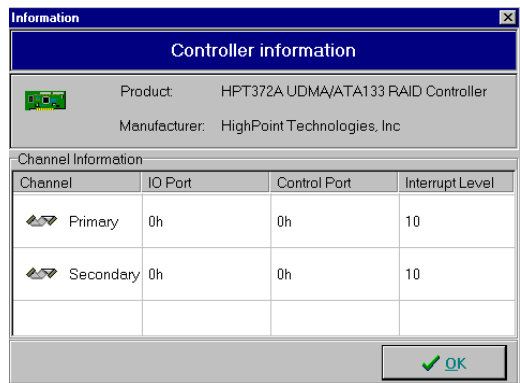
Just click the scrolling bar to view all information about the controller.

 (5) Disk Array Operation

Right-click on the disk array icon, from the popup menu, you can select to delete or rename the disk array.

Note: If the array is being duplicated, broken or disabled, the right-click menu will not be available.

 (6) Refresh

Right-click on the blank area within the System View window, and select Refresh from the popup menu to refresh the devices connected. This refresh operation is as same as the one under Management Functions tab.

Event View

All logged events will appear in this window. The filter divides them into three types: Information, Warning and Error.
Click the tab View --> Event View, the following window will appear:

HighPoint
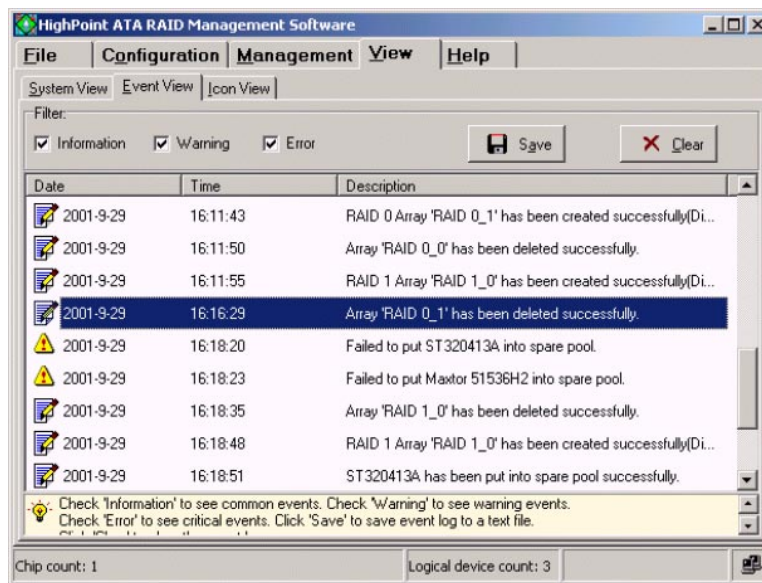
Within this interface, user can:

(1) Selecting what type of events to be listed

There are three types of events: Information, Warning and Error. Just check the information types under the Filter option to select what types of information to be listed.

(2) Save all the listed events into a file

Click the Save button, and type in the file name and path in the follow-up window to save the currently listed events into a TXT file.

(3) Clear all the currently logged events

Click the Clear button, then all the currently logged events will be deleted from the system and no more appear in the Event View list.

Icon View

All icon types and their meanings will be listed in the Icon View window, from here user will check what meaning a specific icon represents.

Click the tab View --> Icon View, the following window will appear:
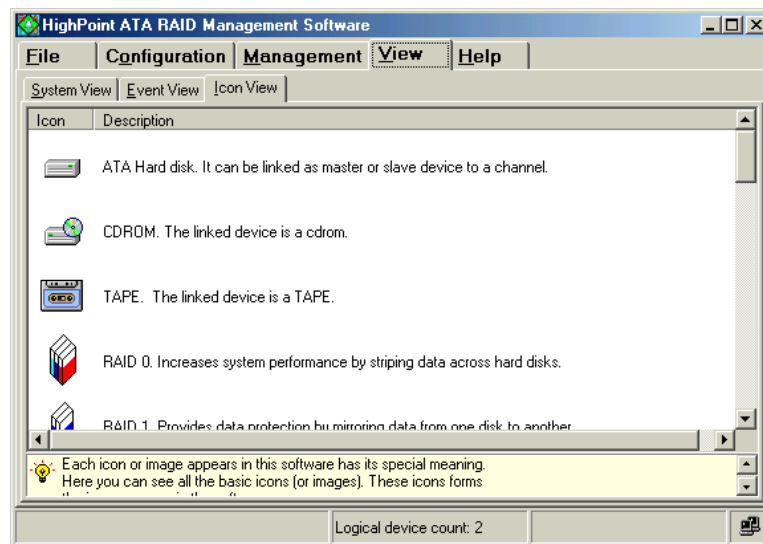
4.4 Rebuild Broken RAID 1 or 0/1 Array

During the running of ATA RAID software, if a RAID 1 or RAID 0/1 array is broken due to a disk failure, then the software will report the error and warn user with beeping until user confirm the error by clicking the OK button, like below:


If the broken array is a RAID 1 array and there is a spare disk in the spare pool which can be used, then the ATA RAID software will automatically use the spare disk to replace the failed disk, and rebuild the broken RAID 1 and replace data to the target disk.
If the broken array is RAID 0/1 array, or the broken array is RAID 1 array but no proper spare disk can be used to automatically rebuild, then user still can use the following ways to rebuild the broken RAID 1 or RAID 0/1 array:
 (1) Use an already-connected physical hard disk to rebuild broken RAID 1 array
Follow these steps to rebuild by this way:

   Right click on a physical hard disk (not belong to any disk array) in the System View window, then select add to array from the popup menu, see below:
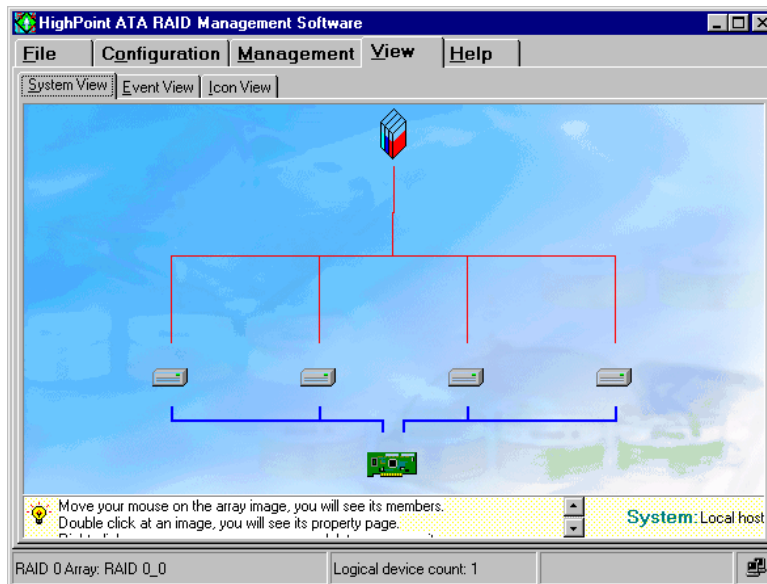
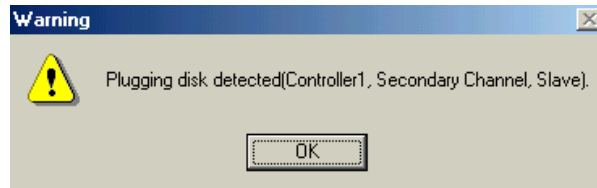Then the follow-up window will appear as below:
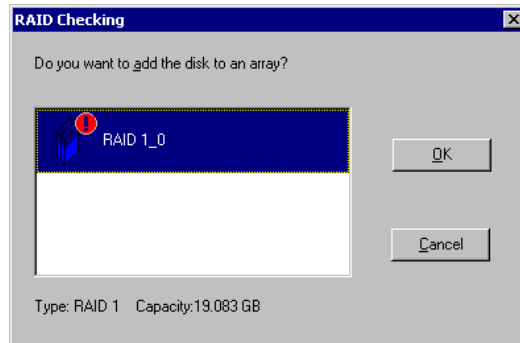
Just select the broken array, then click OK and confirm the follow-up data loss warning message box to finish the rebuilding of the selected broken RAID 1 array. After rebuilding, the new array will be automatically duplicated to rebuid the lost data.

(2) Hot swapping a hard disk to rebuild broken RAID 1 or RAID 0/1 array

Follow these steps to rebuild by this way:

Hot swap on a good hard disk(user may need to hot swap off the failed disk first), then within the ATA RAID software click Management --> Refresh tab to refresh the devices connected. After refreshing, the ATA RAID software will find new disk plugged, see below:

Just click OK, the following window will popup to prompt user whether to use this newly plugged disk to rebuild the broken array, see below:
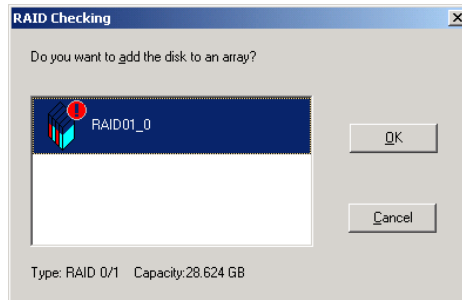
Just select the broken array, then click OK and confirm the follow-up data loss warning message box to finish the rebuilding of the selected broken array. After rebuilding, the new array will be automatically duplicated to rebuild the lost data.

(3) Power off the computer and connect a new hard disk, then power on and boot into BIOS or ATA RAID software to rebuild.

Warning:

1. In order to avoid possible damage to hard disk or the computer when manually unplugging or plugging a hard disk while computer is powered, please use hard disk hot swapping mobile rack for plugging or unplugging.

2. Data on the hard disk used to rebuild the broken array will be all destroyed.

HighPoint

Chapter 5
Trouble Shooting

This chapter will list the most possibly occurred problem and most frequently asked question, and their corresponding solution. Please refer this chapter when you encounter a problem or do not know what to do when using our product.

HighPoint

1. The adapter can not be recognized by the computer after plugged into PCI slot.

If user can find the following information on the screen when starting computer, it indicates that the adapter has been recognized successfully.

```
HighPoint Technologies, Inc. HPT372/372A BIOS Setting Utility v2.1
(c) 1999-2001. HighPoint Technologies, Inc. All rights reserved

Press <Ctrl><H> to run BIOS Setting Utility
Scan Devices. Please wait ...
```

If the above information does not appear, it indicates that the adapter is not recognized by the system. Then you should open the computer chassis and check the following points:

1. Whether the adapter has been correctly and steadily plugged into the PCI slot on the motherboard.
2. If necessary, try to use another PCI slot.

After checked the above points, replace the computer case and power on the computer.

2. The hard disk connected to adapter can not be detected out.

After the RocketRAID 133 adapter is recognized, the adapter's BIOS will start to scan disks connected to the adapter, the information will display as below:

```
HighPoint Technologies, Inc. HPT372/372A BIOS Setting Utility v2.1
(c) 1999-2001. HighPoint Technologies, Inc. All rights reserved

Press <Ctrl><H> to run BIOS Setting Utility
Scan Devices. Please wait ...
Primary Master:   Maxtor 5T020H2
Primary Slave:    ST320414A
Secondary Master: Maxtor 5T020H2
Secondary Slave:  MAXTOR 6L040J2
```

Please pay attention to the hard disks listed on the screen, if all connected disks are correctly detected out, it indicates that these hard disks are well connected and recognized by the computer.

If some hard disks are not recognized out, you should open the computer chassis and check the following points:

1. Whether the power supply connector has been well plugged. If necessary, try to use another connector.
2. Whether the cable has been well connected. If necessary, try to use another cable.

3. If there are two devices connected to one cable, check the jumper setting to ensure no conflict exists. (The two devices connected to one cable must be configured one as master and the other as slave)

After checked the above points, please replace the cover of computer chassis and power on the computer.

3. Hard disk mode is not correctly recognized.

ATA 66/100/133 hard disks require special IDE cable. If user use a wrong cable, then hard disk mode will be set to a lower level. The solution is change a proper IDE cable for the hard disks.

4. Cannot boot from the OS installed on the device drive, which attached to the adapter.

In order to boot from disk or disk array connected to adapter, usually you should do the following things:

1. Set SCSI device as the fisrt booting device in main board BIOS;
2. Set a booting device in RocketRAID 133 adapter BIOS (refer Chapter 3 on how to set a boot device);

5. What to do if an array is broken?

If an array is broken, user may first power off the computer and check the power and cable connection between adapter and hard disk (if necessary, please change a new cable and power connector) and then power on the computer again. These measures may bring the broken array back to normal if the broken is caused by the connection problem.

If the above measures do not work, then the reason of broken most likely is hard disk's not function. For RAID 1 or 0/1 array, user can use a new hard disk to rebuild the broken RAID 1 or 0/1 array, data will not lost. For RAID 0 or JBOD array, user has to delete the array, and all data on that array will lost. So please always backup the important data stored on a RAID 0 or JBOD array.

Appendix A
Glossary

Array

Also known as Disk Array, two or more hard disks combined together to appear as a single device to the host computer.

Broken Array

Disk array with a member disk failed. A broken RAID 1 or 0/1 array can still function with the remained normal disks, but a broken RAID 0 or JBOD will no longer function.

Critical

A RAID 1 or 0/1 array can be in critical status, that means the array may have inconsistency between user data and backup data due to some reasons, and need duplicate operation to make the backup data consist with the user data.

Duplicate

The operation of duplicating user data to generate backup data within a RAID 1 or 0/1 array. Also known as Synchronize.

Hot Swap

The ability to remove a failed member of a redundant disk array and replace it with a good disk, then repairing the error redundant disk array without turning down the computer and interrupting user's work.

Mirroring

Known as RAID 1, which provides data protection by real-time and automatic duplicating all data from a source disk to a mirror disk.

RAID

Redundant Array of Independent Disks, it is a method of combining several hard disks (physical disks) into one logical unit (logical disk), thus providing higher performance and data redundancy.

RAID Levels

RAID levels refer to different array architectures (or methods of organizing a disk array). Different RAID levels represent different performance level, security level and cost.

RAID 0/1

Mirroring of two striped disk arrays. It is the combination of RAID 0 and RAID 1.

Rebuild

The ability to use a new disk to replace the failed disk in a redundant disk array (say mirror array or 0/1 array), then to repair the broken disk array and recover all the data on that failed disk.

Spare Disk

A spare hard disk which can automatically be used to replace the failed member of a redundant disk array and then automatically recover the redundant disk array without intervention.

Spare Pool

Logically the place where spare disks stay. When a disk is added into the spare pool, it will become a spare disk.

Striping

Known as RAID 0, spread data over multiple disks to improve performance. It does not provide data protection.

Synchronize

Same as Duplicate.

Appendix B
Contact Technical Support

If you have any problems and questions when using our products, you may get help from the following ways:·
- Read this manual carefully;
- Visit our website: www.highpoint-tech.com We will post the most updated materials and FAQs onto our website.

If you still can not solve the problem after tried the above two ways, please contact our technical support: support@highpoint-tech.com
Our technical support will respond your question quickly with the proper answer!

Thank you for choosing our products!