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Hot Rod 100 Pro User's Manual

Index

Chapter 1. The Introduction of Hot Rod 100 Pro Features

1-1.   Features of This IDE RAID Controller Card

This IDE RAID controller card provides two IDE hard drive connectors that support the latest Ultra ATA/100 (Also known as Ultra DMA/100) hard drives with the data transfer rate of 100MB/sec. It is also backward compatible with Ultra ATA/66, Ultra ATA/33, Enhanced IDE, and Fast ATA-2. Each IDE connector supports a master/slave combination of any IDE device, including IDE, EIDE and Ultra-ATA standards.

The Hot Rod 100 Pro includes EZRAID for boosting disk performance and data protection. The EZRAID function supports Striping (RAID 0), Mirroring (RAID 1), or Striping/Mirroring (RAID 0+1) operation. For Striping operation, the identical drives can read and write data in parallel to increase performance. The Mirroring operation increases read performance through load balancing and elevator sorting while creating a complete backup of your files. Striping with Mirroring operation offers both high read/write performance and fault tolerance. The EZRAID function of the Hot Rod 100 Pro offers quick and easy installation and configuration.

1-2. Specifications

1. Chipset

- HPT370 Ultra DMA 100 IDE controller

2. BUS

- PCI

3. Specification

- Ultra DMA 100MB/sec data transfer rate
- RAID 0 (stripping mode for boosting performance)
- RAID 1 (mirroring mode for data security)
- RAID 0 + 1 (stripping and mirroring)
- Two independent ATA channels
- 256 Byte FIFO per ATA channels
- Compliant with Plug & Play
- Up to 4 IDE devices supported

4. Drive Modes Support

- Ultra 5/4/3/2/1/0
- PIO 4/3/2/1/0
- DMA 2/1/0

5. BIOS Support

- Friendly UI for RAID functions settings
- Auto detects and supports Ultra Mode(ATA/EIDE) transfers
- Recognizes drives up to 128 GB

6. Operating System Supports

- Microsoft DOS 5.X and above
- Microsoft Windows 95/98
- Microsoft Windows 2000
- Microsoft Windows NT4.0
- ABIT Gentus 2.0 or later version (Linux)

Table 1-1: Hot Rod 100 Pro specifications

Bus:	PCI
Drive Transfer Rate:	100MB/sec burst w/Ultra ATA/100 devices
Number of Supporting Drives:	4
Drive Modes:	Ultra DMA mode 5/4/3/2/1/0 DMA mode 2/1/0 PIO mode 4/3/2/1/0
Devices:	ATAPI Hard Drives
Operating Systems:	Microsoft DOS 5.X and above Microsoft Windows 95/98 Microsoft Windows 2000 Microsoft Windows NT4.0 ABIT Gentus 2.0 (Linux)
BIOS:	1MB Flash ROM Auto ID/Configure Max. Storage: 128GB Supports ACPI function
Hardware:	Bus mastering Triple data channels (all DMA 33/66/100)
Utilities:	ABIT Vivid Installation

1-3. Layout Diagram
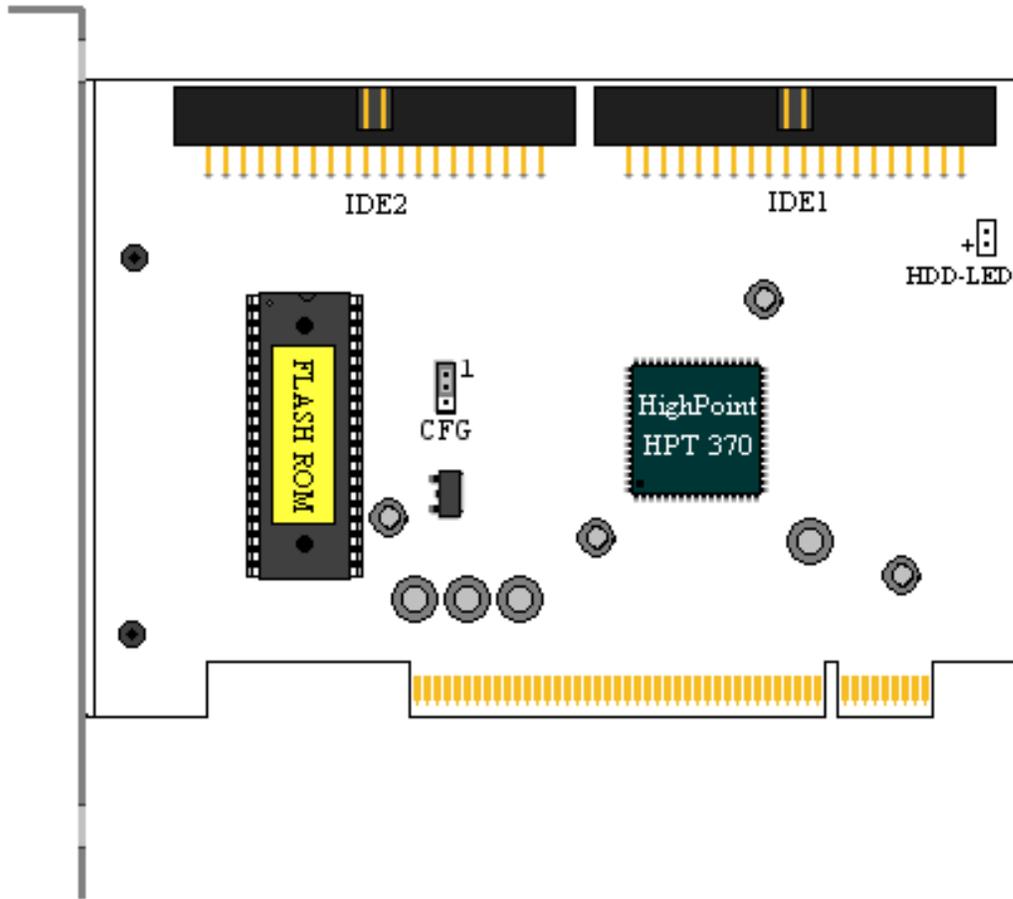
Figure 2-1: Hot Rod 100 Pro controller card component locations

1-4.   Introduction of Ultra ATA/100

Ultra ATA/100 enhances existing Ultra ATA/66 technology by increasing both performance and data integrity. This new high-speed interface enhances the Ultra ATA/66 and Ultra/33 burst data transfer rate to 100 Mbytes/sec. The result is maximum disc performance using the current PCI local bus environment. Figure 2-2 shows you the difference between the Ultra ATA/33 and Ultra ATA/66 Cable.
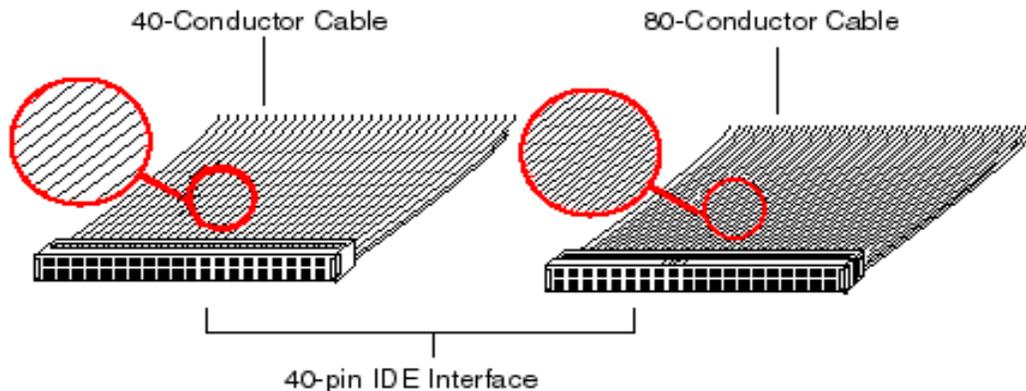
Figure 2-2: The difference between Ultra ATA/33 and Ultra ATA/66 Conductor Cables

In order to achieve the Ultra ATA100 transfer speed you must have a system which supports Ultra ATA/100 and equipped with, an Ultra ATA HDD, and Ultra ATA/66 cable. The correct drivers must be loaded and an Ultra ATA/66 specific data cable must be used.

The Ultra ATA/66 cables use a Cable Select method rather than a Master / Slave scheme. The drive must be jumped to enable Cable Select. The Boot drive (C:) is attached to the connector on the end of the cable and the second drive is attached to the middle connector. If an Ultra ATA/66 specific cable is not used, the drive will default to Ultra ATA/33 mode.

Figure 2-3 shows you a photo of an Ultra ATA/66 Conductor Cable. An Ultra ATA/66 cable is a 40-pin, 80-conductor cable with a black connector on one end, a blue connector on the other end and a gray connector in the middle. The additional 40 wires are ground lines that reduce the crosstalk caused by the electro-magnetic fields that build up during high-speed data transfers. In addition, line 34 on the cable should be notched or cut (this may be difficult to see).

Figure 2-3: Photo of an Ultra ATA/66 Cable

Ultra ATA/100 is backwards compatible with all Ultra ATA/33/66 systems, but it will be limited in its transfer mode to Ultra ATA/33/66 (Ultra DMA Mode 2 - 33 Mbytes/sec or Ultra DMA Mode 2 - 66 Mbytes/sec) or PIO Mode 4 (16.6 Mbytes/sec). The Ultra ATA/100 hard drives are 100 percent backward compatible with both Ultra ATA/33/66, DMA and with existing ATA (IDE) hard drives, CD-ROM drives, and host systems. The Ultra ATA/100 protocol and commands are designed to be compatible with existing ATA (IDE) devices and systems. Although a new 40-pin, 80-conductor cable is required for Ultra ATA/100, the chip set pin connector remains the same at 40. Hard drives that support Ultra ATA/100 also support Ultra ATA/33/66 and legacy ATA (IDE) specifications.

1-5.   Requirements for Attaining Ultra ATA/100

There are four requirements for attaining Ultra ATA/100:

1. The drive must support Ultra ATA/100.

2. The motherboard and system BIOS (or an add-in controller) must support Ultra ATA/100.

3. The operating system must support Direct Memory Access (DMA); Microsoft Windows 2000, Windows NT, Windows 98, and Windows 95B (OSR2) support DMA.

4. The cable must be 80-conductor; the length should not exceed 18 inches.

If all the above requirements are met, you can enjoy the Ultra ATA/100 features of your computer system.

Note

For obtaining the performance of Hot Rod 100 Pro, please use the Ultra ATA/66 cable that comes with the package.

Chapter 2. Hardware Installation

This IDE RAID controller card is as easy to install as any other computer peripheral. It uses the Plug & Play design concept. First, plug this controller card into any PCI slot on your motherboard. Second, connect the Ultra ATA/100 devices to its IDE connectors using the included Ultra ATA/66 cables.

2-1. Installing the Hot Rod 100 Pro

Installing this controller card into your computer is a simple process. You just have to insert the card into any available PCI slot on the motherboard (see figure below).

➡ Open your computer case.
➡ Remove the inside slot cover of an available PCI slot on the motherboard.
➡ Insert this controller card into the open slot.
➡ Fasten the controller card bracket to the case.
➡ Attach the two-threaded IDE HDD LED connector of the computer case to HDD-LED connector on this controller card. (Note: Watch out the pin orientation.)
➡ Connect the Ultra ATA/100 HDD to the IDE connectors on this controller card.
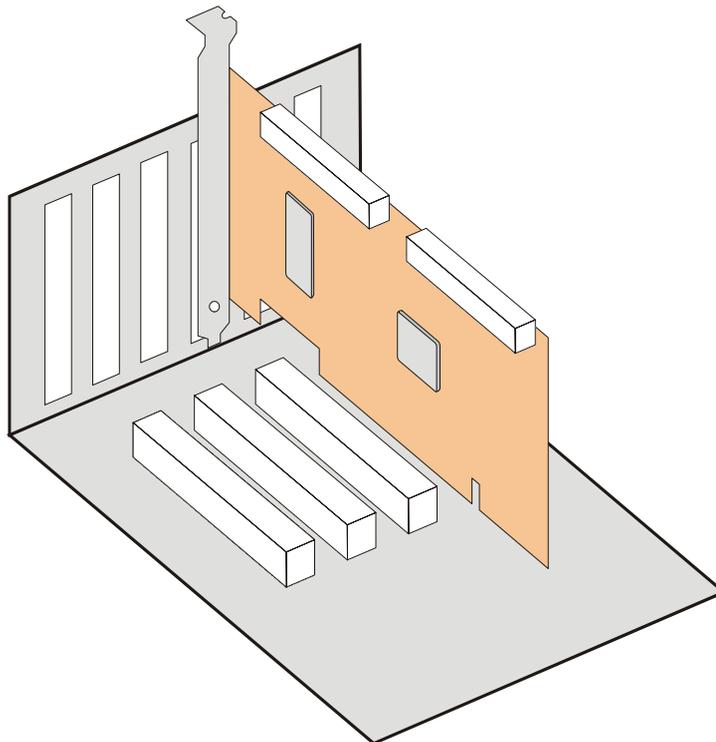
Figure 2-1: The installation of the Hot Rod 100 Pro controller card

2-2. Connecting Hard Drives

This IDE RAID controller card provides two IDE hard drive connectors that support Ultra ATA/100 (Also known as Ultra DMA/100) specification.

How to install the Ultra ATA/66 Cable Assembly:
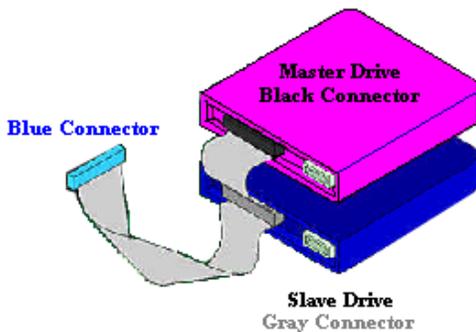
Figure 2-2. How to connect an ATA/66 Cable to this IDE RAID controller

■ Connect the **BLUE** connector of the first Ultra ATA/66 cable to the IDE1 connector on this IDE RAID controller card. (Note that the colored cable edge indicates Pin # 1.)

■ Connect the **BLACK** connector of this Ultra ATA/66 cable to the Master Drive.

■ Connect the **GRAY** connector of this Ultra ATA/66 cable to the Slave Drive (if you are using more than two hard drives).

■ For the second Ultra ATA/66 cable connection, please follow the previous procedure.

■ Each connector on the Ultra ATA/66 cable assembly has a small polarization tab centrally located on the body of the plastic. This fits into the matching slot on the mating plugs on this IDE RAID controller card and the drives, thus assuring positive mating (pin #1 to pin #1). Please refer to figure 2-2.

■ When two hard drives are attached, configure each drive as a Master (with no Slave attached) and each hard drive on a separate channel. Check the hard drive setup for details on Master and Slave settings as shown in table 2-1. For better performance, use all available connectors before chaining a slave drive.

Table 2-1: Hot Rod 100 Pro Hard Drive Setup

Total Drives	IDE 1	IDE 2
1	Master	---
2	Master	Master
3	Master and Slave	Master
4	Master and Slave	Master and Slave

■ For optimal performance, install all identical drives of the same model and capacity. The drives' matched performance allows the array to the function better as a single drive.

■ For maximum IDE fault tolerance, each mirrored pair should be installed on separate IDE connectors.

Connecting hard drives with onboard ATAPI CD-ROM:

ATAPI CD-ROM

Bootable   Secondary
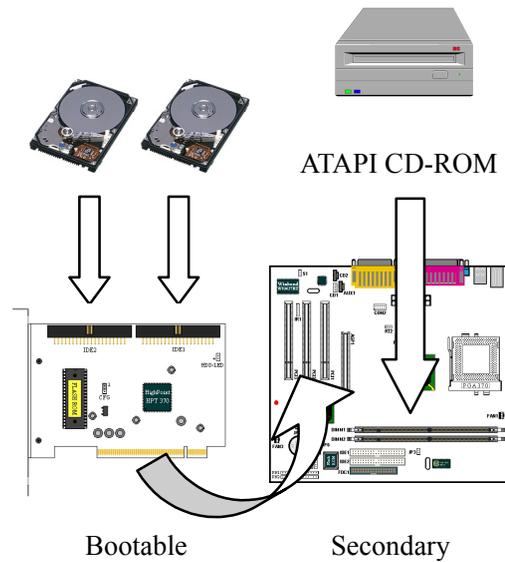
Please **DO NOT** attach ATAPI devices to this IDE RAID controller card. Hot Rod 100 Pro is for hard drives only.

ATAPI IDE CD-ROM drives or other devices can be installed on motherboard or add-on IDE controllers. No configuration is necessary on the motherboard BIOS setup.

Connecting hard drives with onboard IDE controller:

Secondary   Bootable
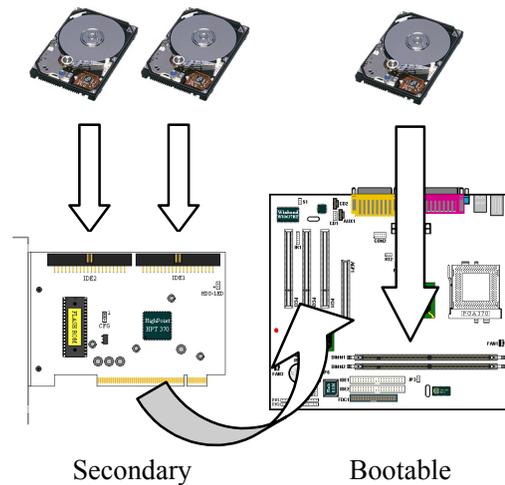
This IDE RAID controller card can coexist with onboard or add-on IDE controller(s) and hard drives installed.

If the motherboard's CMOS has a "boot to SCSI" option, it is possible to boot from this IDE RAID controller card and still recognize the onboard non-bootable drives.

If the motherboard's CMOS does not allow booting to SCSI, the boot drive must be attached on the onboard IDE controller.

Connecting hard drives with SCSI controller:
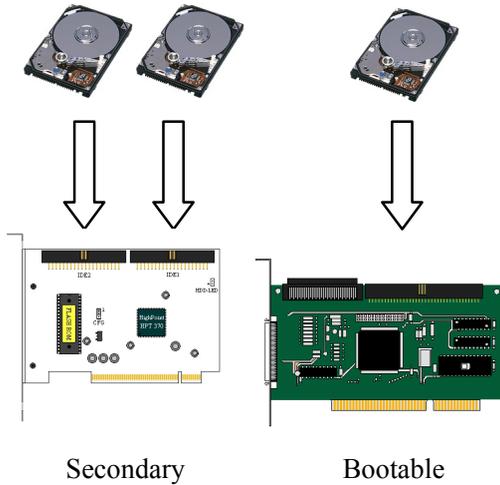
This IDE RAID controller card is bootable with a SCSI controller in the system. The adapter with the lower BIOS address will be bootable. If it is necessary to change the boot sequence, swap the Hot Rod 100 Pro slot position with that of SCSI card's PCI slot.

Secondary   Bootable

Chapter 3. BIOS Setting Utility

In this chapter we will discuss the BIOS setting procedure of this IDE RAID controller card before starting the software installation.

3-1. Set Motherboard CMOS Setup

No changes are necessary in the motherboard CMOS setup for resources or drive types. As this IDE RAID controller card is a PCI Plug and Play device, the motherboard's PCI PnP BIOS automatically assigns the Interrupt and Port address. For this IDE RAID controller card to be the bootable IDE controller, confirm in the motherboard's Standard CMOS Setup that the drive types (for hard disk drives) are set for "Not Installed" or "None". Or use the "Boot to SCSI" option, if this setting is available in the motherboard's BIOS. No changes are needed for CD-ROM drives that are attached to the motherboard IDE controller.

3-2. Enter the BIOS Setting Menu

After you have installed this IDE RAID controller card and attached the hard disks, reboot your system. Press <*CTRL*> and <*H*> key while booting up the system to enter the BIOS setting menu. The main menu of BIOS Setting Utility appears as shown below:

```
                   HPT3xx   <BIOS Setting Utility>
 ┌Menu──────────────────────────────┐  ┌Help───────────────────────────┐
 │ 1. Create RAID                    │  │ Create a RAID Array with the  │
 │ 2. Delete RAID                    │  │ hard disks attached to the    │
 │ 3. Duplicate Mirror Disk          │  │ HPT3xx                        │
 │ 4. Create Spare Disk              │  │                               │
 │ 5. Remove Spare Disk              │  │                               │
 │ 6. Set Drive Mode                 │  │                               │
 │ 7. Select Boot Disk               │  │                               │
 │                                   │  │ F1:    View Array Status      │
 │                                   │  │ ↑,↓:   Move to next item      │
 │                                   │  │ Enter: Confirm the selection  │
 │                                   │  │ Esc:   Return to top menu     │
 └───────────────────────────────────┘  └───────────────────────────────┘
 ┌Channel Status─────────────────────────────────────────────────────────┐
 │     Channel            Drive Name            Mode  Size(M)    Status    │
 │                                                                         │
 │  Primary Master    QUANTUM FIREBALL CR4.3    UDMA4   4209      HDD0     │
 │  Primary Slave     No Drive                                             │
 │  Secondary Master  QUANTUM FIREBALL CR4.3            4209      HDD1     │
 │  Secondary Slave   No Drive                                             │
 │                                                                         │
 │                                                                         │
 │                                                                         │
 │  (C)1999-2000. HighPoint Technologies, Inc.                             │
 │     All rights reserved                                                 │
 └─────────────────────────────────────────────────────────────────────────┘
```
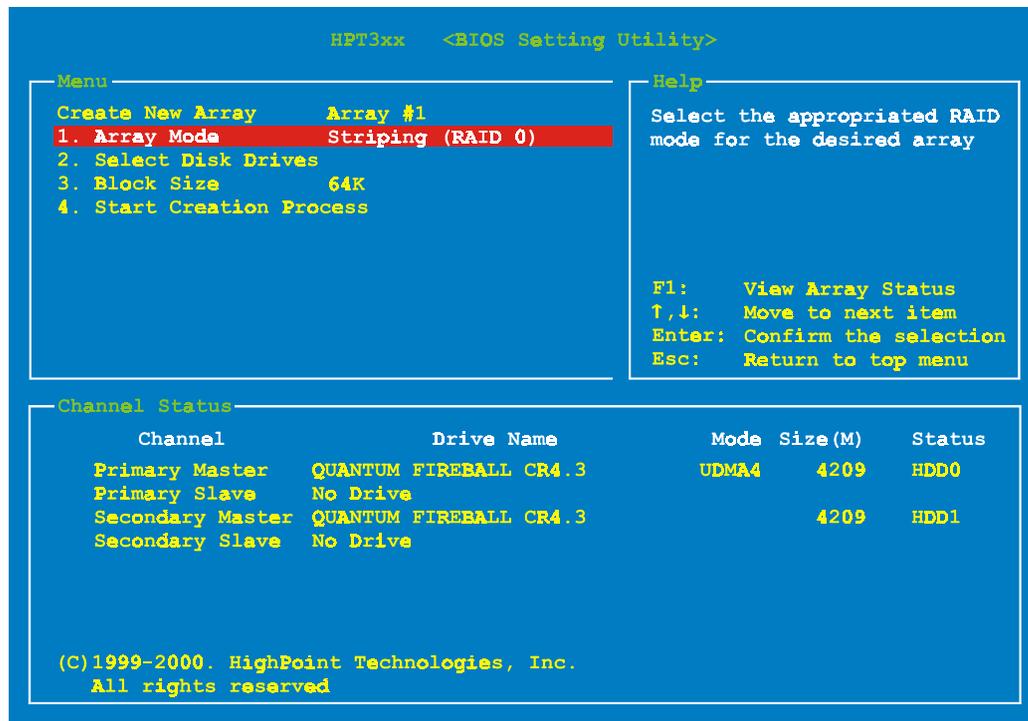
For selecting the options in the menu, you may:

● Press **F1** to view array status.

● Press ↑ ↓ (up, down arrow) to choose the option you want to confirm or to modify.

● Press **Enter** to confirm the selection.

● Press **Esc** to return to the top menu.

3-3.   Create RAID

This item allows you to create a RAID array with the hard disks attached to this IDE RAID controller card.

After you have selected the function you want in the main menu, press the <Enter> key to enter the sub menu as shown below:

```
                    HPT3xx   <BIOS Setting Utility>
┌Menu─────────────────────────────────┐  ┌Help─────────────────────────┐
│ Create New Array     Array #1        │  │ Select the appropriated RAID│
│ 1. Array Mode        Striping (RAID 0)│  │ mode for the desired array  │
│ 2. Select Disk Drives                │  │                             │
│ 3. Block Size        64K             │  │                             │
│ 4. Start Creation Process            │  │                             │
│                                      │  │ F1:    View Array Status    │
│                                      │  │ ↑,↓:   Move to next item    │
│                                      │  │ Enter: Confirm the selection│
│                                      │  │ Esc:   Return to top menu   │
└──────────────────────────────────────┘  └─────────────────────────────┘
┌Channel Status──────────────────────────────────────────────────────────┐
│     Channel            Drive Name          Mode  Size(M)    Status       │
│  Primary Master   QUANTUM FIREBALL CR4.3   UDMA4   4209      HDD0        │
│  Primary Slave    No Drive                                              │
│  Secondary Master QUANTUM FIREBALL CR4.3           4209      HDD1        │
│  Secondary Slave  No Drive                                              │
│                                                                         │
│  (C)1999-2000. HighPoint Technologies, Inc.                             │
│     All rights reserved                                                 │
└──────────────────────────────────────────────────────────────────────┘
```

Warning
All the data stored in the hard disks will be lost after created RAID!

Array Mode:

This item allows you to select the appropriate RAID mode for the desired array. There are four modes to choose.

- ⇒ *Striping (RAID 0):*
  This item is recommended for high performance usage. Requires at least 2 disks.

- ⇒ *Mirror (RAID 1):*
  This item is recommended for data security usage. Requires at least 2 disks.

- ⇒ *Striping and Mirror (RAID 0+1):*
  This item is recommended for data security and high performance usage. Allows Mirroring with a Strip Array. Requires 4 disks only.

- ⇒ *Span (JBOD):*
  This item is recommended for high capacity without redundancy or performance features usage. Requires at least 2 disks.

Select Disk Drives:

This item allows you to select the disk drives to be used with the RAID array.

Block Size:

This item allows you to select the block size of the RAID array. There are five options: 4K, 8K, 16K, 32K, and 64K.

Start Creation Process:

After you have made your selection, choose this item and press <Enter> to start creation.

3-4. Delete RAID

This item allows you to remove a RAID Array on this IDE RAID controller card.

Note: After you have made and confirmed this selection, all the data stored in the hard disk will be lost. (The entire partition configuration will be deleted too.)

3-5. Duplicate Mirror Disk

This item allows you to select the disk you wish to duplicate in preparation for a "Mirror Disk Array".

After you had selected the function you want in the main menu, press the <Enter> key to enter the sub menu as shown below:

```
                    HPT3xx   <BIOS Setting Utility>
 ┌Menu──────────────────────────────────┐  ┌Help────────────────────────┐
 │ 1. Select Source Disk: None          │  │ Select the Source Disk.    │
 │ 2. Select Target Disk: None          │  │ The Source Disk Size must be│
 │ 3. Start Duplication Process         │  │ smaller or equal to the    │
 │                                      │  │ Target Disk Size           │
 │                                      │  │                            │
 │                                      │  │                            │
 │                                      │  │ F1:    View Array Status   │
 │                                      │  │ ↑,↓:   Move to next item   │
 │                                      │  │ Enter: Confirm the selection│
 │                                      │  │ Esc:   Return to top menu  │
 └──────────────────────────────────────┘  └────────────────────────────┘
 ┌Channel Status──────────────────────────────────────────────────────────┐
 │      Channel            Drive Name          Mode  Size(M)    Status      │
 │   Primary Master    QUANTUM FIREBALL CR4.3  UDMA4   4209     HDD0        │
 │   Primary Slave     No Drive                                            │
 │   Secondary Master  QUANTUM FIREBALL CR4.3          4209     HDD1        │
 │   Secondary Slave   No Drive                                            │
 │                                                                         │
 │                                                                         │
 │   (C)1999-2000. HighPoint Technologies, Inc.                            │
 │      All rights reserved                                                │
 └─────────────────────────────────────────────────────────────────────────┘
```

⇒ *Select Source Disk:*

This item is to select the source disk. **The size of the source disk must be smaller or equal to the one of the target disk.**

⇒ *Select Target Disk:*

This item is to select the target disk. The size of target disk must be greater or equal to the one of the source disk.

⇒ *Start Duplicating Process:*

After you had selected this item, the BIOS setting will take up to 30 minutes to run the duplication. Please wait or you may press <Esc> to cancel.

3-6.   Create Spare Disk

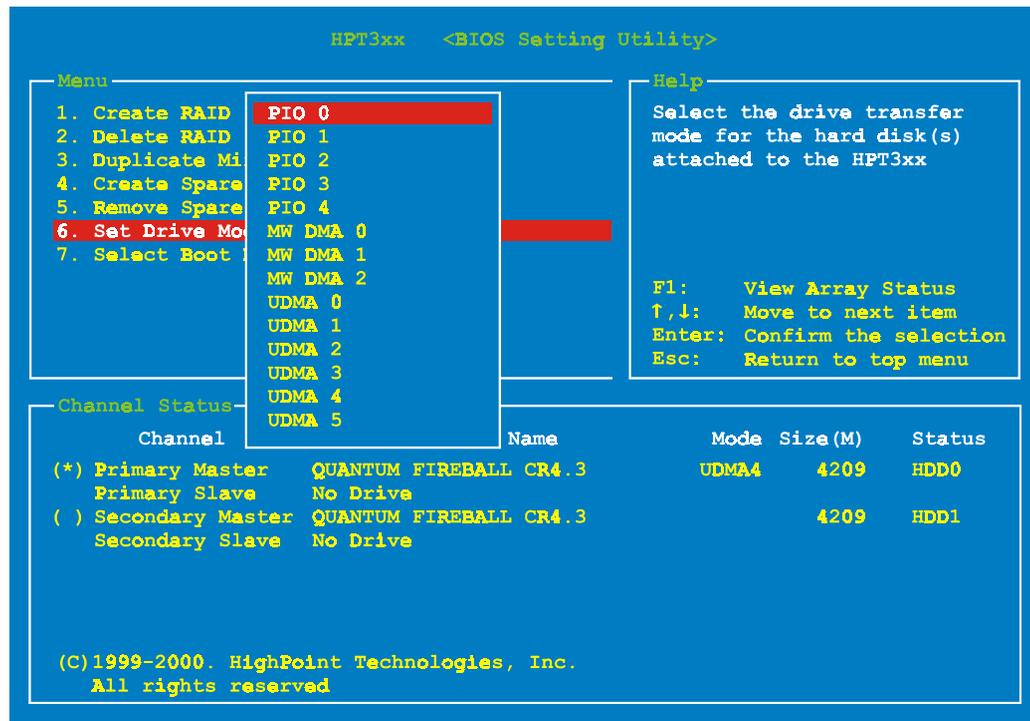This item allows you to select the disk to be used as a spare for a Mirror Disk Array.

3-7.   Remove Spare Disk

This item allows you to remove the spare disk from a Mirror Disk Array.
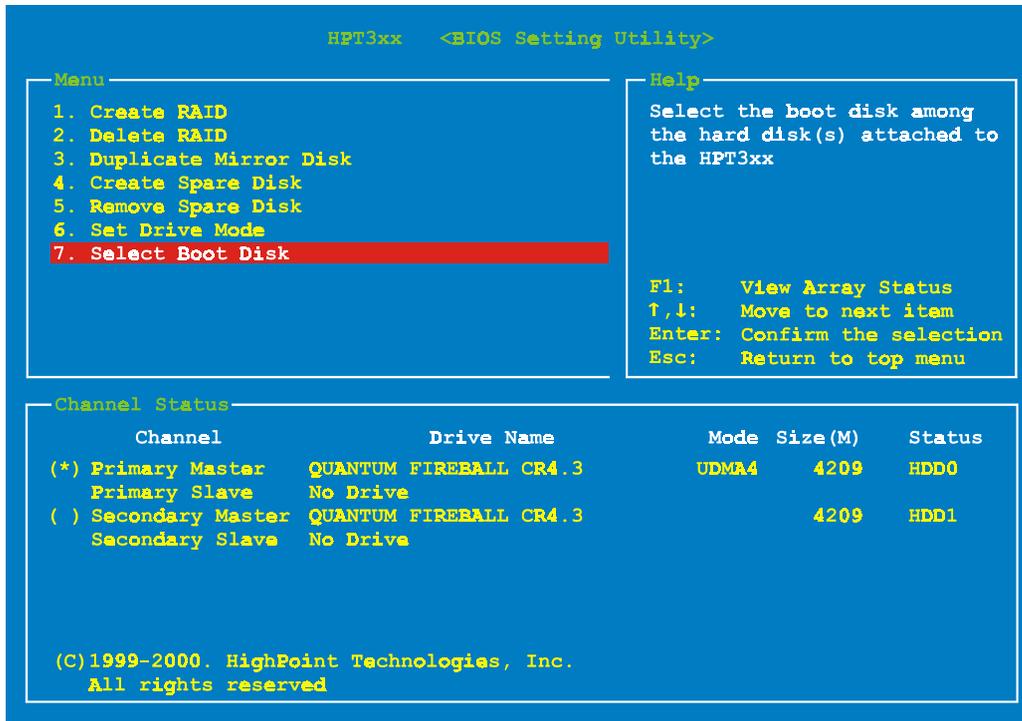
3-8.   Set Drive Mode

This item allows you to select the drive transfer mode for the hard disk(s) attached to this IDE RAID controller card.

Use the up/down arrow to select the menu option to "Set Drive Mode" and press <Enter>. In the Channel Status, select the channel you would like to set and press the <Enter> key. There will be an asterisk mark in the parentheses indicating that the channel selection has been done. Choose the mode from the pop-up menu. You can choose from PIO 0 ~ 4, MW DMA 0 ~ 2, and UDMA 0 ~ 5.

3-9. Select Boot Disk

This item allows you to select the boot disk among the hard disk(s) attached to this IDE RAID controller card.

```
              HPT3xx   <BIOS Setting Utility>
 ┌Menu──────────────────────────────┐  ┌Help──────────────────────┐
 │  1. Create RAID                   │  │ Select the boot disk among│
 │  2. Delete RAID                   │  │ the hard disk(s) attached to│
 │  3. Duplicate Mirror Disk         │  │ the HPT3xx                │
 │  4. Create Spare Disk             │  │                           │
 │  5. Remove Spare Disk             │  │                           │
 │  6. Set Drive Mode                │  │                           │
 │  7. Select Boot Disk              │  │                           │
 │                                   │  │ F1:    View Array Status  │
 │                                   │  │ ↑,↓:   Move to next item  │
 │                                   │  │ Enter: Confirm the selection│
 │                                   │  │ Esc:   Return to top menu │
 └───────────────────────────────────┘  └──────────────────────────┘
 ┌Channel Status─────────────────────────────────────────────────────┐
 │      Channel            Drive Name         Mode  Size(M)    Status  │
 │ (*) Primary Master   QUANTUM FIREBALL CR4.3  UDMA4  4209    HDD0    │
 │     Primary Slave    No Drive                                       │
 │ ( ) Secondary Master QUANTUM FIREBALL CR4.3         4209    HDD1    │
 │     Secondary Slave  No Drive                                       │
 │                                                                     │
 │                                                                     │
 │  (C)1999-2000. HighPoint Technologies, Inc.                         │
 │     All rights reserved                                             │
 └─────────────────────────────────────────────────────────────────────┘
```

Use the up/down arrow to select the menu option to "Select Boot Disk" and press <Enter>. In the Channel Status, select the channel you would like to set as the bootable disk and press the <Enter> key. There will be an asterisk mark in the parentheses indicating that the channel selection has been done. **Note: Your PC or server must be configured to use the Hot Rod 100 Pro as the bootable controller. The system will then use the bootable array as the (fixed) boot C: drive.**

Chapter 4. Software Installation

In this chapter we will show you the driver installation procedure under various operating systems.

4-1. DOS Installation

This IDE RAID card BIOS supports DOS 5.x (or above) and Windows 3.1x without software driver.

4-2. Windows 9x Installation
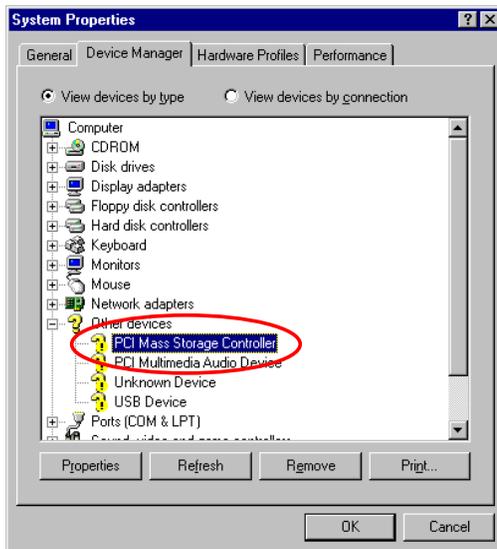
Step 1: After the Windows 9x operating system had been installed and rebooted successfully, go to the "Control Panel" ➜ "System Properties" ➜ "Device Manager". You can see the driver is not yet installed, and there is a device of "? PCI Mass Storage Controller" under "Other devices".
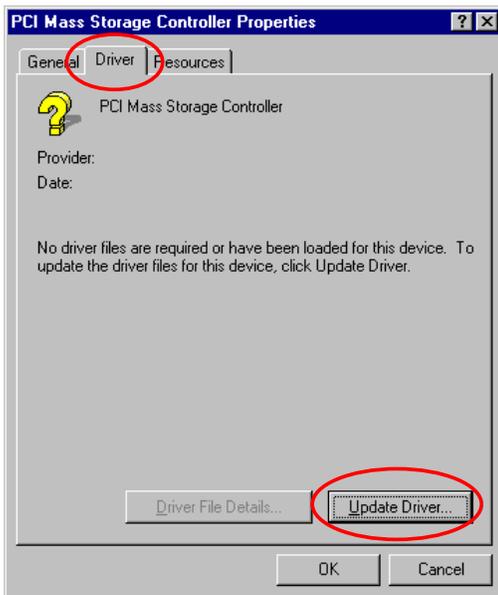
Step 2: Click the right button of your mouse on the "? PCI Mass Storage Controller", and then go to "Driver" tab. Click "Update Driver" to go to the next step.

Step 3: The wizard is going to install the PCI Mass Storage Controller. Click "Next >" to go to the next step.
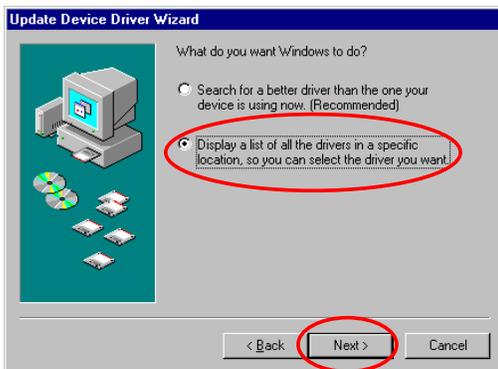
Step 4: Choose "Display a list of all the drivers in a specific location…" and click "Next >" to go on.
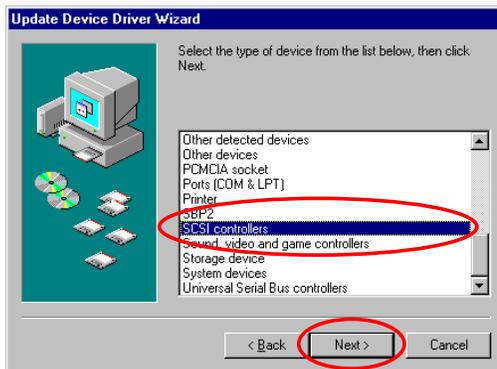
Step 5: Choose "SCSI controllers" and click "Next >" to go on.
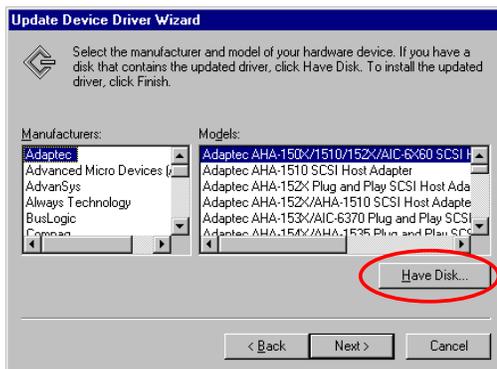
Step 6: Click "Have Disk…" to go on.
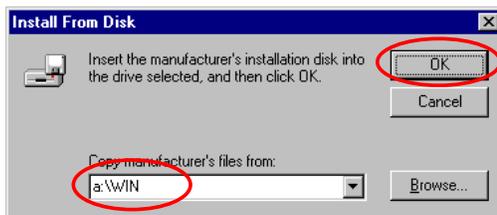
Step 7: Insert the driver disk that comes with the Hot Rod 100 Pro and type the path in the text box "a:\WIN" ("a:\" is your floppy drive letter), or "E:\Drivers\Win9x" (E:\ is your CD-ROM drive letter).

Click "OK" to go on.
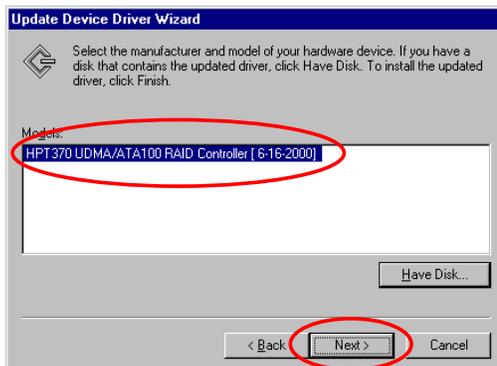
Step 8: Choose "HPT370 UDMA/ATA100 RAID Controller" and click "Next >" to go on.

Step 9: Windows is now ready to install the driver. Click "<u>N</u>ext >" to go on.

Step 10: Windows has finished installing the driver. Click "Finish" to end the installation.
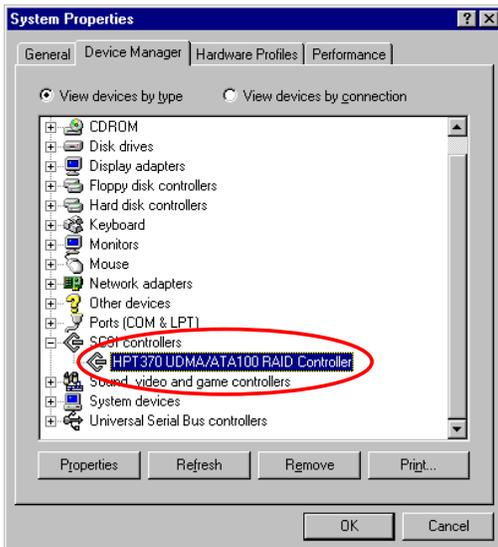
Step 11: After rebooting the system, go to the "Control Panel" ➔ "System Properties" ➔ "Device Manager". Now you can see the driver is installed under the item of "SCSI controllers".

4-3. Windows NT 4.0 Installation

Note

- Before you start to install Windows NT 4.0, you have to create a driver disk for the Hot Rod 100 Pro. You can copy the Ultra ATA/100 (Hot Rod 100) driver files from the CD-Title that comes with this controller card. The path for the Ultra DMA/100 driver files is "E:\drivers\winnt (E is your CD-ROM drive letter)."

- Please note two things before you copy the driver files to diskette. First, the driver files must be copied to the root directory of the diskette. Second, you have to set your system to "Show all files". Otherwise you will be unable to copy some important system files to diskette.

Installing drivers during Windows NT installation:

If the NT 4.0 is first installed on the ATA100 drive connected to the Hot Rod 100 Pro controller card, follow the following installation procedure:

Step 1: Install this IDE RAID controller card in any available PCI slot and then connect your ATA100 hard disk to it (refer to hardware installation).

Step 2: Set your system to boot from "**Drive A**" and then insert the Windows NT installation diskette 1/3. Power on your computer.

Installation Note

If you are installing NT 4.0 from a CD-ROM, please **press the "F6" key** immediately when the message "**Setup is inspecting your computer's hardware configuration…**" appears. Then press "**S**" to configure an additional adapter (Hot Rod 100 Pro).
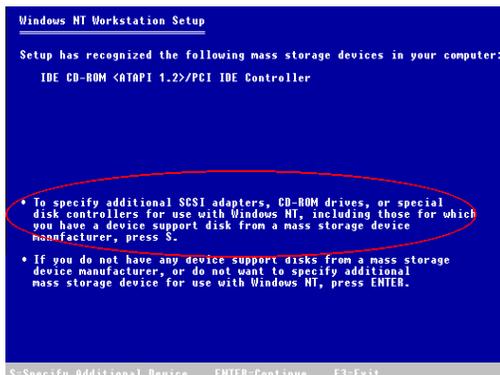
Step 1: The setup program will display a message about installing mass storage devices (see figure left) while you install NT4.0. Please press "**S**" to install Hot Rod 100 Pro driver.
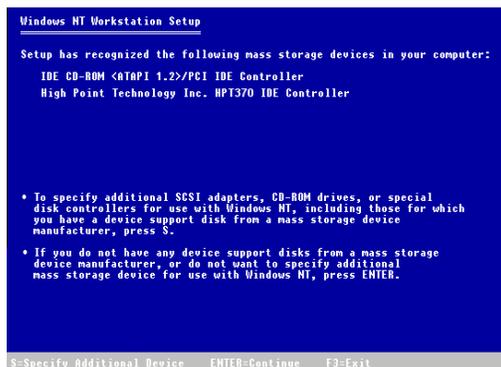
Windows NT Workstation Setup

You have asked to specify an additional SCSI adatper, CD-ROM drive, or special disk controller for use with windows NT

• To selec a mass storage device from the following list use the UP or DOWN ARROW key to move the highlight to the mass storage device you want, and then press ENTER.

• To return to the previous screen without specifying an additional mass storage device for use with Windows NT, press ESC.

⟨More↑⟩

Other, requires disk provided by a hardware manufacturer

ENTER=Select   F3=Exit   ESC=Cancel

Step 2: Select "Other, requires disk provided by a hardware manufacturer", and then press <ENTER>.

Windows NT Workstation Setup

Please insert the disk labeled

Manufacturer-supplied hardware support disk

into drive A:

• Press ENTER when ready

F3=Exit   ENTER=Continue   ESC=Cancel
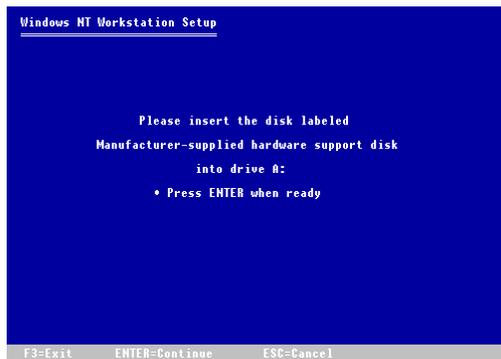
Step 3: Insert the driver disk into drive A and press <ENTER>.

Windows NT Workstation Setup

You have chosen to install a SCSI adapter, CD-ROM drive, or special disk controller provided by a hardware manufacturer.

• To selec a mass storage device from the following list use the UP or DOWN ARROW key to move the highlight to the mass storage device you want, and then press ENTER.

• To return to the previous screen without specifying an additional mass storage device for use with Windows NT, press ESC.

High Point Technology Inc. HPT370 IDE Controller

ENTER=Select   ESC=Cancel

Step 4: Use the UP or DOWN arrow key to move the highlight to the mass storage device you want and press <ENTER> to continue setup.

Windows NT Workstation Setup

Setup has recognized the following mass storage devices in your computer:

    IDE CD-ROM <ATAPI 1.2>/PCI IDE Controller
    High Point Technology Inc. HPT370 IDE Controller

• To specify additional SCSI adapters, CD-ROM drives, or special disk controllers for use with Windows NT, including those for which you have a device support disk from a mass storage device manufacturer, press S.

• If you do not have any device support disks from a mass storage device manufacturer, or do not want to specify additional mass storage device for use with Windows NT, press ENTER.

S=Specify Additional Device   ENTER=Continue   F3=Exit

Step 5: Windows NT setup has recognized this IDE RAID controller card.

Press <ENTER> to continue setup.

Step 6: After you configure your hard disk and specify the installation path, the NT setup will ask you to insert this IDE RAID controller card driver disk into drive A again. Insert the driver disk, and then press <ENTER> to continue setup.

If you have followed the steps described above, you should be finished installing your Hot Rod 100 Pro controller. For the rest of the Windows NT installation steps, please follow the instructions displayed in the NT setup program.

Installing drivers with existing Windows NT:

If there is an existing NT 4.0 file system, you can install this IDE RAID controller card into the existing system by the following procedure:
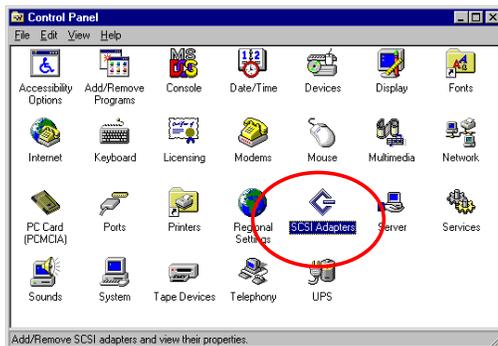
Step 1: Go to "Control Panel", and then enter "SCSI Adapters".
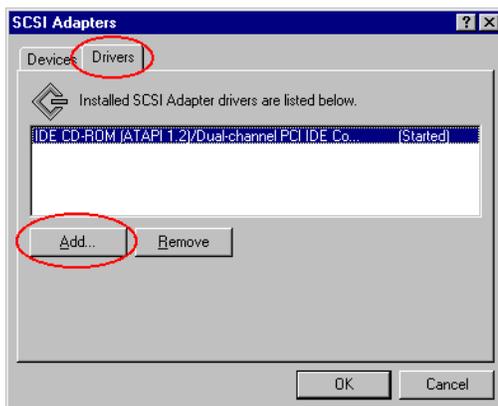
Step 2: Select "Drivers", and then click "Add…".
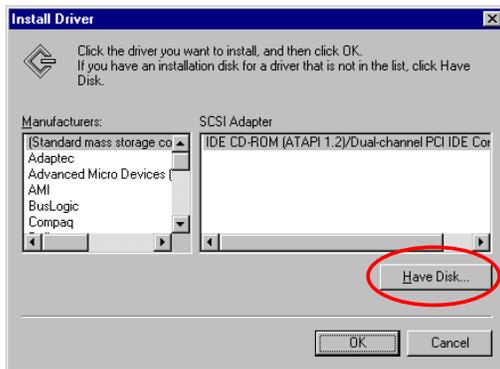
Step 3: Click "Have Disk…" to go on.
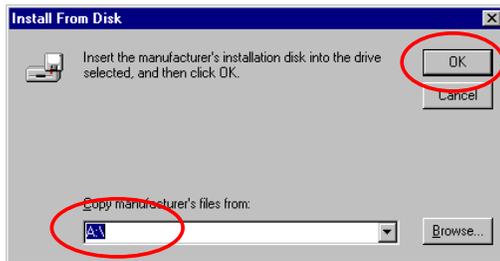
Step 4: Insert this IDE RAID controller card driver disk into drive A, and then click "OK."
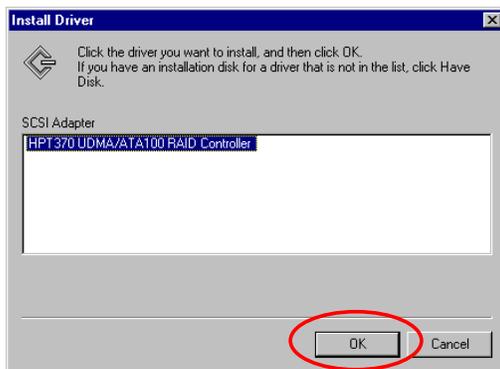
Step 5: Click "OK" to go on.
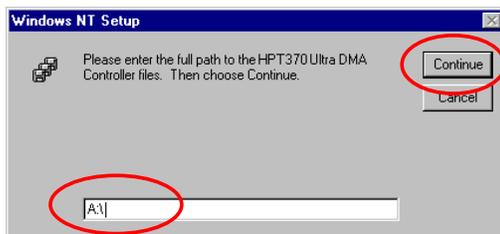
Step 6: Enter "A:\" in the blank space, and then click "Continue".
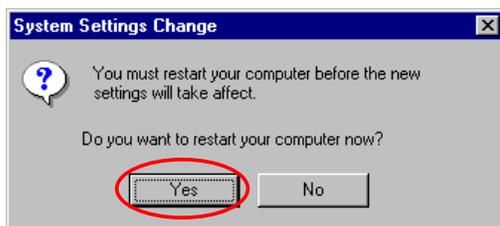
Step 7: Click "Yes" to restart your computer.

4-4.   Windows 2000 Installation

Note

If you want to install the Windows 2000 operating system on the hard drive connected to Hot Rod 100 Pro, please refer to the NT4.0 installation procedure. The following procedure is used only when you don't want to install the Windows 2000 operating system onto the hard drive connected to Hot Rod 100 Pro.

Step 1: Install the Hot Rod 100 Pro and reboot the system. Windows will detect the new hardware automatically.

Click "Next>" to go to the next step.
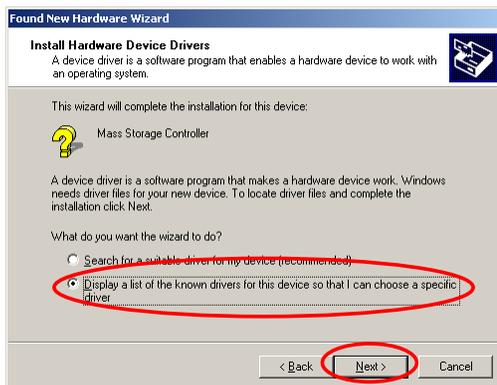
Step 2: Choose "Display a list of all the drivers in a specific location…" and click "Next >" to go on.
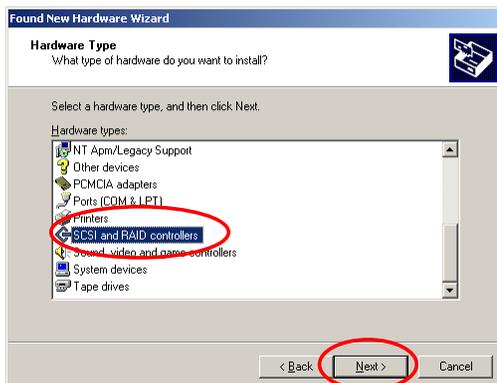
Step 3: Choose "SCSI and RAID controllers" and click "Next >" to go on.
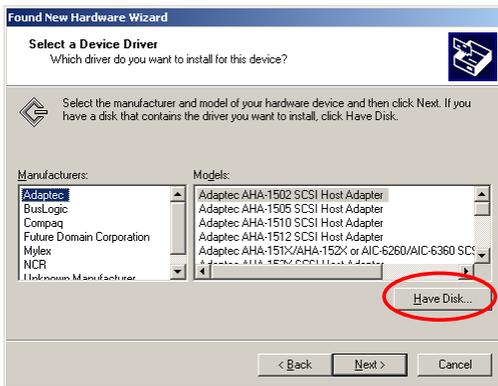
Step 4: Click "Have Disk…" to go on.
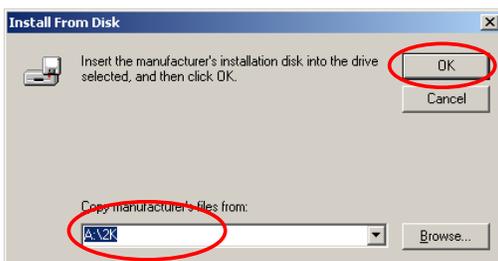
Step 5: Insert the driver disk that comes with the Hot Rod 100 Pro and type the path in the text box "A:\2K" ("A:\" is your floppy drive letter), or "D:\Drivers\Win2k" (D:\ is your CD-ROM drive letter).

Step 6: Choose "HPT370 UDMA/ATA100 RAID Controller" and click "Next >" to go on.

Step 7: Windows is now ready to install the driver. Click "Next >" to go on.

Step 8: Click "Yes" to go on.

Step 9: Windows has finished installing the driver. Click "Finish" to end the installation.
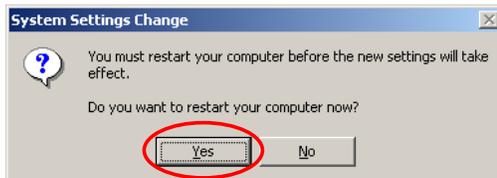
Step 10: Click "Yes" to restart the system.
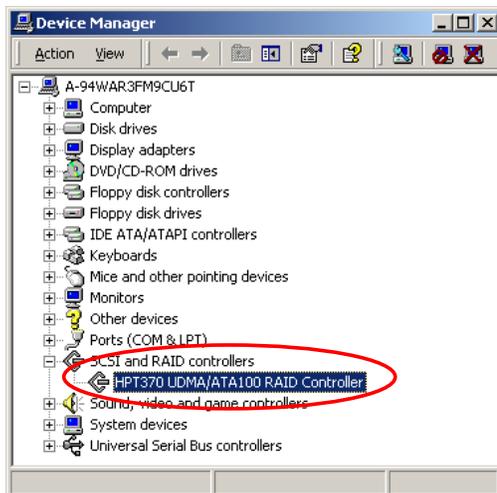
Step 11: Go to the "Control Panel" ➜ "System Properties" ➜ "Device Manager". Now you can see the driver is installed under the item of "SCSI and RAID controllers".

MEMO

Appendix A. The Introduction of RAID

What is RAID?

RAID (Redundant Array of Inexpensive/Independent Disks) technology was developed to offer a combination of outstanding data availability, excellent performance, and high capacity that one single disk drive can not match. A RAID array is defined as two or more disks grouped together to appear as one single device to the host system, which can tolerate the failure of a drive without losing data, and which can operate independently from each other.

To manage MTBF (Mean Time Between Failures) and prevent any single drive failure causing data loss within an array, UC Berkeley scientists proposed five types of redundant array architectures, defining them as RAID levels 1 through 5. Each RAID level has its own strengths and weaknesses, and is well suited for certain types of applications and computing environments. RAID 1, RAID 3 and RAID 5 of these five types are commonly used. RAID 2 and RAID 4 do not offer any significant advantages over these other types. RAID 3 is designed for single-user or data-intensive environments, such as imaging or data acquisition that access extremely large sequential records. This leaves RAID 1 and RAID 5 as the RAID levels applicable for networked and transaction processing-based environments utilizing NetWare, Windows NT, Unix, and OS/2.

In addition to these five redundant array architectures, it has become popular to refer to a non-redundant array of disk drives as RAID 0 array.

Why RAID?

Data security is a very important issue for system administrators. They have to adopt efficient methods of data protection to guard against potential losses due to drive failures. Tape-based backups are used to be one solution for data security, but this method is becoming a task more difficult. The demand to store increasingly large software applications will impel disk capacities to exceed 10GBs by the end of 1997. Slow, cumbersome tape backup solutions lose their effectiveness for servers and workstations.

RAID technology is another solution for data security. There are a number of factors responsible for the growing adoption of arrays for critical network storage. Because today's applications create larger files, the need for network storage has increased proportionately. To accommodate expanding storage requirements, users are adding disk drives --- raising the probability of drive failures. In addition, the development of CPU speed has exceeded data transfer rates to storage media, causing I/O bottlenecks for networking applications.

RAID technology overcomes these challenges by providing a combination of outstanding data availability, extraordinary and highly scalable performance, as well as high capacity. RAID provides real-time data rebuild when a disk drive fails, increasing system uptime and network availability, while protecting against the loss of data. Multiple drives working together also increases system performance.
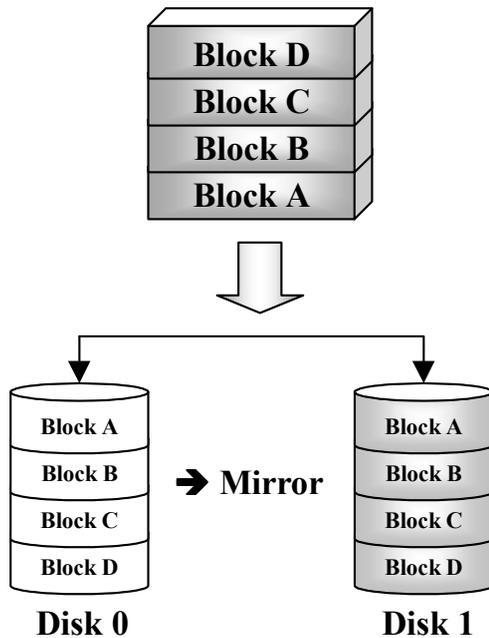
The RAID Levels

RAID Level 0:

Disk 0　　**Disk 1**
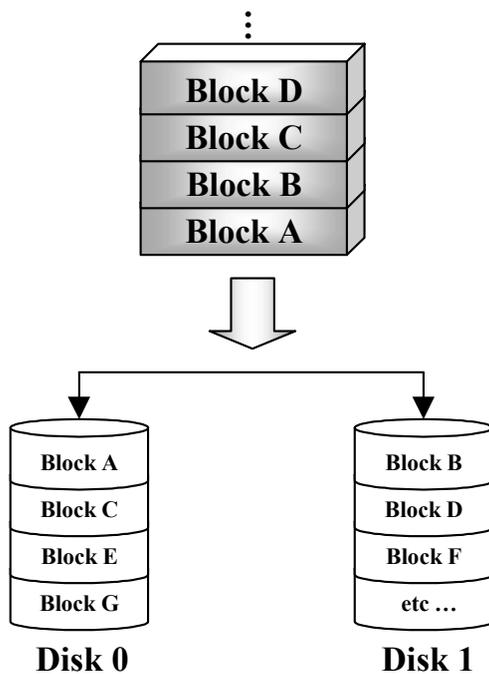
Striped Disk Array without Fault Tolerance

RAID 0 is typically defined as a non-redundant collection of striped disk drives. It doesn't provide data protection but it offers very high data throughput, especially for large files.

RAID 0 does not deliver any fault tolerance. All data is lost if any drive in the array fails. It is intended for non-critical data requiring high performance.

RAID Level 1

Block D
Block C
Block B
Block A

Block A
Block B
Block C
Block D

➔ **Mirror**

Block A
Block B
Block C
Block D

Disk 0   **Disk 1**

Mirroring and Duplexing

RAID 1 provides 100% redundancy by mirroring one drive to another one. In the event of a disk drive failure, the array controller will automatically switch the read/write activity to another drive.

Each individual drive can execute simultaneous read operations. Mirroring thus doubles the read performance of a single drive and leaves the write performance unchanged.

RAID 1 is a good entry-level redundant system, since only two drives are required. However, the cost of RAID 1 is higher because one drive has to be used to store duplicate data.

RAID Level 0+1

Block D
Block C
Block B
Block A

Disk 0
Block A
Block C
Block E
Block G

Disk 2
Block A
Block C
Block E
Block G

Stripe   **Stripe**

Disk 1
Block B
Block D
Block F
Block H

Disk 3
Block B
Block D
Block F
Block H
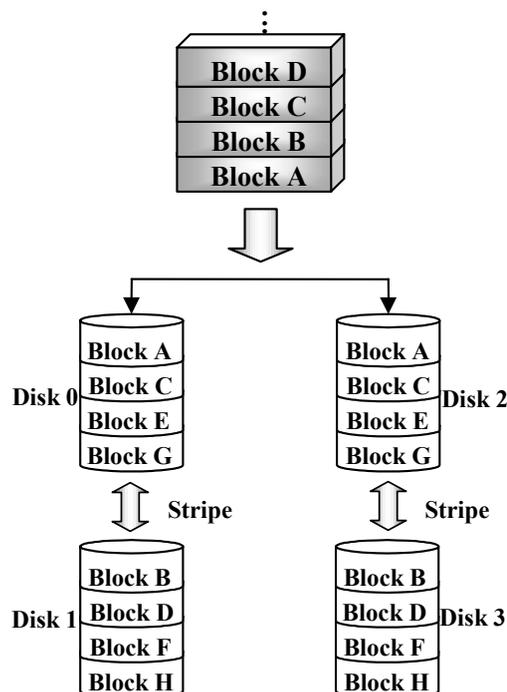
Performance and Security

RAID 0+1, which uses Hamming error correction codes, is intended for use with drives which do not have built-in error detection. Because the check method of Hamming code is very complicated, and more than one drive is required to store ECC information, RAID 2 offers no significant advantages over RAID 3.

RAID Level 2
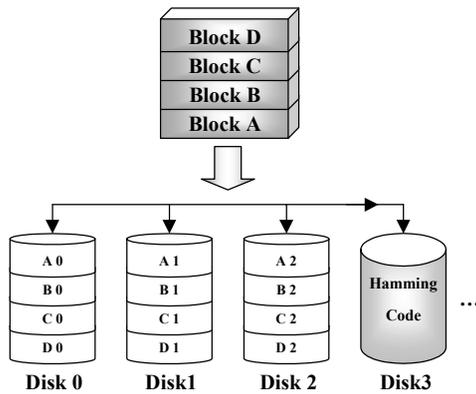
Disk Striping with error-correction code (ECC)

RAID 2, which uses Hamming error correction codes, is intended for use with drives which do not have built-in error detection. Because the check method of Hamming code is very complicated, and more than one drive is required to store ECC information, RAID 2 offers no significant advantages over RAID 3.

RAID Level 3
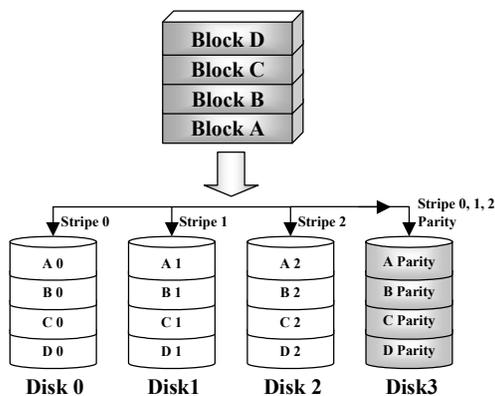
Parallel transfer with parity

RAID 3 uses a separate drive to store parity and stripes data on a byte-by-byte basis across all of the data disks in the array.

Because each I/O accesses all drives in the array, RAID 3 does not support multiple, simultaneous read/write requests. It is optimized for large, sequential data requests.

RAID Level 4
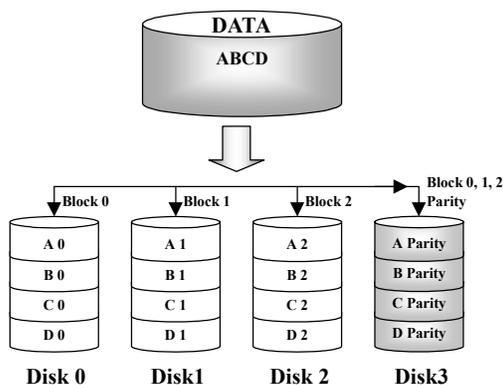
Independent Data disks with shared parity disk

RAID 4 is identical to RAID 3 except the block level stripes are used.

RAID 4 supports multiple simultaneous read requests. However, since all write operations require that parity data to be updated each time, they can not be overlapped. And so the RAID 4 offers no significant advantages over RAID5.

RAID Level 5

DATA
ABCD

A Block | B Block | C Block | D Block

A 0	B 0	C 0	0 Parity
A 1	B 1	1 Parity	D 1
A 2	2 Parity	C 2	D 2
3 Parity	B 3	C 3	D 3

Disk 0   **Disk1**   **Disk 2**   **Disk3**
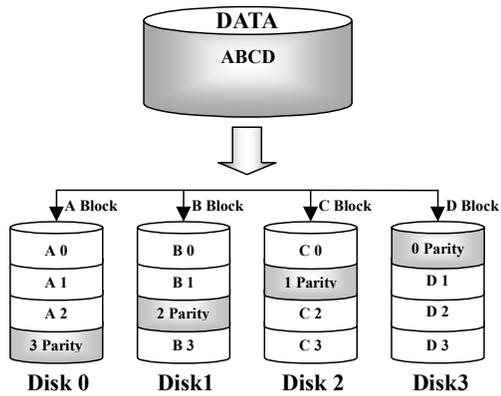
Independent Data disks with distributed parity blocks

RAID 5 also stripes data at a block level across several drives. But it distributes parity among the drives, which avoids the write bottleneck caused by the single dedicated parity drive. Each drive takes turns storing parity information for a different series of stripes. RAID 5 can execute read/write to disk drives either in parallel or independently.

Which RAID Level Should I Use?

Many different disk array configurations are possible, depending on end-user requirements and the goals of the manufacture. Each controller design has a different functionality to accomplish specific performance and data availability goals. Therefore, no individual RAID level is inherently superior to any other. Each of the five array architectures is well suited for certain types of applications and computing environments. The follow table summarizes the strengths and weaknesses of each RAID level.

RAID Level	Min. No. of Drives	Description	Characteristics / Strengths	Weaknesses
RAID 0	2	• Striped Disk Array without Fault Tolerance	• Highest I/O Performance • Very simple design • Easy to implement	• No redundancy One drive fails, all data is lost
RAID 1	2	• Mirroring and Duplexing	• 100% redundancy of data • Twice the Read transaction rate of a single disk, same Write transaction rate as single a disk • Simplest RAID storage subsystem design	• High redundancy cost overhead
RAID 0+1	4	• Performance and Security	• The combination of Striping and Mirroring • Offers the speed advantages of RAID level 0 combined with the data reliability advantages of RAID level 1	• Need twice the data capacity
RAID 2	Not used in LAN	• Disk Striping with error-correction code (ECC)	• Previously used for RAM error environments correction (known as Hamming Code) and in disk drives before the use of embedded error correction	• No practical use

RAID 3	3	• Parallel transfer with parity	• Very high Read data transfer rate • Very high Write data transfer rate • Excellent performance for large, sequential data requests • Low ratio of ECC (Parity) disks to data disks means high efficiency	• Doesn't support multiple, simultaneous Read and Write requests • Transaction rate equal to that of a single disk drive at best (if spindles are synchronized)
RAID 4	3	• Independent Data disks with shared parity disk	• Very high Read data transaction rate • High aggregate Read transfer rate • Low ratio of ECC (Parity) disks to data disks means high efficiency	• Worst Write transaction rate and Write aggregate transfer rate •
RAID 5	3	• Independent Data disks with distributed parity blocks	• Highest Read data transaction rate • Medium Write data transaction rate • Best cost/performance for transaction-oriented networks • Supports multiple, simultaneous Read and Write • Low ratio of ECC (Parity) disks to data disks means high efficiency	• Write performance is slower than RAID 0 or RAID1

Note: Hot Rod 100 Pro only supports RAID level 0, 1, and 0+1 currently.

MEMO

Appendix B. BIOS Flashing User Instructions

This IDE RAID controller card is equipped with 1 Mbit flash BIOS onboard. If you receive information about an update for this IDE RAID controller card BIOS from our website (http://www.abit.com.tw) or technical support, download the BIOS file and save it under the name "*BIOS*", then follow the procedure below to upgrade this IDE RAID controller card BIOS:

Step 1: Copy the files "*load.exe* (included in this IDE RAID Driver Disk)" and "*BIOS*" to a new floppy.

Step 2: Reboot your system and go into the pure DOS environment.

Step 3: Insert the floppy that contains the files "*load.exe*" and "*BIOS*" into drive A.

Step 4: At the "A:\>" prompt, type "*load BIOS*" and then press "*enter*".

**Step 5:** Remove the floppy A, and then restart your system.

# Appendix C. Hot Rod Utility Instructions

In order to provide you with the on-screen monitoring function about the device information of disk array, you may install the "Hot Rod Utility" onto your system. Please insert the Hot Rod 100 Pro CD-Title into your CD-ROM drive. It should execute the program automatically. If not, you can go to the CD location and execute the execution file from the main directory of the CD-Title. After it is executed, you will see the screen shot below.
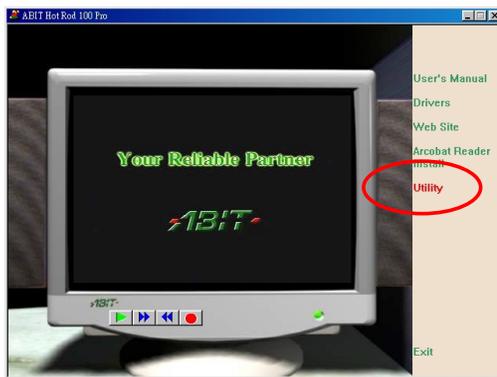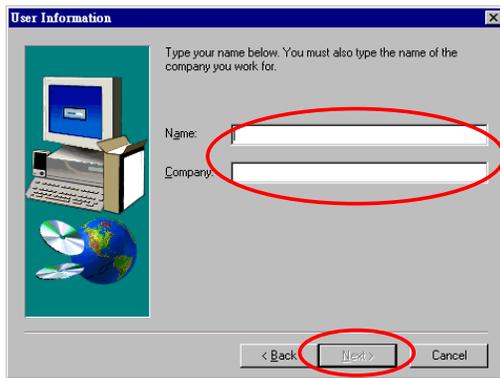

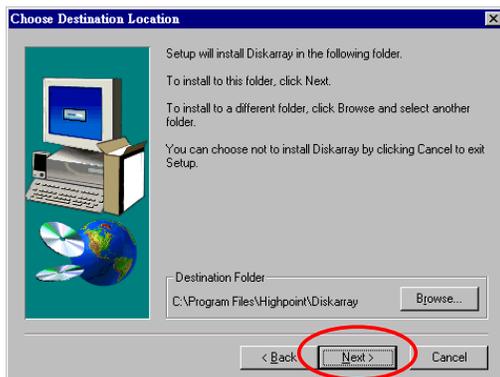Move the cursor to "Utility" and click on it to go to the next step.
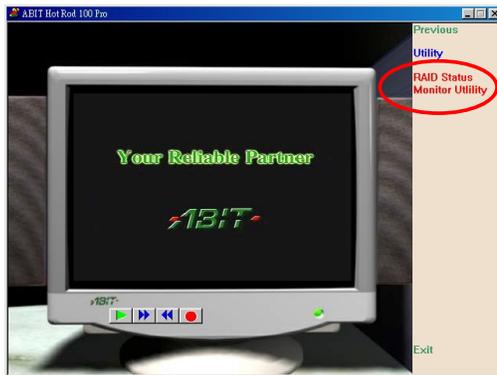
Move the cursor to "RAID Status Monitor Utility" and click on it to go to the next step.
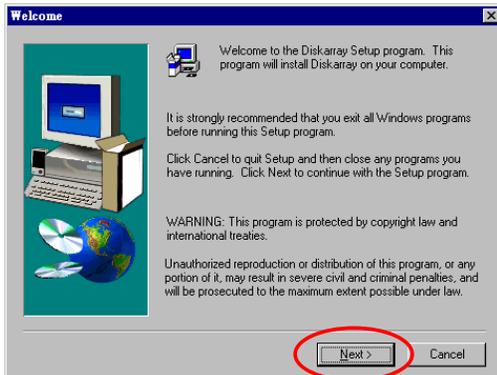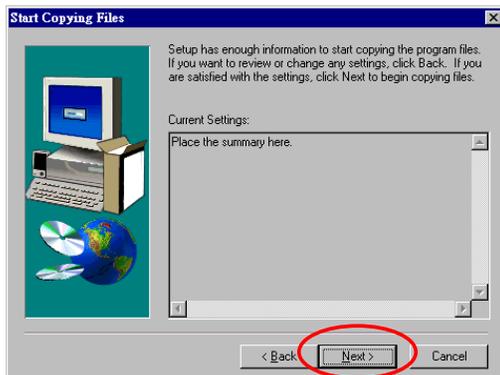

Click "Next>" to go on.

Type in the information of your name and company and then click "Next>" to go on.

Now you can choose the folder for the destination location you want. We suggest you use the default folder as the destination location. When you are sure of the folder, click "Next>" to go on.

Now you can select the program folder. The setup wizard will add program icons to those program folders listed. Click "Next>" to go on.
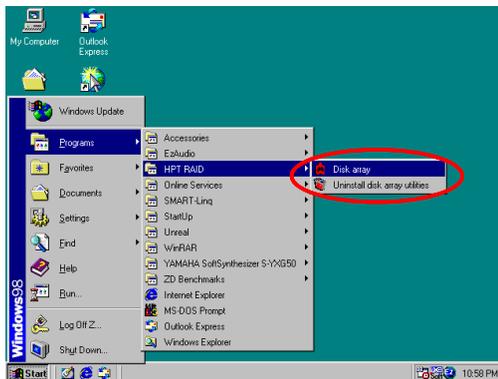
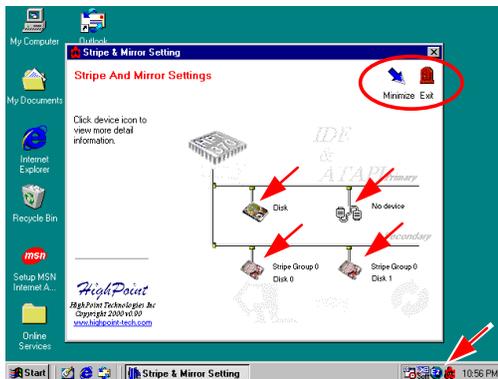The system will start copying files. Click "Next>" to go on.

When the installation is completed, choose "Yes, I want to restart my computer now." In the check box and click "Finish" to end the setup.

After the system restart, you can run this "Stripe & Mirror Settings" monitoring program.

Move the cursor to where the execution file is, shown left.

The monitoring screen pops up. Note that there will be a shortcut icon appears in the tool bar. This is used for bringing out the screen again after you had clicked the "Minimize" icon on the upper right corner of the screen. This short cut icon will disappear after you click the "Exit" icon.

Now you are in the monitoring screen. Your current device allocation is viewable at a glance. Move the cursor to the drive icon you want to view and click on it.

Appendix D. Trouble Shooting (Need Assistance?)

Q & A

Q: May I use hard drives with different capacity or transfer mode?

A: In order to get optimized performance, we suggest using hard drives with the same model.

Q: How to assign a booting device?

A: You may press <Ctrl><H> to assign a booting device in RAID BIOS (user's manual section 3-9).

Q: Why can't I see correct capacity in FDISK utility?

A: It's a well-known issue of win95/98's FDISK utility. If an IBM 75GB hard disk DTLA 307075 only gets 7768MB in Win95/98's FDISK utility, please contact Microsoft for a latest version of FDISK utility or download IBM's Disk Manager DiskGo! 2.5 to fix it. For windows 2000, there is no such a 64GB issue. http://www.storage.ibm.com/techsup/hddtech/welcome.htm

Q: How to create a striping and mirror array (RAID 0+1)?

A: You need four drives (Appendix A), every two of them on the same channel/cable build a striping array. Then create a mirror array by these two striping arrays (Appendix A-3).

   (i)   Press <Ctrl> <H> to setup configuration

   (ii) Choose item 1 to Create RAID.

   (iii) Choose item 1 to set Array Mode as Striping and Mirror (RAID 0+1).

   (iv) Choose item 2 to Select Disk Drives. There are two striping arrays built automatically and you only have to enter twice.

   (v) Choose item 4 to Start Creation Process.

   (vi) Press <Esc> to finish setting and leave RAID BIOS.

Q: How to rebuild a mirror array when one of the drives corrupts?

A: You need to delete previous array setting, duplicate the data, then rebuild a new array setting (user's manual 3-5).

(i)   Press <Ctrl><H> to setup configuration

(ii) Choose item 2 to Delete Array.

(iii) Choose item 3 to Duplicate Mirror Disk.

(iv) Choose sub item 1 to Select Source Disk, the one with data on it.

(v) Choose sub item 2 to Select Target Disk, the brand new and empty one.

(vi) Choose sub item 3 to Start Duplication Process.

(vii)After duplication process completes, press <Esc> to leave RAID BIOS.

Q: Why I see "NO ROM BASIC SYSTEM HALTED" when booting?

A: There isn't any activated primary partition in you system. Please use FDISK or any other utilities to create/set one.

Do & Don't

1. **Do** always use the same model drives to achieve best quality and performance. Different firmware has different timing characteristic, thus may somewhat decrease the RAID performance.

2. If you have two drives, **do** connect them on two different channels as master drive please.

3. When attach drives to the RAID card, **do** make sure the master/slave jumper settings are correct please. If there is only one drive on one channel/cable, do set it as master or single drive.

4. **Do** always use 80 conductor cables please.

5. **Don't** connect any ATAPI devices (CD-ROM, LS-120, MO, ZIP, removable HD etc.) on the RAID card please.

6. For the best performance result, please **do** use the Ultra ATA 66/100 Hard Disks.

📖 Technical Support Form

🏭 **Company Name:**   🔊 **Phone Number:**

🗣 **Contact Person:**   🖨 **Fax Number:**

📪 **E-mail Address:**

IDE Card Product Name	*	IDE Card BIOS Version	*
Motherboard Manufacturer, Model Name and Chipset type	*	IDE Card Software and Driver Version	*
Operating System Type	*		*

Hardware name	Type	Specifications
CPU Type and Speed	*	
HDD ☐IDE1 ☐IDE2		
CD-ROM Drive ☐IDE1 ☐IDE2		
System Memory Size (SDRAM)	*	
Add-On Card	*	

✍

Problem Description:

_____

_____

_____

_____

_____

_____

_____

Appendix E. How to Get Technical Support

(From our website) **http://www.abit.com.tw**
(In North America) **http://www.abit-usa.com**
(In Europe) **http://www.abit.nl**

Thank you for choosing ABIT products. ABIT sells all our products through distributors, resellers and system integrators, we have no direct sales to end-users. Before sending email for tech support please check with your resellers or integrators if you need any services, they are the ones who sold you your system and they should know best as to what can be done, how they serve you is a good reference for future purchases.

We appreciate every customer and would like to provide the best service to you. Providing fast service to our customers is our top priority. However we receive many phone calls and a huge amount of email from all over the world. At the present time it is impossible for us to respond to every single inquiry. Therefore it is quite possible that if you send an email to us that you may not receive a response.

We have done many compatibility tests and reliability tests to make sure our products have the best quality and compatibility. In case you need service or technical support, please understand the constraint we have and **always check with the reseller who sold the product to you first.**

To expedite service, we recommend that you follow the procedures outlined below before contacting us. With your help, we can meet our commitment to provide the best service to the **greatest number of ABIT customers:**

1. **Check the Manual.** It sounds simple but we have taken a lot of care in making a well written and thorough manual. It is full of information that doesn't only pertain to motherboards. The CD-ROM included with your board will have the manual as well as drivers. If you don't have either one go to our Program Download Area of the website or FTP server at: **http://www.abit.com.tw/download/index.htm**

2. **Download latest BIOS, software or drivers.** Please go to our Program Download area on our website to check to see if you have the latest BIOS. They are developed over periods of time to fixes bugs or incompatibilities. **Also please make sure you have the latest drivers from your peripheral cards makers!**

3. **Check the ABIT Technical Terms Guide and FAQ on our website.** We are trying to expand and make the FAQs more helpful and information rich. Let us know if you have any suggestions. For hot topics check out our HOT FAQ!

4. **Internet Newsgroups.** They are a great source of information and many people there can offer help. ABIT's Internet News group, **alt.comp.periphs.mainboard.abit**, is an ideal forum for the public to exchange information and discuss experiences they have had with ABIT products. Many times you will see that your question has already been asked before. This is a public Internet news group and it is reserved for free discussions, Here is a list of some of the more popular ones:

   alt.comp.periphs.mainboard.abit
   alt.comp.periphs.mainboard
   comp.sys.ibm.pc.hardware.chips
   alt.comp.hardware.overclocking
   alt.comp.hardware.homebuilt
   alt.comp.hardware.pc-homebuilt

5. **Ask your reseller.** Your ABIT authorized distributor should be able to provide the fastest solution to your technical problem. We sell our products through distributors who sell to resellers and stores. Your reseller should be very familiar with your system configuration and should be able to solve your problem much more efficiently than we could. After all, your reseller regards you as an important customer who may purchase more products and who can urge your friends to buy from him or her as well. They integrated and sold the system to you. They should know best what your system configuration is and your problem. They should have reasonable return or refund policies. How they serve you is also a good reference for your next purchase.

6. **Contacting ABIT.** If you feel that you need to contact ABIT directly you can send email to the ABIT technical support department. First, please contact the support team for the branch office closest to you. They will be more familiar with local conditions and problems and will have better insight as to which resellers offer what products and services. Due to the huge number of emails coming in every day and other reasons, such as the time required for problem reproduction, we will not be able to reply to every email. Please understand that we are selling through distribution channels and don't have the resources to serve every end-user. However, we will try to do our best to help every customer. Please also remember that for many of our technical support team English is a second language, you will have a better chance of getting a helpful answer if your question can be understood in the first place. Be sure to use very, simple, concise language that clearly states the problem, avoid rambling or flowery language and always list your system components. Here is the contact information for our branch offices:

In North America and South America please contact:
ABIT Computer (USA) Corporation
46808 Lakeview Blvd.
Fremont, California 94538 U.S.A.
sales@abit-usa.com
technical@abit-usa.com
Tel: 1-510-623-0500
Fax: 1-510-623-1092

In the UK and Ireland:
ABIT Computer Corporation Ltd.
Caxton Place, Caxton Way,
Stevenage, Herts SG1 2UG, UK
abituksales@compuserve.com
abituktech@compuserve.com
Tel: 44-1438-741 999
Fax: 44-1438-742 899

In Germany and Benelux (Belgium, Netherlands, Luxembourg) countries:
AMOR Computer B.V. (ABIT's European Office)
Van Coehoornstraat 5a,
5916 PH Venlo, The Netherlands
sales@abit.nl
technical@abit.nl
Tel: 31-77-3204428
Fax: 31-77-3204420

All other territories not covered above please contact:

<u>Taiwan Head Office</u>
When contacting our headquarters please note we are located in Taiwan and we are 8+ GMT time. In addition, we have holidays that may be different from those in your country.

ABIT Computer Corporation
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Hsi Chi, Taipei Hsien
Taiwan, R.O.C.

sales@abit.com.tw
market@abit.com.tw
technical@abit.com.tw
Tel: 886-2-2698-1888
Fax: 886-2-2698-1811

7. **RMA Service.** If your system has been working but it just stopped, but you have not installed any new software or hardware recently, it is likely that you have a defective component. Please contact the reseller from whom you bought the product. You should be able to get RMA service there.

8. **Reporting Compatibility Problems to ABIT**. Because of tremendous number of email messages we receive every day, we are forced to give greater weight to certain types of messages than to others. For this reason, any compatibility problem that is reported to us, giving detailed system configuration information and error symptoms, will receive the highest priority. For the other questions, we regret that we may not be able to reply directly. But your questions may be posted to the internet news group in order that a larger number of users can have the benefit of the information. Please check the news group from time to time.

Thank you, ABIT Computer Corporation
http://www.abit.com.tw