

User Manual

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Introduction

Thank you for your recent purchase.The PC which you are using either already contains a Promise Technology® FastTrak100 RAID card installed by a third-party or you have acquired a FastTrak100 retail box for your existing PC and will be installing the card yourself.

For PC owners wishing to install their Promise Technology® FastTrak100, proceed to the **Getting Started** section (see page 6).

For PCs with a Promise Technology® FastTrak100 card already installed, consult the **Troubleshooting** section of the manual (see page 71) if you are experiencing any difficulties with the hard drive being recognized by the card. If your operating system has crashed for some reason or you have downloaded updated drivers from the Promise website (www.promise.com), you may wish to reinstall software drivers for the FastTrak100 card. Use the **Installing Drivers** section (see page 34).

What is the FastTrak100 RAID Card?

Promise designed its FastTrak100 card to provide a cost-effective, high performance RAID card that adds performance and/or reliability to PC desktops and/or servers using Ultra ATA/100, Ultra ATA/66, Ultra ATA/33 or EIDE drives. FastTrak100 supports striping (RAID 0), mirroring (RAID 1), striping/mirroring (RAID 0+1), or spanning (JBOD) operation , respectively.

With striping, identical drives can read and write data in parallel to increase performance. Mirroring increases read performance through load balancing and elevator seek while creating a complete backup of your files. Striping with mirroring offers both high read/write performance and error tolerance. Spanning uses the full capacity of all attached drives without requiring identical drive size, but offers no other RAID functionality.

A FastTrak100 striped array can double the sustained data transfer rate of Ultra ATA/100 drives. FastTrak100 fully supports Ultra ATA/100 specification of up to 100 MB/sec per drive, depending on individual drive specifications.
FastTrak100 also offers fault tolerant, data redundancy for entry-level network file servers or simply for desktop PC users wanting to continually protect valuable data on their PC. FastTrak100 offers RAID 1 mirroring (for two drives) and RAID 0+1 mirroring and striping (for four drives) to protect data. Should a drive that is part of a mirrored array fail, FastTrak100 uses the mirrored drive (which contains identical data) to assume all data handling. When a new replacement drive is later installed, FastTrak100 rebuilds data to the new drive from the mirrored drive to restore fault tolerance.

FastTrak100's bootable BIOS supports individual drives larger than 8.4GB. With FAT32 and NTFS partitioning, the array can be addressed as one large *single* volume.

Keys Features and Benefits

The following information offers an overview of the major features of your new Promise FastTrak100. It is divided into two areas: Advanced Hardware Design, and Compatibility.

Advanced Hardware Design	
Features	**Benefits**
Supports data striping (RAID 0), mirroring (RAID 1), and striping/mirroring combination (RAID 0+1)	Provides dramatic increase in drive performance and/or fault tolerant options. Offers performance customization and data rebuilds from the BIOS menu.
Supports Ultra DMA 5/4/3/2/1/0, DMA 2/1/0	Burst data transfer rates up to 100MB/sec from Ultra ATA/100 drives to boost overall system performance.
PCI Plug-n-Play, PCI Interrupt sharing and *coexists* with mainboard IDE controllers	Easy to install; support four ATA drives on the FastTrak100 while still supporting 4 devices on motherboard ATA controller.
Supports concurrent dual IDE controller operation	Drive workload is distributed in parallel between members of the array.
Supports IDE bus master operation	Allows multiasking during disk transfers which increase CPU efficiency. The CPU is free to process tasks during IDE data transfers through the PCI Bus to/from system memory.
Utilizes FastBuild™ automenu from the FastTrak100 onboard BIOS	Offers pre-set application specific settings which can be optimized for Desktop, Server, or A/V Editing. Has "Auto Setup" option for quick and easy array builds.
Displays status and error checking messages during bootup	Notifies user of possible errors and allows for recovery of mirrored drive arrays directly from FastBuild™.
Employs the latest Promise PCI Ultra ATA/100 ASIC technology.	Fully supports Ultra ATA/100 specifications with 100 MB/sec timing and CRC error-checking at high speeds.
Mirroring supports automatic background rebuilds	Fault tolerance can be restored automatically without rebooting

Compatibility	
Features	**Benefits**
Complies with PCI v2.1 Local Bus standard	Provides highest level of hardware compatibility.
Compliant with PCI IDE Bus Master standard. PCI IDE Bus Master support for Windows 98/95, Windows NT 3.5x, 4.0	Provides 32-bit I/O, IDE Bus Master, and Ultra ATA performance for optimal system performance.
Tested compatiblity to coexist with Mainboards that have integrated IDE controllers	Improves system performance of new and existing installations including mainboards with Intel chipsets.
Compatible with Ultra ATA/100, Ultra ATA/66, Ultra ATA/33, EIDE and Fast ATA-2 drives supporting multi-word DMA	Works with newest and current IDE drive specifications. Promise engineers experienced with IDE devices perform verification testing with major drive manufacturers and development partners.
Features LBA and Extended Interrupt13h drive translation in controller onboard BIOS	Breaks capacity barriers for support of drives greater than 8.4GB in capacity. Offers flexible storage options for space demanding applications.

NOTES

Getting Started

This section is designed to get you started for installation of your FastTrak100.

Unpacking Your FastTrak100

When you receive the FastTrak100, the package should contain the items listed below:

- FastTrak100 Ultra ATA/100 RAID Card
- FastTrak100 User' s Manual
- Registration Card
- FastTrak100 Driver floppy diskette, utility diskette
- Two Internal 80-wire/40-pin Ultra ATA/100 hard drive cables (18" length)

If ANY of the contents are missing or appear to be damaged, please contact your dealer or distributor immediately.



***WARNING**: Before installing the adapter into an existing system, backup any necessary data. Failure to follow this accepted PC practice could result in data loss.*

***NOTE**: FastTrak100, like every other valuable part of your system, is subject to static electricity. Be sure that you' re properly grounded (Promise recommends that you wear an anti-static strap, or touch a grounded object), and that your system is unplugged before installing FastTrak100.*

Installing The Card

Installing the FastTrak100 controller card in a system is a simple process. The card fits into any available 32-bit PCI slot on the system' s motherboard (see figure below).

1. Remove the cover of your system.
2. Remove the inside slot cover of an available 32-bit PCI slot on the motherboard.
3. Install the FastTrak100 controller card into the open slot (see Figure 1 below).
4. Attach your system case' s 2- or 4-pin LED cable to the LED connector on the FastTrak100 controller card (see figure next page). Make sure that pin 1 on the connector is aligned with pin 1 of the cable.
5. Fasten the controller card bracket to the system case (see below).

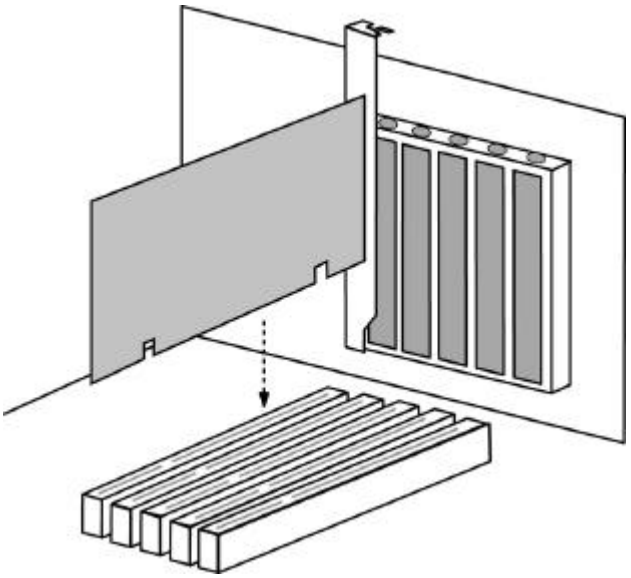


Figure 1

Installing The Hard Drives



***WARNING**: If you wish to include your current bootable drive using the Windows NT 4.0 or Windows 2000 operating system as part of a bootable Mirrored (RAID 1) array on your FastTrak100, do NOT connect the hard drive to the FastTrak100 controller yet. You MUST install the Windows NT4 or 2000 driver software first (see page 34) to this drive while it is still attached to your existing hard drive controller. For all other Operating Systems, proceed here.*

Hard drives must be Ultra ATA/100, Ultra ATA/66, Ultra ATA/33, EIDE and/or Fast ATA-2 compatible to operate with the FastTrak100 RAID Adapter. For optimal performance, install all ***identical*** drives of the same model and capacity. The drives' ***matched performance*** allows the array to function better as a single drive.

1. Promise recommends using identical drives as part of a FastTrak100 array. If striping for performance, use up to four new drives. If mirroring for protection, you can use two new drives OR use an existing drive and a new drive (the new drive must be the same size or larger than the existing drive).
2. Configure the jumpers of the hard drive you' re preparing to connect to the FastTrak100 using the correct "Master" or "Cable-Select" settings in the positions described in the table below.

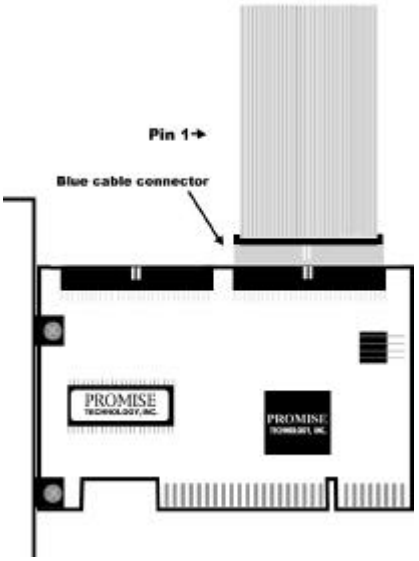
   ***NOTE**: Sometimes the Master drive with no slave attached is called "Single." The master slave setting differentiates two drives chained on the same connector.*

Jumper Settings		
# of Drives	IDE Channel 1	IDE Channel 2
1	M	----
2	M	M
3	M & S	M
4	M & S	M & S

M = Master, S = Slave

3. Install the hard drives into the hard drive bays of your system, including the power cables.

4. Attach one Ultra ATA cable to each hard drive. Then attach one cable to each of the IDE connectors on the FastTrak100 controller card. The colored edge of the cable(s) indicates pin 1 (see below), and the blue cable connector must be attached to the FastTrak100 or Ultra100 ATA connector.



***NOTE**: You must use an 80-wire, 40-pin cable when connecting an Ultra ATA/100 hard drive to the FastTrak100 controller card. The FastTrak100 package contains two 80-wire, 40-pin cables.*

Checking CMOS Settings

No changes are necessary in the Mainboard CMOS Setup for resources or drive types. Since FastTrak100 is a PCI Plug-n-Play (PnP) device, the Interrupt and Port address resources are automatically assigned by the Mainboard' s PCI PnP BIOS.

The FastTrak100 system resources including port address, interrupt, and BIOS address are ***automatically*** determined by the system PnP BIOS. To customize IRQ settings, enter the Mainboard BIOS' s Advanced PCI setup and follow the manufacturer' s procedures. When the system is limited by IRQ resources, the FastTrak100 card can be set for the same IRQ as other PCI cards that support PCI interrupt sharing.

For the FastTrak100 to be the bootable IDE controller, confirm in the mainboard' s Standard CMOS Setup that the drive types (for *hard disk* drives) are set for "Unknown Device" or "Not Installed" (see below). If there is a "Hard-Disk Drive Sequence," place the FastTrak controller as the second choice in searching for a bootable device. No changes are needed for CD-ROM drives that are attached to the mainboard IDE controller.

Processor ID: MHz	**BIOS version: xxx**
Cache:	**Server Tag: xxxxx**
System Time	18:50:37
System Date	Tue May 02, 2000
Diskette Drive A:	3.5 inch, 1.44 MB
Diskette Drive B:	Not Installed
Primary Drive 0	Unknown Device
Primary Drive 1	Unknown Device
Secondary Drive 0	CD-ROM Reader
Secondary Drive 1	Unknown Device
Hard-Disk Drive Sequence	<ENTER>
Boot Sequence	<ENTER>

Creating Your Disk Array

You will now use the onboard FastBuild BIOS utility to create your array using the attached drives. There are three different scenarios in creating this array. You can create an array for performance, you can create a Security array using new hard drives (recommended), or you can create a Security array using an existing hard drive and a new hard drive.



***WARNING**: If creating a Security array using an existing hard drive, backup any necessary data. Failure to follow this accepted PC practice could result in data loss.*

1. Boot your system. If this is the first time you have booted with the FastTrak100 card and drives installed, the Promise onboard BIOS will display the following screen.

```
FastTrak100 (tm) BIOS Version 1.xx (Build xxxx)
(c) 1995-2000 Promise Technology, Inc. All Rights Reserved.

No array defined . . .

Press <Ctrl-F> to enter FastBuild (tm) Utility
Or press <ESC> key to continue booting the system.
```

2. Press <Ctrl-F> keys to display the FastBuild (tm) Utility Main Menu
3. Press "1" to display the Auto Setup Menu below. This is the fastest and easiest method to creating your first array.

```
        FastBuild (tm) Utility 1.xx (c) 1995-2000 Promise Technology, Inc.
                          [Auto Setup Options Menu]

   Optimize Array for:              Performance
   Typical Application usage:       A/V Editing

                          [ Auto Setup Configuration ]

   Mode.....Stripe
   Drives used in Array .....2
   Array Disk Capacity .....16126

                          [ Keys Available ]

    [↑] Up [↓] Down   [←, →, Space] Change Option   [ESC] Exit   [Ctrl-Y] Save
```

***NOTE**: If you wish to customize certain settings at a later time, you may do so by manually creating your array (see page 15 Using FastBuild Configuration Utility).*

Creating an Array for Performance

NOTE: *FastTrak100 allows users to create striped arrays with 1, 2, 3, or 4 drives.*

To create an array for best performance, follow these steps:

1. Using the Spacebar, choose "Performance" under the **Optimize Array for** section.
2. Select how you will use your PC most under the **Typical Application usage** section The choices are A/V Editing, Server, and Desktop (the default).
3. Press <Ctrl-Y> keys to Save and create the array.
4. Reboot your system.
5. Once the array has been created, you will need to FDISK and format the array as if it were a new single hard drive.
6. Proceed to Installing Drivers section of the manual (see page 34).

Creating a Security Array With New Drives

NOTE: *FastTrak100 permits only two drives to be used for a single Mirrored array in Auto Setup. If more drives are physically attached to the card, the Mirroring option will not be available at all in Auto Setup.*

To create an array for data protection using new hard drives, follow these steps:

1. Using the Spacebar, choose "Security" under the **Optimize Array for** section.
2. Press <Ctrl-Y> keys to Save your selection.
3. The window below will appear.

```
Do you want the disk image to be duplicated to another? (Yes/No)
Y - Create and Duplicate
N - Create Only
```

4. Press "N" for the Create Only option.
5. A window will appear almost immediately confirming that your Security array has been created. Press any key to reboot the system

```
Array has been created.
<Press Any Key to Reboot>
```

6. Proceed with normal FDISK and format procedures as if you had just installed a new hard drive.
7. Once the arrayed drives have been formatted, proceed to the **Installing Driver** chapter on page 34 to install your operating system and/or FastTrak100 driver.

Creating a Security Array With An Existing Data Drive

NOTE: *FastTrak100 permits only two drives to be used for a single Mirrored array in Auto Setup. If more drives are physically attached to the card, the Mirroring option will not be available.*

You would use this method if you wish to use a drive that already contains data and/or is the bootable system drive in your system. You will need another drive of identical or larger storage capacity.



WARNING*: Backup any necessary data before proceeding. Failure to follow this accepted PC practice could result in data loss.*



WARNING*: If you wish to include your current bootable drive using the Windows NT 4.0 or Windows 2000 operating system as part of a bootable Mirrored (RAID 1) array on your FastTrak100, do NOT connect the hard drive to the FastTrak100 controller yet. You MUST install the Windows NT4.0 or 2000 driver software first (see page 34) to this drive while it is still attached to your existing hard drive controller. For all other Operating Systems, proceed here.*

Follow these steps:

1. Using the Spacebar, choose "Security" under the **Optimize Array for** section.
2. Press <Ctrl-Y> keys to Save your selection. The window below will appear.

```
Do you want the disk image to be duplicated to another? (Yes/No)
Y - Create and Duplicate
N - Create Only
```

3. Press "Y" for the Create and Duplicate option. The window below will appear asking you to select the Source drive to use. FastBuild will copy all data from the Source drive to the Target drive.

```
                        Source Disk
Channel:ID          Drive Model              Capacity (MB)

                        Target Disk
Channel:ID          Drive Model              Capacity (MB)

                  [Please Select A Source Disk]
 Channel:ID         Drive Model              Capacity (MB)
 1 :Master          QUANTUMCR8.4A              8063
 2 :Master          QUANTUMCR8.4A              8063

              [↑] Up [↓]  [ESC] Exit  [Ctrl-Y] Save
```

4. Use the arrow keys to choose which drive contains the existing data to be copied.
5. Press [Ctrl-Y] keys to Save selection and start duplication. The following progress screen will appear.

```
Start to duplicate the image . . .
Do you want to continue? (Yes/No)
Y – Continue  N - Abort
```

6. Select "Y" to continue. If you choose "N", you will be returned to step 1.
7. Once complete, the following screen will appear confirming that your Security array has been created. Press any key to reboot the system

```
Array has been created.
<Press Any Key to Reboot>
```

8. Proceed to the **Installing Driver** chapter on page 34 to install the FastTrak100 driver and/or operating system.

NOTES

Using FastBuild™ Configuration Utility

The FastBuild™ Configuration Utility offers several menu choices to create and manage the drive array on the Promise FastTrak100 adapter. For purposes of this manual, it is assumed you have already created an array in the previous chapter and now wish to make a change to the array or view other options.

Viewing FastTrak100 BIOS Screen

When you boot your system with the FastTrak100 card and drives installed, the Promise onboard BIOS will detect the drives attached and show the following screen.

```
FastTrak100 (tm) BIOS Version 1.xx (Build xxxx)
(c) 1995-2000 Promise Technology, Inc. All Rights Reserved.

Scanning IDE drives . . . . .
```

If an array exists already, the BIOS will display the following screen showing the card' s BIOS version and status of the array.

```
                FastTrak100 (tm) BIOS Version 1.xx (Build xxxx)
            (c) 1995-2000 Promise Technology, Inc. All Rights Reserved.

ID      MODE      SIZE      TRACK-MAPPING      STATUS

1 *     2+0 Stripe          16126M      611/128/32        Functional


Press <Ctrl-F> to enter FastBuild (tm) Utility....
```

The array status consists of three possible conditions: *Functional, Critical, Offline*.

Functional - The array is operational.

Critical - A mirrored array contains a drive that has failed or disconnected. The remaining drive member in the array is functional. However, the array has temporarily lost its ability to provide fault tolerance. The user should identify the failed drive through the FastBuild™ Setup utility, and then replace the problem drive.

Offline - A mirrored array has 2 drives that have failed/disconnected or a striped array has 1 drive that has failed or been disconnected. When the array condition is "offline," the user must replace the failed drive(s), then restore data from a backup source.

Navigating the FastBuild™ Setup Menu

When using the menus, these are some of the basic navigation tips: Arrow keys highlights through choices; [Space] bar key allows to cycle through options; [Enter] key selects an option; [ESC] key is used to abort or exit the current menu.

Using the Main Menu

This is the first option screen when entering the FastBuild™ Setup.

```
FastBuild (tm) Utility 1.xx (c) 1995-2000 Promise Technology, Inc.
[ Main Menu ]

Auto Setup.....[ 1 ]
View Drive Assignments .....[ 2 ]
Define Array.....[ 3 ]
Delete Array .....[ 4 ]
Rebuild Array .....[ 5 ]
Controller Configuration.....[ 6 ]

[ Keys Available ]
Press 1...6 to Select Option  [ESC] Exit
```

To create a new array automatically, follow the steps under "Creating Arrays Automatically" on page 17. Promise recommends this option for most users.

To manually create an array or define an array as bootable, follow the steps under "Manually Creating Arrays" on page 22. You will need to manually create an array if you wish to modify block size.

To view drives assigned to arrays, see "Viewing Drive Assignments" on page 21.

To delete an array (but not delete the data contained on the array), select "Deleting An Array" on page 28.

To rebuild a mirrored array, see "Rebuilding an Array" on page 30.

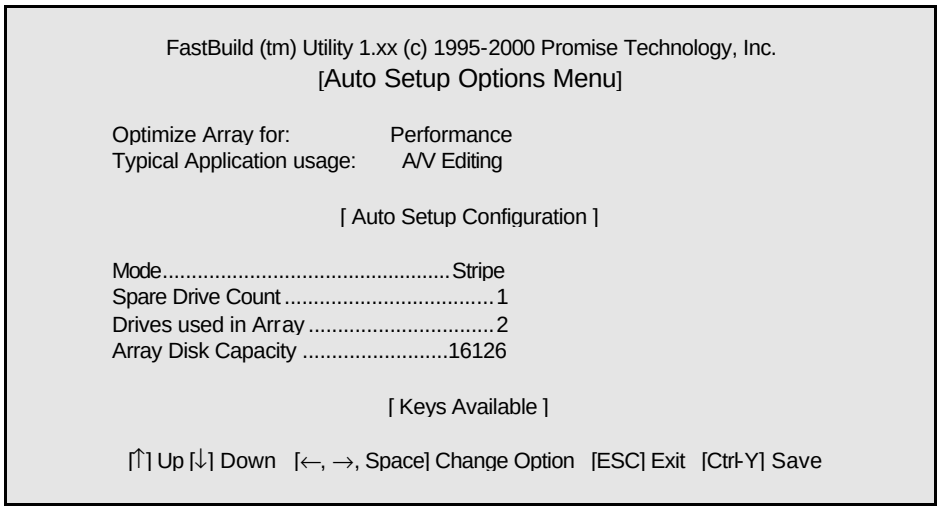
To view controller settings, see "Viewing Controller Configuration" on page 32.



NOTE: After installing the FastTrak100 card and configuring an array using FastBuild, you should FDISK and format the arrayed drive(s) if you are using new, blank drives.

Creating Arrays Automatically

The Auto Setup <1> selection from the Main Menu can intuitively help create your disk array. It will assign all available drives appropriate for the disk array you are creating. After making all selections, use Ctrl-Y to Save selections. FastBuild will automatically build the array.



Optimize Array For

Select whether you want Performance (RAID 0), Security (RAID 1 or RAID 0+1), or Capacity (Spanning) under the "Optimize Array for" setting.

Performance (RAID 0 Striping)

Supports the maximum performance. The storage capacity equals the number of drives times the capacity of the smallest drive in the disk array.

NOTE: *FastTrak100 permits striped arrays using 1, 2, 3, or 4 drives attached in Auto Setup mode.*

Security (RAID 1 Mirroring, or RAID 0+1 Striping/Mirroring)

Creates a mirrored (or fault tolerant) array for data security.

NOTE: *Under the Security setting, FastTrak100 permits two drives to be used for a single Mirrored array or four drives to be used for a Mirrored/Striped array in Auto Setup.*

Capacity (Spanning)

Achieves the maximum amount of capacity by adding the sum of all attached drives. The Stripe Block option does not apply.

Defining Typical Application Usage

Allows the user to choose the type of PC usage that will be performed in order to optimize how FastTrak100 handles data blocks to enhance performance. Your choice will determine the block size used. You may choose from: A/V Editing (for audio/video applications, or any similar application that requires large file transfers), Server (for numerous small file transfers), or Desktop (a combination of large and small file sizes).

Using a "Hot" Spare Drive

If a third drive is attached as a "Slave" and is not assigned to a mirrored two-drive disk array (one optimized for "Security"), it will be recognized as a Spare Drive. Such a drive is immediately used as a "standby" replacement. It is automatically added to an array once a disk member of the array has been detected as "failed." To restore fault tolerance as quickly as possible, FastTrak100 begins to perform an automatic data rebuild on the "spare" drive in the background without the need to restart the system. At a later time, the failed drive can be physically removed from the FastTrak100 card and an extra drive added in its place to function as the "spare" drive.

Creating Multiple Disk Arrays

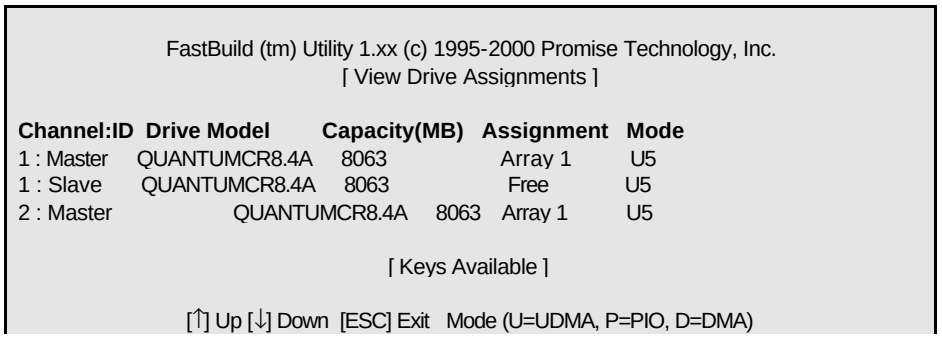
1. If you plan to create multiple arrays, attach only the drives necessary to create the first disk array and complete the <1> Auto Setup.
2. Install the additional drives needed for the second array and again use the <1> Auto Setup.

***NOTE**: If you wish to customize the settings of individual disk arrays (such as block size), you must manually create disk arrays with the Define Array <3> option from the Main Menu.*

Viewing Drive Assignments

The View Drive Assignments <2> option in the Main Menu displays whether drives are assigned to a disk arrays or are unassigned.

Under the "Assignment" column, drives are labeled with their assigned disk array or shown as "Free" if unassigned. Such "Free" drives can be used for a future array or used as a spare drive when a drive fails in a mirrored array. Unassigned drives are not accessible by the OS. The menu also displays the data transfer mode that relates to speed used by each drive (U5 refers to 100MB/sec transfers, U4 refers to 100MB/sec transfers, etc...)



Manually Creating an Array

The Define Array <3> option from the Main Menu allows users to begin the process of manually defining the drive elements and RAID levels for one or multiple disk arrays attached to FastTrak100. Users will commonly create one or two drive arrays with FastTrak100, though the card will support a maximum of four arrays[1].

NOTE: *For most installations, Promise recommends the <1> Auto Setup for easy disk array creation.*

FastBuild (tm) Utility 1.xx (c) 1995-2000 Promise Technology, Inc.
[Define Array Menu]

Array No	RAID Mode	Total Drv	Capacity(MB)	Status
* Array 1	Stripe	2	16126	Functional
Array 2	— —	—	—	
Array 3	— —	—	—	
Array 4	— —	—	—	

[Keys Available]

Note: * —Bootable Array

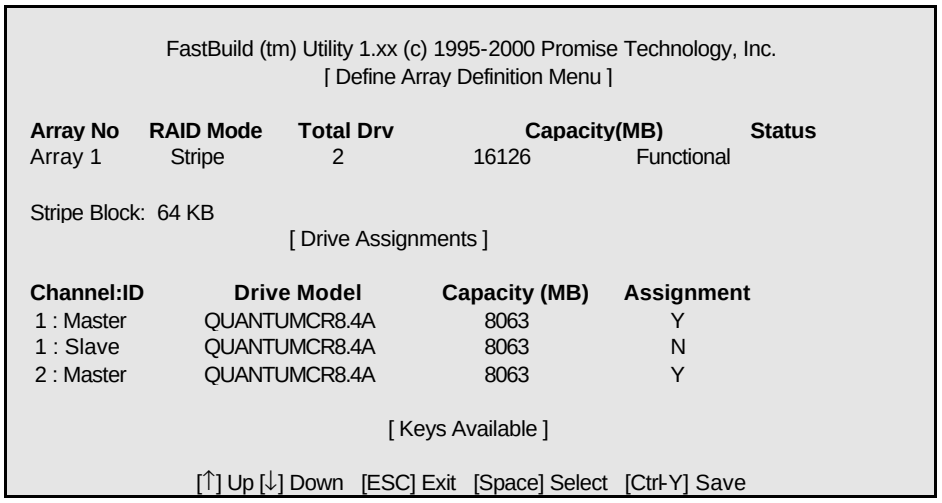
[↑] Up [↓] Down [ESC] Exit [Enter] Select [Space] Change Boot Drive

1. To manually create an array from the Define Array Menu, use the arrow keys to highlight the array number you wish to define, and press [Enter] to select.
2. The Define Array Definition Menu will next appear that allows drive assignments to the disk array (see next page).

[1] *A user may use a single drive in either striping or spanning mode with FastTrak100. In this rare scenario, the card will create an individual array ID but will offer conventional controller performance, depending on the drive type. At a later time, a second drive can be added to the array and the array re-created to support RAID 1 mirroring.*

Selecting Array Type

1. Under the Definition section of this menu, highlight the Array # for which you want to assign a RAID level.
2. Use the [Space] key to cycle through three array types: Performance (RAID 0 Striping), Security (RAID 1 Mirroring, RAID 0+1 Striping/Mirroring (for 4 drives), or Capacity (Spanning). See page 65 about RAID levels.



Selecting Stripe Block

For RAID 0 Striped arrays only, you may manually select the "stripe block size." Use the Spacebar to scroll through choices progressing as follows (1, 2, 4, 8 , 16 . . . 1024).

The size selected affects how FastTrak100 sends and retrieves data blocks from the drives. You will need to perform your own testing to determine how the data block size is affecting your particular use of the array. In general, a larger block size is better when handling large data transfers (such as in A/V editing or graphics) while a smaller block size is better when handling e-mail and other common server data. The default is 64K.

Assigning Drive(s) to Array

1. Under the [Drive Assignments] section, highlight a drive using the [↑] Up [↓] keys.
2. With the [Space] bar key, change the Assignable option to "Y" to add the drive to the disk array.
3. Press <Ctrl-Y> to save the disk array information. Depending on the array type selected, the following scenarios will take place:

a) If choosing a Striping, Spanning, or Mirroring/Striping array, the initial Define Array Menu screen will appear with the arrays defined. From there you may ESC to exit and return to the Main Menu of FastBuild.

b) If you selected a Mirroring array for two drives, there is an additional window that appears as described in order to create the array. To do this you will use either two brand new drives, or one drive that contains existing data that you wish to mirror.

Creating A Mirrored Array Using New Drives

As described in the Drive Assignments Option section above, if you selected a mirroring array and wish to use two new assigned drives, follow the directions here.

1. After assigning new drives to a Mirroring array and saving the information with <Ctrl-Y>, the window below will appear.

Do you want the disk image to be duplicated to another? (Yes/No) Y - Create and Duplicate N - Create Only

2. Press "N" for the Create Only option.

3. A window will appear almost immediately confirming that your Security array has been created. Press any key to reboot the system

Array has been created. <Press Any Key to Reboot>

Adding Fault Tolerance to an Existing Drive

FastTrak100 will create a mirrored array using an existing system drive with data. You must assign the existing drive and another drive of same or larger capacity to the Mirroring array. The BIOS will send the existing data to the new blank drive.



***WARNING**: Backup any necessary data before proceeding. Failure to follow this accepted PC practice could result in data loss.*



***WARNING**: If you wish to include your current bootable drive using the Windows NT 4.0 or Windows 2000 operating system as part of a bootable Mirrored (RAID 1) array on your FastTrak100, do NOT connect the hard drive to the FastTrak100 controller yet. You MUST install the Windows NT4.0 or 2000 driver software first (see page 34) to this drive while it is still attached to your existing hard drive controller. For all other Operating Systems, proceed here.*

1. After assigning the drives to a Mirroring array, press <Ctrl-Y> keys to Save your selection. The window below will appear.

```
Do you want the disk image to be duplicated to another? (Yes/No)
Y - Create and Duplicate
N - Create Only
```

2. Press "Y" for the Create and Duplicate option. The window below will appear asking you to select the Source drive to use. FastBuild will copy all data from the Source drive to the Target drive.

```
                        Source Disk
Channel:ID          Drive Model              Capacity (MB)

                        Target Disk
Channel:ID          Drive Model              Capacity (MB)

                  [Please Select A Source Disk]
 Channel:ID         Drive Model              Capacity (MB)
 1 :Master          QUANTUMCR8.4A              8063
 2 :Master          QUANTUMCR8.4A              8063

          [↑] Up [↓]  [ESC] Exit  [Ctrl-Y] Save
```

3. Use the arrow keys to choose which drive contains the existing data to be copied.



***WARNING**: All target drive data will be erased. Make sure you choose the correct drive.*

4. Press [Ctrl-Y] keys to Save selection and start duplication. The following confirmation screen will appear.

```
Start to duplicate the image . . .
Do you want to continue? (Yes/No)
Y – Continue  N - Abort
```

5. Select "Y" to continue. If you choose "N", you will be returned to step 1.
6. Once "Y" is selected, the following progress screen will appear. The process will take a few minutes.

```
Please Wait While Duplicating The Image
                                        10%
Complete
```

7. Once mirroring is complete, the following screen will appear confirming that your Security array has been created. Press any key to reboot the system

```
Array has been created.
<Press Any Key to Reboot>
```

Making a FastTrak100 Disk Array Bootable



***WARNING**: In order for you to boot from an array on the FastTrak100, your PC or server must be configured in the CMOS Setup to use the FastTrak100 as a bootable device (versus the onboard controller or another add-in card). This option is not available if the FastTrak100 is being used as a secondary controller.*

1. Once you have returned to the Define Array Menu window (below), you will see the array(s) you have created. You now may use the menu to select which previously-defined array will be used as the bootable array.

```
FastBuild (tm) Utility 1.xx (c) 1995-2000 Promise Technology, Inc.
[ Define Array Menu ]

  Array No      RAID Mode    Total Drv      Capacity(MB)      Status
* Array 1                Stripe              2              13044          Functional

Note: * —Bootable Array

[↑] Up [↓] Down   [ESC] Exit   [Enter] Select   [Space] Change Boot Drive
```

2. Highlight the array which you want to boot from using the [↑] Up [↓] Down keys.
3. Press the [Space] bar key.
4. An * asterisk will appear next to the array number indicating it as bootable. The system will now recognize this array as the first array seen
5. The system will then use this bootable array as the (fixed) boot C: drive.

***NOTE**: The bootable array must contain your configured operating system.*

Creating a "Hot" Spare Drive for Mirrored Arrays

For automatic rebuilds of a mirrored array, attach an extra "spare" drive to the FastTrak100. Drives that are not assigned to an array and are the same size or larger than the original will be used for the automatic rebuild. This is performed in the background under all supported operating systems, except DOS. At a later time, the system can be turned off and the failed drive can be physically removed.

How FastTrak100 Orders Arrays

During startup, the disk arrays on the FastTrak100 are recognized in this order: 1) The array set to bootable in the FastBuild™ Setup, and 2) the Array number (i.e. Array 0, Array 1..). This would be involved in determining which drive letters will be assigned to each disk array.

How FastTrak100 Saves Array Information

All disk array data is saved into the reserved sector on each array member. Promise suggests that users record their disk array information for future reference.

Another feature of the FastTrak100 disk array system is to recognize drive members even if drives are moved between different FastTrak100 card connectors. Since each drive' s array data identifies itself to the array, it is possible to move or swap drives without modifying the array setup. This is valuable when adding drives, or during a rebuild.

Deleting An Array

The Delete Array <4> Menu option allows for deletion of disk array assignments. This is not the same as deleting data from the drives themselves. If you delete an array by accident (and before it has been used again), the array can normally be recovered by defining the array identically as the deleted array.



***WARNING**: Deleting an existing disk array could result in its data loss. Make sure to record all array information including the array type, the disk members, and stripe block size in case you wish to undo a deletion.*

FastBuild (tm) Utility 1.xx (c) 1995-2000 Promise Technology, Inc.
[Delete Array Menu]

Array No	RAID Mode	Total Drv	Capacity(MB)	Status
Array 1	Stripe	2	16126	Functional
Array 2	Mirror	2	8063	Functional
Array 3	—	—	—	—
Array 4	—	—	—	—

[Keys Available]

[↑] Up [↓] Down [ESC] Exit [Del] Delete

1. To delete an array, highlight the Array you wish to delete and press the [Del] key.
2. The View Array Definition menu will appear (see below) showing which drives are assigned to this array.

FastBuild (tm) Utility 1.xx (c) 1995-2000 Promise Technology, Inc.
[Define Array Menu]

Array No	RAID Mode	Total Drv	Capacity(MB)	Status
Array 1	Stripe	2	16126	Functional

Stripe Block: 64 KB

[Drive Assignments]

Channel:ID	Drive Model	Capacity (MB)	Assignment
1 : Master	QUANTUMCR8.4A	8063	Y
2 : Master	QUANTUMCR8.4A	8063	Y

3. Confirm yes to the following warning message with the <Ctrl-Y> key to continue array deletion:

Are you sure you want to delete this array?

Press Ctrl-Y to Delete, others to Abort

4. After deleting the array, you should create a new array using Auto Setup or the Define Array menu from the FastBuild Main Menu.

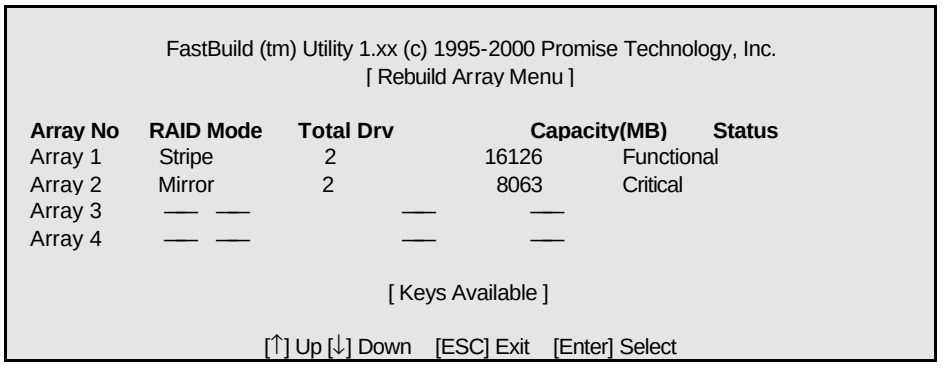
Rebuilding A Mirrored Array

The Rebuild Array <5> Menu option is necessary to recover from an error in a mirrored disk array. You will receive an error message when booting your system from the FastTrak BIOS.

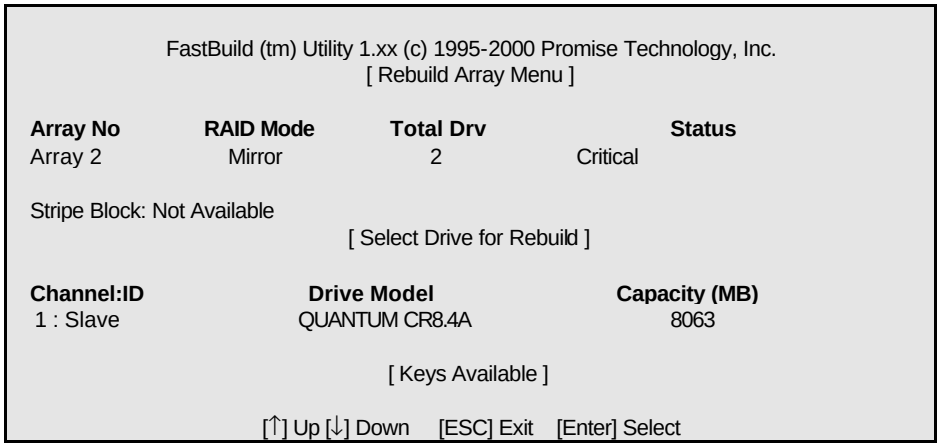
***NOTE**: Drives MUST be replaced if they contain any physical errors.*

Follow these steps BEFORE using the Rebuild Array menu option:

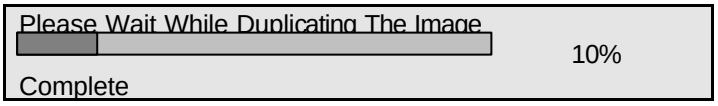
1. On bootup, the FastTrak100 Startup BIOS will display an error message identifying which drive has failed.
2. Press <Ctrl-F> keys to enter FastBuild Main Menu.
3. Select submenu Define Array <3>.
4. Select the failed array and identify the Channel and ID of the failed drive.
5. Power off and physically remove the failed drive.
6. Replace the drive with an identical model.
7. Reboot the system and enter the FastBuild Main Menu.
8. Select the <5> Rebuild Array option. The following screen will appear.



9. Highlight the array whose Status is "Critical".
10. Press [Enter]. The following screen will then appear (see next page).



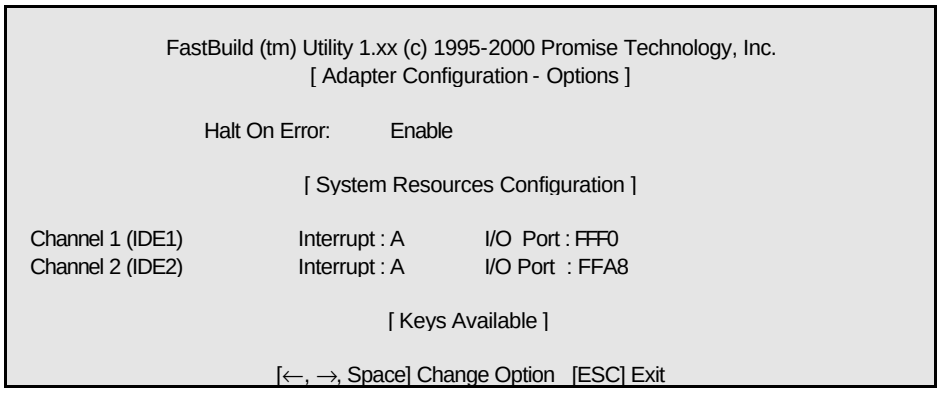
11. Under [Select Drive for Rebuild], highlight the replacement drive.
12. Press [Enter] and confirm that the data will be copied on to the selected drive. All data on the replacement drive will be written over with mirrored information from the array drive. A progress bar will appear as below.



13. Once the rebuild process is complete, the user will be asked to reboot the system.

Viewing Controller Settings

The Controller Configuration <6> menu selection allows you to enable or disable the FastTrak100 BIOS from halting (the default) if it detects an error on boot up. You may also view the system resources (Interrupt and I/O port address) of FastTrak' s data channels.



Halting FastTrak BIOS On Bootup Errors

The [Adapter Configuration – Options] section allows you to enable or disable FastTrak100 to Halt operation at the BIOS startup screen should an error be detected. This is the only option that can be changed on this screen.

Viewing FastTrak System Resources

The [System Resources Configuration] section of this submenu displays the PCI slot interrupt and port address used by the FastTrak100. The resources used are determined by the Mainboard PCI PnP BIOS for the PCI slot in which the FastTrak100 resides.

In the rare case that there is a resource conflict, refer to the Mainboard BIOS documentation on changes on resources allocated to the FastTrak100 PCI slot.

NOTES

Installing Drivers

This section details the FastTrak100 driver installation when used with various operating systems. The software includes the driver necessary to identify FastTrak100 to the operating system.

- For Windows 2000, see below.
- For Microsoft Millennium, see page 36.
- For Windows 95/98, see page 38.
- For Windows NT 4.0, see page 42
- For Windows 3.1/DOS, see page 41.

Windows 2000

Installing Driver During New Windows 2000 Installation

1a. Floppy Install: Boot the computer with the Windows 2000 installation diskettes.

1b. Floppyless Install: Boot from floppy and type "WINNT". After files have been copied, the system will reboot. On the reboot, press <F6> after the message "Setup is inspecting your computer's hardware configuration..." appears.

1c. CD-ROM Install: Boot from the CD-ROM. Press <F6> after the message "Press F6 if you need to install third party SCSI or RAID driver" appears.

2. When the "Windows 2000 Setup" window is generated, press "S" to Specify an Additional Device(s)

3. Press "O" to select "Other" and press the "Enter" key.

4. Insert the Promise Technology® driver diskette into drive A: and press "Enter" key.

5. Choose "Win2000 Promise FastTrak100 (tm) Controller" from the list that appears on screen, then press the "Enter" key.

6. The Windows 2000 Setup screen will appear again saying "Setup will load support for the following mass storage devices:" The list will include "Win2000 Promise FastTrak100 (tm) controller"..

   ***NOTE**: If you need to specify any additional devices to be installed, do so at this time. Once all devices are specified, continue to step 7.*

7. From the Windows 2000 Setup screen, press the Enter key. Setup will now load all device files and then continue the Windows 2000 installation.

Installing Driver in Existing Windows 2000 System



***WARNING**: If you will be moving the boot drive containing the existing Windows 2000 operating system to a mirrored RAID 1 array on the FastTrak100 card, the FastTrak100 driver MUST be loaded to the hard drive while it is still attached to your existing hard drive controller. Do not attach this drive or any other hard drive to the FastTrak100 controller card before completing this step.*

After installing the FastTrak100 card and rebooting your system, Windows 2000 setup will show a "New Hardware Found" dialog box. Under Windows 2000, the "PCI RAID Controller" will be displayed.

1. In the dialog box, choose "Driver from disk provided by hardware manufacturer" button.
2. In the A: drive, insert the FastTrak100 driver diskette.
3. Type "A:\WIN2000" in the text box. Press "Enter".
4. Choose "Win2000 Promise FastTrak100 (tm) Controller" from the list that appears on screen, then press the "Enter" key.
5. The Windows 2000 Setup screen will appear again saying "Setup will load support for the following mass storage devices – Win2000 Promise FastTrak100 (tm) controller". The FastTrak100 driver will now be copied on to the system and entered into the Windows 2000 driver database.
6. When the "System Settings Change" dialog box appears, remove the floppy diskette and click on "Yes" to restart the system. Windows 2000 will then restart for the driver installation to take effect.
7. Power off your system, then attach your hard drives to the FastTrak100 controller card.

Confirming Windows 2000 Installation

1. From Windows 2000, open the Control Panel from "My Computer" followed by the System icon.
2. Choose the "Hardware" tab, then click the "Device Manager" tab.
3. Click the "+" in front of "SCSI & RAID Controllers hardware type." The driver "Win2000 Promise FastTrak100 (tm) Controller" should appear.

Microsoft Millennium

Installing Drivers During Millennium Installation

The following details the installation of the FastTrak100 drivers while installing Microsoft's Millennium (with the FastTrak100 controller card already in place). If you're installing the FastTrak100 drivers on a system with Millennium already installed, see "Installing Drivers with Existing Millennium System."

1. Install Microsoft Millennium fully.
2. After installation, go the "Start" menu and choose "Settings."
3. From the "Settings" menu, choose "Control Panel."
4. In the "Control Panel" window, double-click on the "System" icon.
5. In the "System" window, choose the "Device Manager" tab.
6. In the hierarchical display under "Other Devices" is a listing for "PCI RAID Controller." Choose it and then press the "Properties" button.
7. Choose the "Driver" tab in the "Properties" window, choose "Update Driver," and then press "Next."
8. Choose "Search for a better driver than the one your device is using now (recommended)," then press "Next."
9. Choose "Specify Location," and then type "A:\WINME" in the text box.
10. Insert the "FastTrak100 Driver" diskette into the A: drive.
11. Press the "Next" button. A message informing you that Windows Millennium has found "Windows Millennium Promise FastTrak100 Controller" should appear.
12. Press "Next," then "Finish," then "Yes" when asked if you want to restart your computer. Be sure to remove the diskette from drive A:.

Installing Drivers with Existing Millennium System

The following section details the installation of FastTrak100 drivers on a system that has Millennium already installed and running. If you're installing the FastTrak100™ drivers on a system during an installation of Millennium, see "Installing Drivers During Millennium Installation."

1. After installing the FastTrak100 controller card and configuring the hard drives, power up the system and boot.
2. The "Add New Hardware Wizard" will appear, informing you that it has found a "PCI RAID Controller."
3. Click on "Next," and from the generated list box, choose "Search for a better driver than the one your device is using now."
4. Click on "Next," and from the generated choices, choose "Specify a location."
5. Insert the "FastTrak100 Driver" diskette in drive A:.
6. Type "A:\WINME" in the text box that appears.
7. Click on "Next." A message informing you that Windows Millennium has found "Windows Millennium Promise FastTrak100 Controller" should appear.
8. Click on "Next," and then on "Finish."
9. Choose "Yes" when asked if you want to restart your computer. Be sure to eject the diskette from drive A:.

Confirming Driver Installation in Millennium

To confirm that the driver has been properly loaded in Millennium, perform the following steps:

1. Choose "Settings" from the "Start" menu.
2. Choose "Control Panel," and then double-click on the "System" icon.
3. Choose the "Device Manager" tab, and then click the "+" in front of "SCSI & RAID controllers." "Windows Millennium Promise FastTrak100 Controller" should appear.

Windows 95/98

Installing Drivers During Windows 95/98 Installation

The following three sections detail the installation of the FastTrak100 drivers while installing Windows 95/98 (with the FastTrak100 controller card already in place). If you're installing the FastTrak100 drivers on a system with Windows 95/98 already installed, see "Installing Drivers with Existing Windows 95/98" on page 40.

Windows 98

1. After installing the FastTrak100 controller card and configuring the hard drive(s), partition and format your hard drive(s), if necessary.
2. Install Windows 98 normally.
3. After installation, go to the "Start" menu and choose "Settings."
4. From the "Settings" menu, choose "Control Panel."
5. In the "Control Panel" window, double-click on the "System" icon.
6. In the "System" window, choose the "Device Manager" tab.
7. In the hierarchical display under "Other Devices" is a listing for "PCI RAID Controller." Choose it and then press the "Properties" button.
8. Choose the "Driver" tab in the "Properties" window, choose "Update Driver," and then press "Next."
9. Choose "Search for a better driver than the one your device is using now (recommended)," then press "Next."
10. Choose "Specify Location," and then type "A:\WIN95-98" in the text box.
11. Insert the "FastTrak100 Driver" diskette into the A: drive.
12. Press the "Next" button. A message informing you that Windows 98 has found "Win95-98 Promise FastTrak100 (tm) Controller" should appear.
13. Press "Next," then "Finish," then "Yes" when asked if you want to restart your computer. Be sure to remove the diskette from drive A:.

Windows 95

1. After installing the FastTrak100 controller card and configuring the hard drives, partition and format your hard drive(s), if necessary.
2. Install Windows 95 normally.
3. After installation, go to the "Start" menu and choose "Settings."
4. From the "Settings" menu, choose "Control Panel."
5. In the "Control Panel" window, double-click on the "System" icon.
6. In the "System" window, choose the "Device Manager" tab.

7. In the hierarchical display under "Other Devices" is a listing for "PCI Mass Storage Controller." Choose it and then press the "Properties" button.
8. Choose the "Driver" tab in the "Properties" window, and then press the "Update Driver" button.
9. When asked if you want Windows to search for the driver, choose "Yes (recommended)."
10. Insert the "FastTrak100 Driver" diskette into the A: drive, then press "Next."
11. When Windows informs you that it was unable to find the drivers, press "Other Locations…".
12. In the "Select Other Location" dialog box, type "A:\WIN95-98".
13. Press the "Next" button. A message informing you that Windows 95 has found "Win95-98 Promise FastTrak100 (tm) Controller" should appear.
14. Press "Finish." (If Windows can't find the "FastTrak100.MPD" file, type "A:\WIN95-98" in the "Copy files from:" text box).
15. Choose "Yes" when asked if you wish to restart the system, and remove the diskette.

Installing Drivers with Existing Windows 95/98

The following three sections detail the installation of FastTrak100 drivers on a system that has Windows 95/98 already installed. If you're installing the FastTrak100 drivers on a system during a Windows 95/98 installation, see "Installing Drivers During Windows 95/98 Installation" on page 38.

Windows 98

1. After installing the FastTrak100 controller card and configuring the hard drives, power up the system and boot Windows.
2. The "Add New Hardware Wizard" will appear, informing you that it has found a "PCI RAID Controller."
3. Check the "Search for the best driver for your device" box and click the Next button.
4. Check the "Specify a Location" box and click Next button.
5. Type "A:\WIN95-98" in the text box that appears.
6. Insert the "FastTrak100 Driver" diskette in drive A:.
7. Click on "Next." The Add New Hardware wizard will say it has found "Win95-98 Promise FastTrak100 (tm) controller".
8. Click on "Next," and then on "Finish."
9. Choose "Yes" when asked if you want to restart your computer. Be sure to eject the diskette from drive A:.

Windows 95

1. After installing the Ultra100 controller card and configuring the hard drives, power up the system and boot Windows.
2. The "Update Device Drive Wizard" will appear, informing you that it has found a "PCI Mass Storage Controller."
3. Insert the "FastTrak100 Driver" diskette in drive A:.
4. Type "A:\WIN95-98" in the text box, then click on "Next." Windows will inform you that it has found the "Win95-98 Promise FastTrak100 (tm) controller".
5. Click on "Finish," and when prompted to insert the "FastTrak100 Driver" diskette, click on "OK."
6. If a message informing you that the file "FastTrak100.MPD" cannot be found, go to the "Copy files from:" text box and type: "A:\WIN95-98".
7. Choose "Yes" when asked whether you want to start your computer. Be sure to remove the diskette from drive A

Confirming Driver Installation in Windows 98/95

To confirm that the driver has been properly loaded in Win 95/98, perform the following steps:

1. Choose "Settings" from the "Start" menu.
2. Choose "Control Panel," and then double-click on the "System" icon.
3. Choose the "Device Manager" tab, and then click the "+" in front of "SCSI & RAID controllers." "Win95-98 Promise FastTrak100 (tm) controller" should appear

DOS/Windows 3.1x

For first-time installation, follow the standard procedure of installing DOS on to your hard disk (partition all hard drives with FDISK and format before performing the following procedure):

1. Insert "Disk 1" of your DOS installation diskettes into drive A:.
2. Type "A:SETUP" at the "A:\" prompt.
3. Continue with normal DOS installation procedure, and refer to your DOS manual for additional details.

***NOTE**: The FastTrak100 BIOS supports both DOS and Windows 3.1x without software drivers.*

Windows NT4.0

Installing Drivers During Windows NT 4.0 Installation

1. Start the system installation by booting from the Windows NT disk:

   a) Floppy install: boot the system with the Windows NT installation diskettes.
   b) Floppyless install: boot from floppy and type "WINNT /B". After files have been copied, the system will reboot. On the reboot, press the "F6" key when the message "Setup is inspecting your computer's hardware configuration...". appears.
   c) CD-ROM disk install: boot from the CD-ROM disk and press the "F6" key when the message "Setup is inspecting your computer's hardware configuration...". appears.

2. When the "Windows NT Setup" window is generated, press "S" to Specify an Additional Device(s).
3. Press "O" to select "Other" and press the "Enter" key.
4. Insert the Promise Technology® FastTrak100 driver diskette into drive A: and press the "Enter" key.
5. Choose "WinNT Promise FastTrak100 (tm) Controller" from the list that appears on screen, then press the "Enter" key.
6. The Windows NT Setup screen will appear again saying "Setup will load support for the following mass storage devices:" The list will include "WinNT Promise FastTrak100 (tm) controller".

   ***NOTE**: If you need to specify any additional devices to be installed, do so at this time. Once all devices are specified, continue to step 7.*

7. From the Windows NT Setup screen, press the Enter key. Setup will now load all device files and then continue the Windows NT installation.
2. After a successful installation, the "SCSI Adapter Setup" box will show that the "WinNT Promise FastTrak100 (tm) Controller" driver has been installed.

Installing Driver with Existing Windows NT 4.0



WARNING*: If you plan to move your boot drive to a mirrored RAID 1 FastTrak array, hard drives should NOT be connected to the FastTrak100 controller card before performing the following procedure. The FastTrak100 drivers must be loaded on the system hard drive (running under the existing hard drive controller) before any hard drives are connected to the FastTrak100 controller card.*

1. Choose "Settings" from the "Start" menu.
2. Choose "Control Panel" from the "Settings" menu.
3. Double-click on the "SCSI Adapters" icon, which generates the "SCSI Adapters" dialog box.
4. Choose "Drivers," and then press "Add."
5. In the "Install Drivers" dialog box, press "Have Disk..".
6. When the "Install From Disk" appears, insert the "FastTrak100 Driver" diskette in drive A:.
7. Type "A:\NT4" in the text box window, then choose "OK."
8. When the "Install Driver" dialog box appears, select "Win NT Promise FastTrak100 Controller" and then press "OK."
9. When the "Select SCSI Adapter Option" dialog box appears, press "Install."
10. After a successful installation, the "SCSI Adapter Setup" box will show that the "Win NT Promise FastTrak100 (tm) Controller" has been installed.
11. Power off your system.
12. If moving the boot drive to the FastTrak card, now attach the hard drives (see page 7. otherwise reboot.

Removing the Driver from Windows NT 4.0

1. In "Start" Button choose "Control Panel" in "Setup" group.
2. In "Control Panel," select "SCSI Adapter," next choose "Drivers" label
3. Choose "Remove" button.
4. After successful removing, the "SCSI Adapter Setup" box will show that "Win NT FastTrak100 (tm) RAID Controller" has been removed.

Using The FastCheck™ Monitoring Utility

You can monitor the operating status of all arrays and drives configured on the FastTrak100 using the supplied FastCheck monitoring utility for Windows-based operating systems. FastCheck generates visual and audible messages alerting you of possible problems with the disk array or controller.

FastCheck visually identifies the physical location of attached drives on the FastTrak100 by IDE channel (1 or 2) and setting (Master/Slave). It also displays which drives are included as part of individual arrays. Administrators can customize FastCheck to maintain operating logs and event notification, set Password access to the utility, and schedule maintenance on Mirrored (RAID 1) or a Striped/Mirrored (RAID 0/1) arrays.

Installing FastCheck

1. From the Start Button on the Windows Taskbar, choose Run.
2. Insert Promise FastCheck Utility Diskette.
3. In the Run dialog box, type in "A:\Setup" and click OK.



4. Follow the directions from the setup program.
5. During installation, click YES when prompted to run the utility on every startup. If NO is selected, FastCheck will not initialize during startup. You may manually execute the utility via the Start button.

   ***NOTE**: Promise recommends to have FastCheck load during Startup. This insures you that it will be ready to post alerts on errors.*

Running FastCheck

As described in the Installation section, the default option for FastCheck is to load during startup of Win95/98/NT/2000. It appears minimized on the taskbar under Win 95/98/NT4.0/2000/Millennium (see below).



To start FastCheck, double-click on the FastCheck icon on the taskbar (above) or you may also use the Taskbar Start/Promise/FastTrak/FastCheck menus shown below.



Closing FastCheck

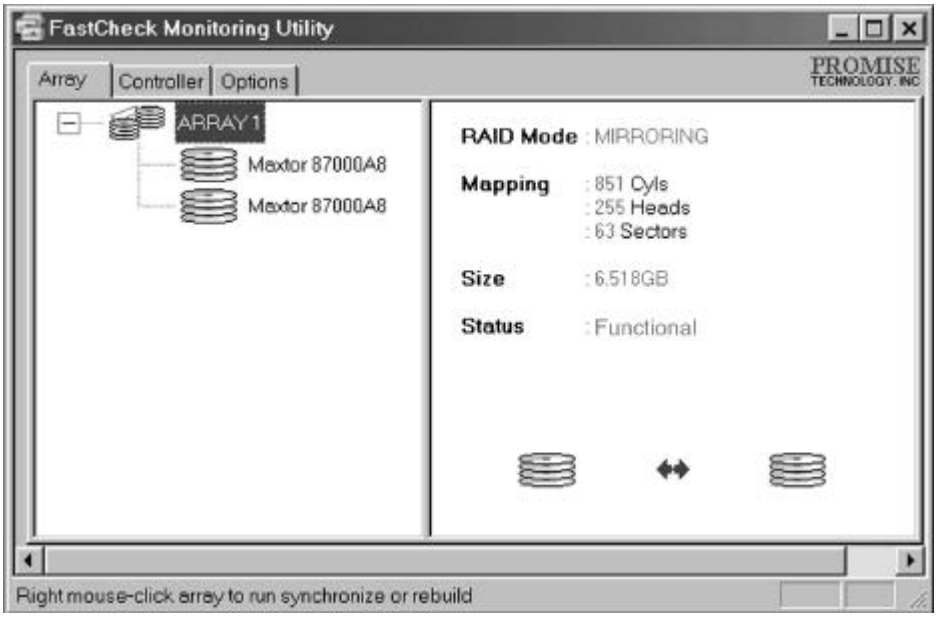
Once FastCheck is opened (either automatically on startup or manually), the monitoring utility remains running in the background even if the user "closes" the FastCheck window.

To completely shut down FastCheck, perform the following steps.

1. Right-click the FastCheck icon on the Taskbar.
2. Select Exit from the pop-up window.
3. FastCheck will no longer be running and will no longer be monitoring the array.

Using FastCheck Array Window

Once FastCheck is selected, the FastCheck Monitoring Utility window will appear. The main pane has three information window tabs: Array, Controller, and Options. The user can switch screens by clicking on the tab. The Array Window is the active screen by default as shown below:



The Array Window (see above) displays information about the arrays configured on your FastTrak100 through the FastBuild BIOS. From this window, you can also perform data Synchronization of mirrored arrays, or Rebuild data from one drive to a replacement drive within a mirrored array.

While the Array Window does not allow you to change the array configurations directly, it clearly identifies which drives are associated with each array shown in the left pane.

Viewing Array Information

By left-clicking on the Array #, the right pane shows the following information categories for that array:

RAID mode: (Striping, Mirroring, Mirroring & Striping, Spanning)

Mapping: (similar to physical drive specifications) describing # of cylinders, heads, and sectors of the array's "virtual" drive as seen by the system

Size: Storage capacity of the array

Status: (Functional, Critical, Offline)

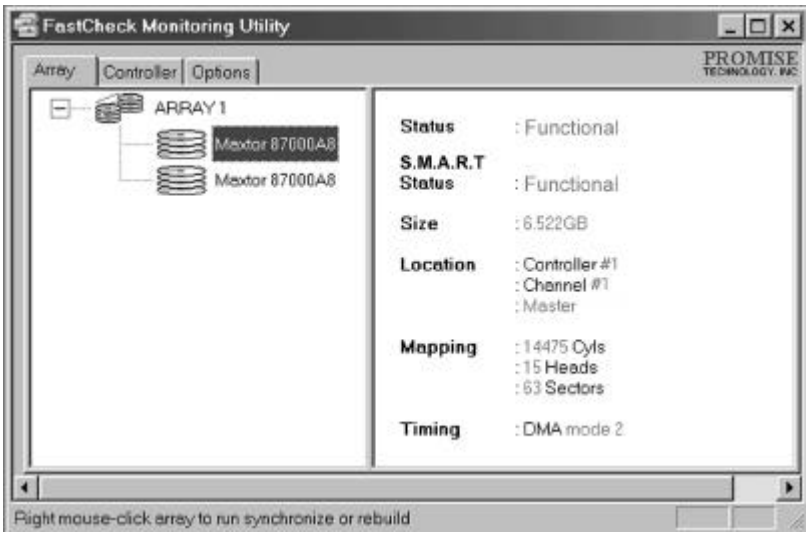
Functional: Means the array is providing full functionality

Critical: Used only in reference to a Mirroring array (RAID 1 or RAID 0+1). A problem has been detected in one of the drives of the array and the drive has been taken "offline." However, a "critical" array will continue to save and retrieve data from the remaining working drive(s). Promise recommends replacing the failed drive as soon as possible since a "Critical" array offers no data redundancy.

Offline: This would appear most commonly within a RAID 0 or Spanning array. The "Offline" results from a drive having failed which has taken the entire array "offline." In this case, you have likely lost data. Fix/replace the drive that has failed, then restore data from a backup source.

Viewing Arrayed Drive Information

By left-clicking on a drive member of an array in the left pane, the right pane shows the following information categories for that drive:



Status (also shown under the Array Window) can be Functional, Critical, or Offline. The meanings are shown below.

Functional: Means the drive is working normally

Critical: A problem has been detected in the drive and the drive taken offline as part of a mirroring array. Mirrored arrays will continue to function without the drive. Fix/replace the drive that has failed, then restore data from a backup source.

Offline: Drives that are NOT identified as "bad" may be taken offline if part of a Striping or Spanning array containing a "bad" drive. These drives do NOT need to be replaced, however.

S.M.A.R.T. Status: Indicates whether attached hard drive implements Self-Monitoring Analysis & Reporting Technology to predict drive failure

Size: Indicates capacity of individual drive

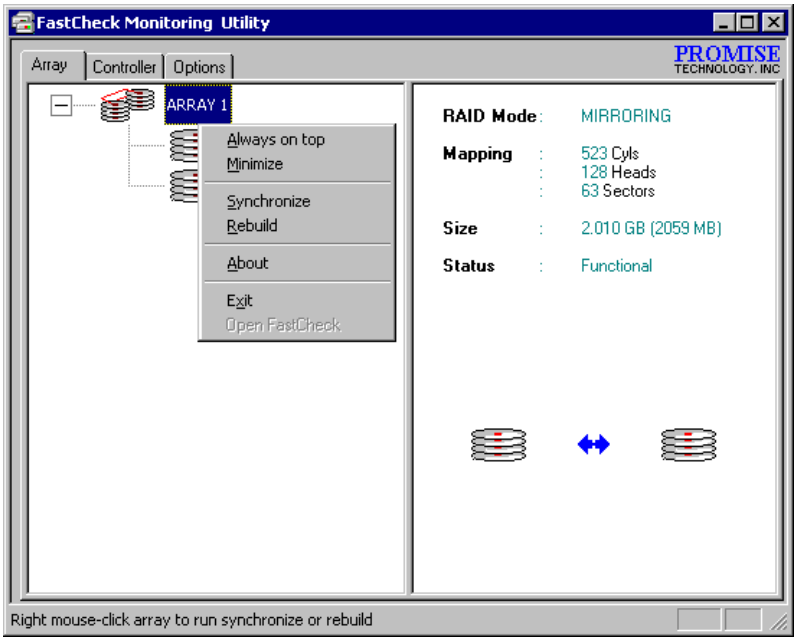
Location: Shows physical location of drive. Indicates on which IDE channel (1 or 2), and whether drive is Master or Slave on cable. This allows user to identify drives for removal/replacement.

Mapping: Indicates physical parameters of drive (cylinders, heads, sectors)

Timing: Shows selection of drive timing (directly related to burst speed) based on type of drive and cable used.

Using Array Pull-down Menu

At the bottom of the Array window, it indicates to right-click on an Array to perform synchronization or rebuild operations. Right-clicking displays the following pull-down menu:



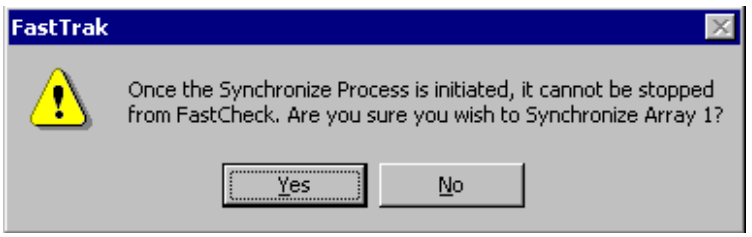
From this menu, users may choose to have the Window Always **Appear** on Top of applications, **Minimize**, **Synchronize** mirrored drives, **Rebuild** a mirrored array, use **About** to check FastCheck version #, or **Exit** the onscreen window.

Synchronizing An Array

Synchronization is a periodic maintenance procedure for Mirroring (RAID 1, RAID 0+1) arrays to maintain data consistency on all mirrored drives. In operation, array synchronization compares data on the mirrored drives for any differences. If there are differences detected, data from the primary drive(s) is automatically copied to the secondary drive(s). This assures that all mirrored drives will contain the exact information.

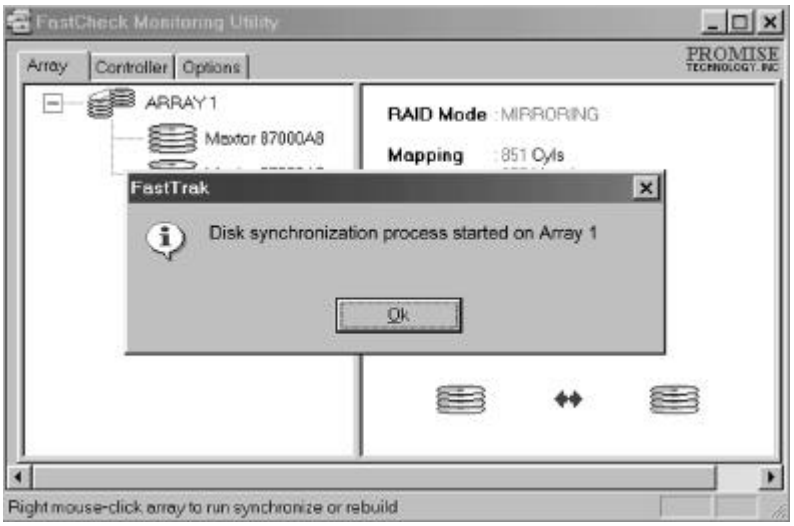
***NOTE**: You may instead choose to schedule array synchronization automatically under the Options Tab view versus manually initiating synchronization (see page 46).*

1. To synchronize, choose the Array Tab View (see figure on previous page).
2. Right-click on the array you wish to synchronize and choose "Synchronize" from the context menu.
3. Click "Yes" to initiate Synchronization (see below) when the Confirmation window appears. To cancel this option, click the No button.



***WARNING**: Once initiated, synchronization can NOT be halted in order to prevent data errors.*

4. Once Synchronization is confirmed, the following information screen appears. Click OK button or close the window to proceed.



***NOTE**: During Array Synchronization, users may continue to access the working array and perform normal PC functions. However, system performance will be slightly degraded and the process will take longer.*

5. A progress bar will appear at the bottom of the FastCheck Monitoring window showing synchronization in progress and the percentage that has been completed.



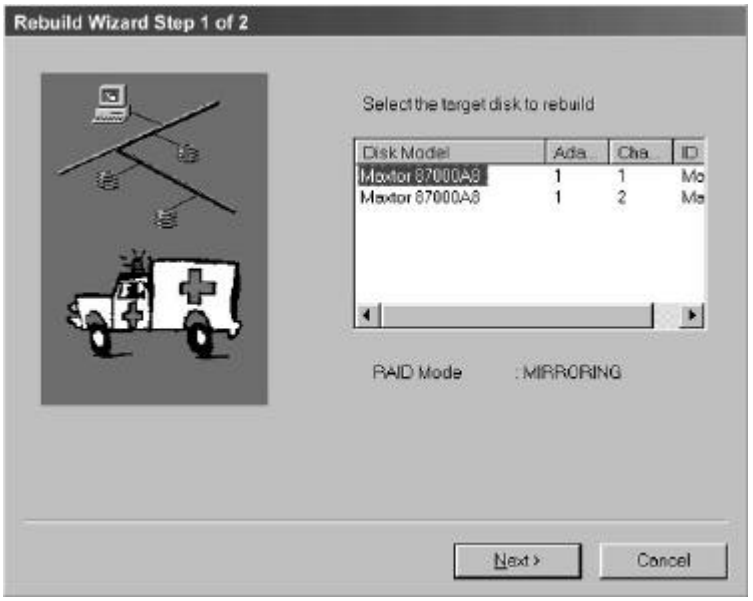
Rebuilding An Array

This command effectively copies or overwrites data from an existing data drive in the array on to a blank drive. The operation will be typically used when a failed drive has been replaced with a new drive as part of a mirrored array.

1. To perform a Rebuild, choose the Array Tab View.
2. Right click the array number and choose Rebuild from the context menu.
3. Once Rebuild is selected, you will be asked to "Initialize Rebuild process on Array #" by clicking OK.

Using Rebuild Wizard

1. Initiating rebuild array will open the Rebuild Wizard Step 1 screen shown below.
2. Select the Target drive which will receive data. Make sure you select the blank new or replacement drive. The unselected drive will contain "good" data. It will be the remaining working drive of an array, or a system drive containing existing data that you wish to mirror.

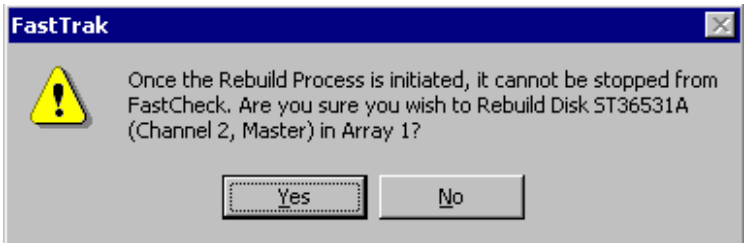


***WARNING**: Make absolutely sure and double-check which drive is which. If data exists on the target drive, it will be over-written.*

3. Click the Next button to proceed to Rebuild Wizard Step 2 (see next page) or Cancel button to stop.



4. Rebuild Wizard Step 2 confirms the Target or "Rebuild" disk by Array # and drive ID.
5. Click Finish button to initiate physical Rebuild, Back button to review Step 2, or Cancel button to Stop. A final confirmation window appears as below:



6. Click "Yes" to initiate Rebuild. To cancel this option, click the No button.

***WARNING**: Once initiated, Array Rebuild can NOT be halted in order to prevent data errors.*

***NOTE**: During Array Rebuild, users may continue to access the array and perform normal PC functions however the array will NOT provide data redundancy until Rebuild is completed. If you choose to continue using the PC during rebuild, system performance will be slightly degraded and the process will take longer.*

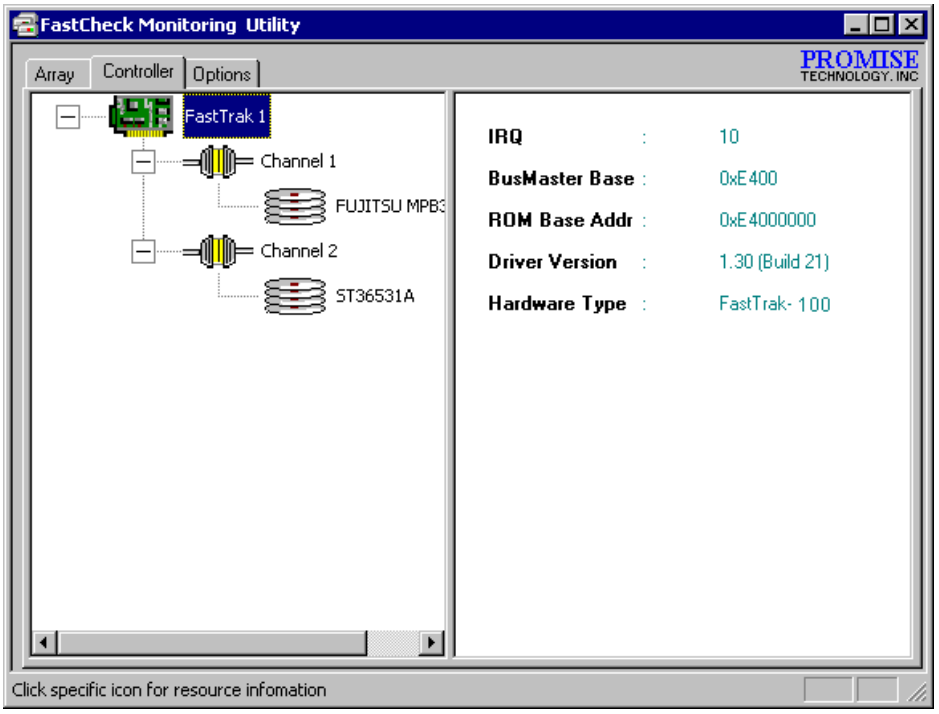
6. Once Array Rebuild has begun, users are returned to the FastCheck Monitoring window. A progress bar showing the rebuild progress in percentage will appear at the bottom of the FastCheck Monitoring window.



***NOTE**: When a "spare" unassigned drive is present on the FastTrak100, a rebuild will automatically be performed from the remaining working drive.*

Using Controller Window

Clicking on the Controller tab, will reveal the Controller Window. This displays physical information about the location of FastTrak100, data channels on the card, and the attached drives.



Viewing Controller Card Information

By left-clicking on the FastTrak controller icon, the right pane shows the following information categories for that array:

IRQ: Identifies interrupt request assigned to PCI slot

Bus Master Base: Shows base address in hex numbering for board' s bus master Input/Output function

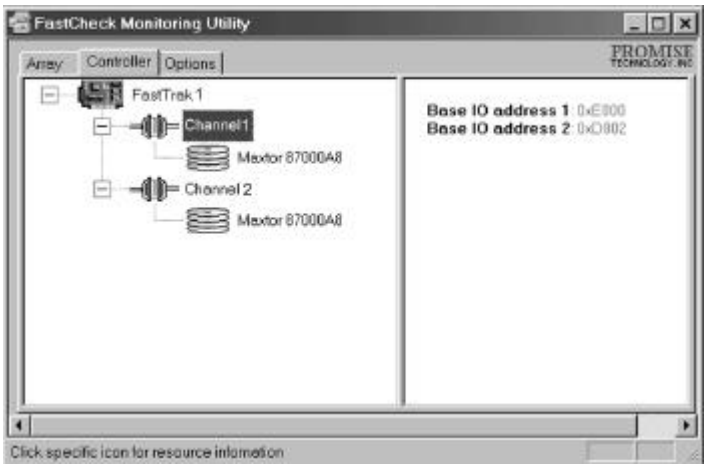
ROM Base Address: Shows base address in hex numbering for FastTrak' s Flash ROM chip

Driver Version: Identifies which version of the Promise FastTrak100 driver you have installed.

Hardware Type: Identifies which FastTrak product is installed.

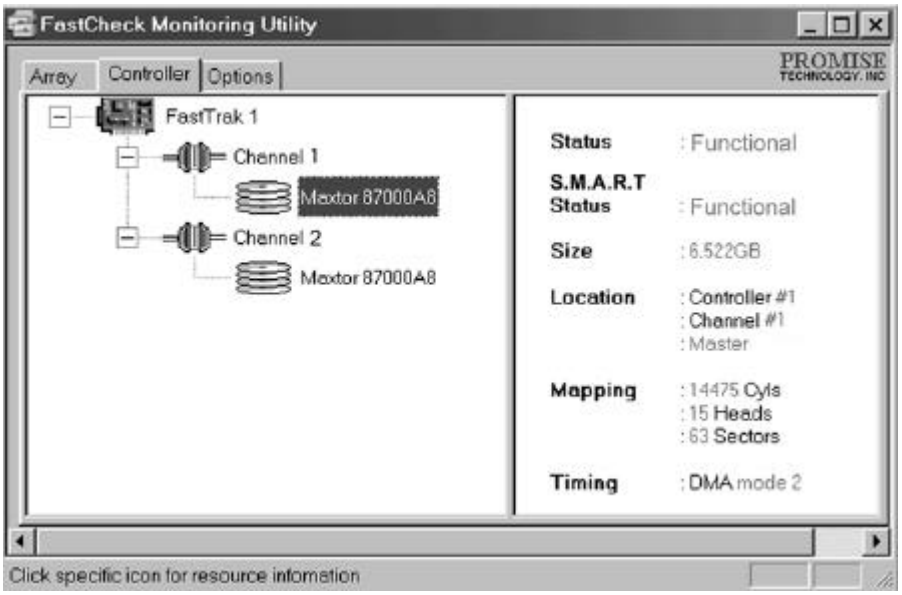
Viewing IDE Channel Information

Left-clicking on a given Channel icon or # in the left pane, will show the Base IO addresses of the channel in the right pane (used for troubleshooting).



Viewing Drive Information

Left-clicking on a given Drive icon or ID in the left pane, will show similar information categories as the Array Window Drive Information in the right pane.



Status (also shown under the Array Window) can be Functional, Critical, or Offline. The meanings are shown below.

Functional: Means the drive is working normally

Critical: A problem has been detected in the drive and the drive taken offline as part of a mirroring array. Mirrored arrays will continue to function without the drive. Fix/replace the drive that has failed, then restore data from a backup source.

Offline: Drives that are NOT identified as "bad" may be taken offline if part of a Striping or Spanning array containing a "bad" drive. These drives do NOT need to be replaced, however.

S.M.A.R.T. Status: Indicates whether attached hard drive implements Self-Monitoring Analysis & Reporting Technology to predict drive failure

Size: Indicates capacity of individual drive

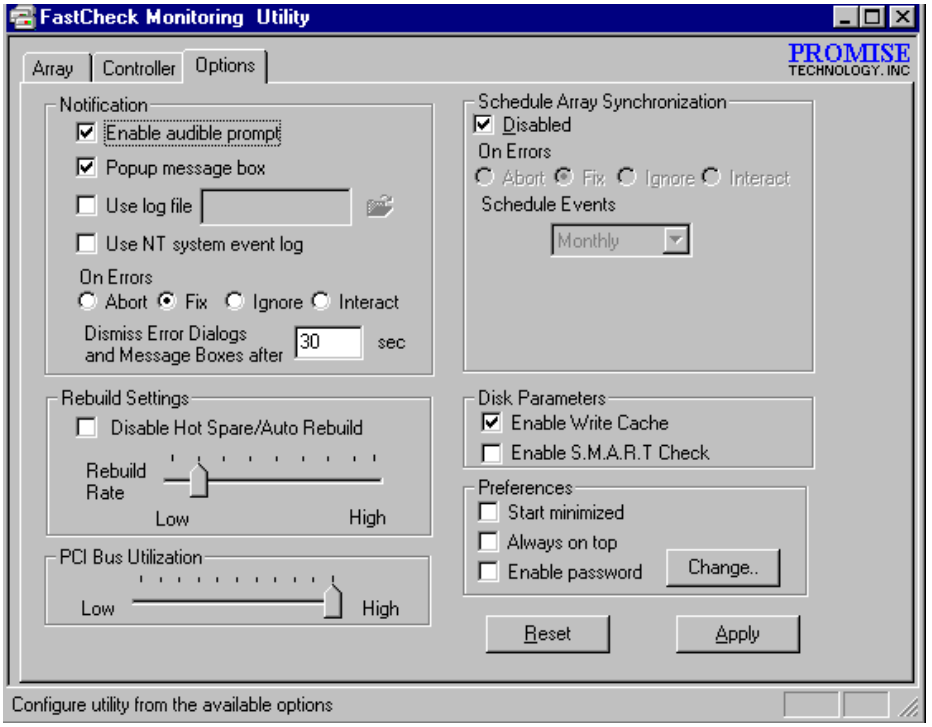
Location: Shows physical location of drive. Indicates on which IDE channel (1 or 2), and whether drive is Master or Slave on cable. This allows user to identify drives for removal/replacement.

Mapping: Indicates physical parameters of drive (cylinders, heads, sectors)

Timing: Shows selection of drive timing (directly related to burst speed) based on type of drive and cable used.

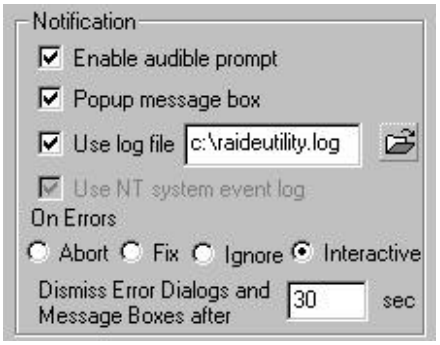
Using Options Window

Clicking on the Options tab reveals the Options Window. Array administrators can customize the FastCheck Monitoring Utility in four major areas: Notification, Array Synchronization Scheduling, setting Password, Desktop Appearance. Most options relate to Mirroring arrays (RAID 1 or RAID 0+1).



Selecting Notification Options

This section of the Options windows allows users to select how they are notified of a system event. A System Event includes driver-initiated Rebuilds (automatic rebuild using a "hot" spare standby drive), user-initiated manual Rebuilds or manual Synchronization, and Error-Handling reporting for these processes.



Enable audible prompt checkbox turns on/off an audible alarm of an event (typically a drive failure, or completion of rebuild or synchronization).

Popup message box checkbox turns on/off the appearance of an event message box that would typically indicates a drive failure, or completion of rebuild or synchronization.

Use log file checkbox allows writing operating event logs of the array activity (alerts and status reports) to a given file name and directory. If a file name is used but the path left blank, the default directory is the same as the FastCheck Utility (typically C:\Program Files\Promise\FastTrak100).

Use NT system event log checkbox is greyed out under Windows 95/98/2000/Millennium automatically. Under Windows NT4.0 and Windows 2000, it permits user to write array logging to NT's own event log.

1. To view FastCheck events under Windows NT, go to Start/Programs/Adminstrative Tools/Event Viewer.
2. In the Event Viewer, choose "Log" from the menu bar, then check "System." Any events generated by FastCheck will appear under the Source column as "FastCheck."

On Errors section offers four radio button choices for the user to select what procedure they would like to perform if an Error is detected during automatic/manual Rebuilds or manual Synchronization. There are three types of errors that FastTrak100 detects -- a data mismatch between the primary and secondary drive, a physical media error on source or target drive, or a total disk failure. The options for handling Errors are as follows:

Abort: stops any Synchronization or Rebuild process if an error is encountered.

Fix: in most cases, FastTrak100 automatically can correct errors. The method of correction varies depending on the type of error.

Ignore: FastTrak100 will log the event error and continue the rebuild or synchronization process. Use this setting if you want to detect the presence of errors, but do not want to fix these errors at the time. The user may then decide what to do about the error(s) detected.

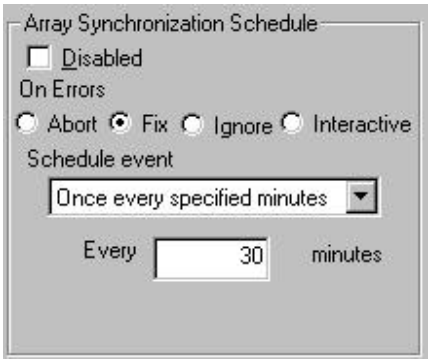
***WARNING**: This may result in mismatched drives under RAID 1 or 0+1.*

Interactive: By checking this option, a selection window will appear each time an error is detected asking the user whether they want to Abort, Fix, or Ignore the error (see Troubleshooting section).

Dismiss Error Dialogs designates the length of time (in seconds) that a Message box or Error Dialog box appears on screen.

Scheduling Array Synchronization

This section of the Options Window allows a user to schedule when and how often FastTrak100 will perform synchronization maintenance of a mirrored array.



Disable checkbox is checked (the default) to turn off automated scheduling of synchronization. When unchecked, the Scheduling section will be highlighted (see above).

On Errors section offers four radio button choices for the user to select what procedure they would like to perform if an Error is detected during a scheduled Synchronization. There are three types of errors that FastTrak100 detects -- a data mismatch between the primary and secondary drive, a physical media error on source or target drive, or a total disk failure. The options for handling Errors are as follows:

Abort: stops the Synchronization process if an error is encountered.

Fix: in most cases, FastTrak100 automatically can correct errors. The method of correction varies depending on the type of error (see Appendix under Error Correction Methodology).

Ignore: FastTrak100 will log the event error and continue the synchronization process. (Warning: this may result in mismatched drives under RAID 1 or 0+1). Use this setting if you want to detect the presence of errors, but do not want to fix these errors at the time. The user may then decide what to do about the error(s) detected.

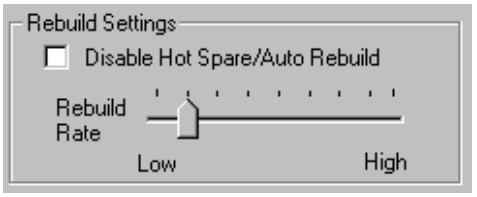
Interactive: By checking this option, a selection window will appear each time an error is detected asking the user whether they want to Abort, Fix, or Ignore the error (see Troubleshooting for more details).

Schedule event drop down box allows scheduling synchronization by minute, by hour, by day, by week, or by month. If enabled, the default is By Month. This allows synchronization to take place during an off-hour when the system is either not in use or not at peak demand.

Start time designates hr/min/ am/pm

On the designates day of week or by ordinal (1st, 2nd, 3rd....) selection.

Setting Rebuild Options



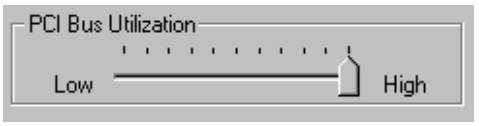
Disable Hot Spare/Auto Rebuild checkbox turns off the use of a "hot" spare drive and automatic rebuilding of a mirrored array. The default is unchecked (or enable Hot Spare/Auto Rebuild).

Rebuild Rate assigns the amount of importance that FastTrak100 gives to mirroring data from one drive to another in the background. A "high" setting assigns most of FastTrak100's resources to the rebuild process at the expense of responding to ongoing read/write data requests by the operating system. A "low" setting gives priority to ongoing read/write data requests by the operating system at the expense of the rebuild process and will typically result in longer rebuild times. The setting shown above is the default.

Setting PCI Bus Utilization Option

***NOTE**: In most cases, a user does not need to change this setting since FastTrak100' s data handling rarely conflicts with another PCI device. However, certain brands of video capture cards can produce a "glitch" on play back of A/V files that may require adjusting the default setting devices (see Tips for Audio/Video Editing for more information).*

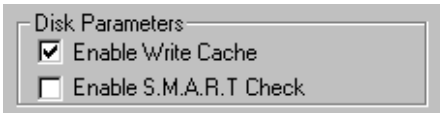
This section of the Options Window allows a user to change how much time the FastTrak100 holds on to the PCI bus to transfer data.



The default setting of "High" on the slider bar means FastTrak100 holds on to the PCI bus longer for data transfers to occur. A setting of "Less" reduces the time which FastTrak100 occupies on the PCI bus and frees that time for use by other PCI devices.

Once a bus setting has been selected, click the Apply button on the Options window to implement changes immediately.

Setting Disk Param(eters) Option

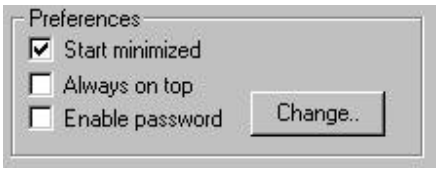


Enable Write Cache checkbox allows user to enable/disable write caching for hard drives that include this performance feature. FastCheck automatically recognizes such drives and enables the feature as the default setting. For drives that do not use write caching, this option is automatically greyed out.

Enable S.M.A.R.T. Check checkbox tells FastCheck to regularly monitor each drive to assure that drive failure prediction is functioning. The default is unchecked, meaning FastCheck will not monitor this function.

Setting Screen Preferences

This section controls how the FastCheck utility screen is displayed and sets the security password to protect the administrative settings.



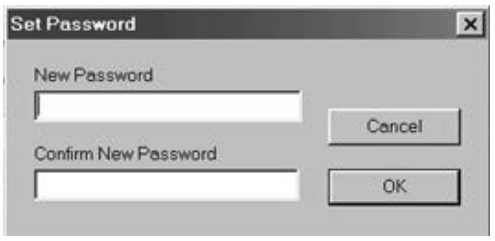
Start Minimized checkbox allows user to have FastCheck appear on the toolbar only on startup. Click on the icon to see the FastCheck utility screen.

Always on Top checkbox tells the Utility to appear above all programs until closed or minimized manually.

Enable Password checkbox in the Preferences section turns on/off use of a Password every time the FastCheck Monitoring Utility icon is selected or the program is run from the Start menu. Disabling use of a current password requires password entry (see Creating Password on next page).

Creating Password

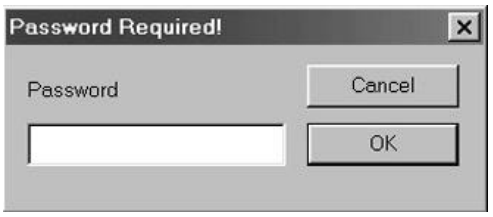
1. To create a password, check the **Enable Password** checkbox in the Preferences section.The "Set Password" window will appear.



2. Type the password you want to use. Press the Tab key or click to retype the same password in the "Confirm New Password" section. Click the OK button.

***NOTE**: Remember to record the password you use in a secure place in case you forget it.*

3. A confirmation screen will appear saying that "Password Checking is Enabled". Click the OK button.
4. Once the password feature is enabled, the following menu will appear before the FastCheck window can be opened.is enabled, the following menu will appear on each use of FastCheck.



Changing Password

1. Input the original password you first created to gain access to FastCheck.
2. Click on Options tab, then click on the Change button in the Password section. The Set Password screen will appear (see figure in step 3 above).
3. Type the password you want to use. Press the Tab key or click to retype the same password in the "Confirm New Password" section.
4. Click OK button.

Disabling Password

1. Input the original password you first created to gain access to FastCheck.
2. Click on Options tab
3. Uncheck the "Enable Password" checkbox. Click Apply button on Options window

Understanding Disk Array Concepts

About FastTrak100 Disk Array Adapter

FastTrak100 is a high performance Ultra ATA/EIDE RAID controller card that features parallel data channel operation and an onboard BIOS. The two channels on the FastTrak100 support parallel operation that allows for overlapped I/O under multi-tasking operating systems and sharing the workload between multiple drives.

About Adapter BIOS

The FastTrak100 card contains a BIOS code that extends the standard disk service routine provided through Int13h. The BIOS is bootable for DOS and other operating systems that rely on the system BIOS for drive operation. FastTrak100 can support drives and disk arrays with capacities exceeding 8.4 GB using Extended Interrupt13 support. When the FastTrak100 BIOS appears during bootup, users can press <Ctrl-F > to enter the FastBuild™ setup to select from menu settings.

FastBuild™ Auto Menu Setup

This setup utility is used to build and manage FastTrak100 disk arrays. The utility is menu driven and features the <1> Auto Setup option that uses a simple, interactive setup process. Once the array is built, all the array members store the configuration information in the drive' s reserved area. See Chapter 4 that provides descriptions of individual functions.

Reserved Sector

Array configuration data about the drive member and other members in the disk array are saved on a special location on the disk drives called the reserved sector. If any member of the array becomes corrupt or lost, the redundant configuration data on the other members can be used for rebuilds.
Disk array members do not have a "memory" of their drive positions. This allows drives to be placed on different FastTrak100 connectors within the system without reconfiguring or rebuilding.

Disk Array Terms

Disk Array Description

A "disk array" is formed from a group of 2 or more disk drives which appear to the system as a single drive. The advantage of an array is to provide better throughput performance and/or data fault tolerance. Better performance is accomplished by sharing the workload in parallel among multiple physical drives. Fault tolerance is achieved through data redundant operation where if one (or more) drive fails or has a sector failure, a mirrored copy of the data can be found on another drive(s).

For optimal results, select identical Ultra ATA/100 drives to install in disk arrays. The drives' ***matched performance*** allows the array to function better as a single drive.

Disk Array Member

The individual disk drives in an array are called "members." Each member of a specific disk array is coded in their "reserved sector" with configuration information that identifies the drive as a member. All disk members in a formed disk array are recognized as a single physical drive to the system.

Disk Array Types

For most installations, the FastBuild™ setup "<1> Auto Setup" option will configure your system.

There are four disk array types in three categories that can be installed on the FastTrak100 card. Striping is in the Performance category while Mirroring, Striping/Mirroring are in the Fault Tolerance category. Spanning (JBOD) is in the Capacity category.

Disk arrays within the Performance and Fault Tolerance categories conform with the **R**edundant **A**rray of **I**ndependent **D**isks technology, or RAID. The RAID levels supported are 0, 1, and 0+1.

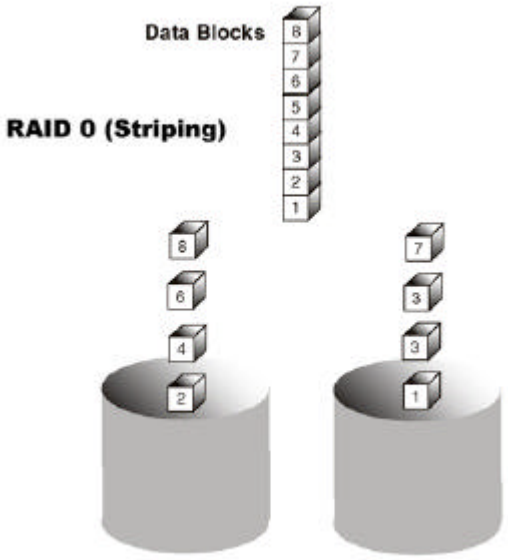
RAID Level	Performance	Capacity	# of Drives
RAID 0 (Striping)	Highest	# Drives x Smallest Size	2 to 4
RAID 1 (Mirroring)	Normal	50% min	2
RAID 0+1 (Stripe/Mirror)	High	50% min	4
JBOD (Spanning)	Normal	100% of All Drives	2 to 4

About RAID Levels

Striping (RAID 0)

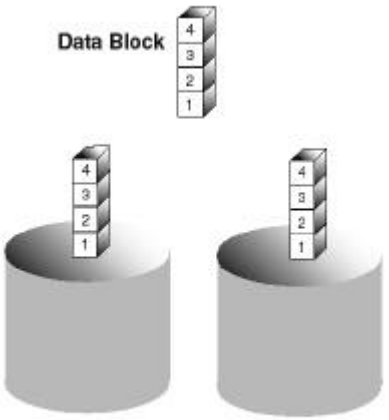
Reads and writes sectors of data interleaved between multiple drives. When any disk member fails, it affects the entire array. Performance is better than a single drive since the workload is balanced between the array members. This array type is for high performance systems. Identical drives are recommended for performance as well as data storage efficiency. The disk array data capacity is equal to the number of drive members times the smallest member capacity. For example, one 1GB and three 1.2GB drives will form a 4GB (4 x 1GB) disk array.

Stripe Size - a value can be set from 1KB to 1024KB sector size. The size can directly affect performance. In the FastBuild BIOS, the "Desktop" default is 8KB while "Server" and "A/V Editing" are 64KB.



Mirroring (RAID 1)

Writes duplicate data on to a pair of drives while reads are performed in parallel. ATA RAID 1 is fault tolerant because each drive of a mirrored pair is installed on separate IDE channels. If one of the mirrored drives suffers a mechanical failure (e.g. spindle failure) or does not respond, the remaining drive will continue to function. This is called ***Fault Tolerance***. If one drive has a physical sector error, the mirrored drive will continue to function.



RAID 1 (Mirroring)

On the next reboot, the FastBuild™ utility will display an error in the array and recommend to replace the failed drive. Users may choose to continue using their PC, however Promise recommends replacing the failed drive as soon as possible. See Chapter 4 for a functional description.

Due to redundancy, the drive capacity of the array is half the total drive capacity. For example, two 1GB drives that have a combined capacity of 2GB would have 1GB of usable storage. With drives of different capacities, there may be unused capacity on the larger drive.

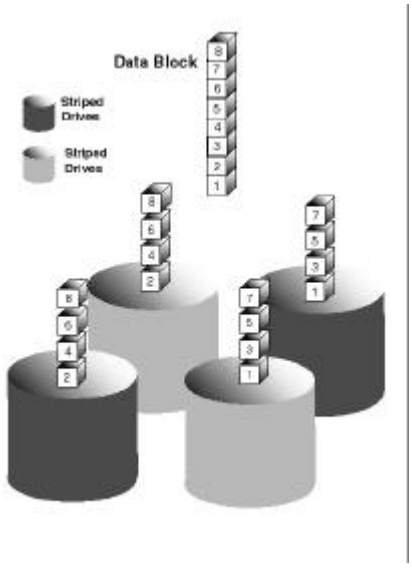
Using a Spare Drive

Under a RAID 1 setup, an extra "hot spare" drive (a third drive on FastTrak100) can be attached to the FastTrak100 and not assigned to the array. Such a drive will be activated to replace a failed drive that is part of a mirrored array. A rebuild is performed automatically in the background to mirror the good drive data on to the spare.

At a later time, the system can be powered off and the failed drive can be physically removed and replaced. Spare drives must be the same or larger capacity than the smallest array member.

Striping/Mirror (RAID 0+1)

A combination of both above array types. It can increase performance by reading and writing data in parallel while protecting data with duplication. A minimum of four drives needs to be installed. With a four-drive disk array, two pairs of drives are striped. Each pair mirrors the data on the other pair of striped drives. The data capacity is similar to a standard Mirroring array with half of total capacity dedicated for redundancy.



About Dual Data Redundancy

One unique (though rarely occurring) feature of RAID 0+1 is dual fault tolerance. In some cases, two drives can fail simultaneously and still maintain the integrity of data. There are six combinations in which two drives can fail. FastTrak100 protects the data array in four of those cases depending on drive type (some drives do not permit the Slave drive to continue to function if the Master drive fails).

Assume the drives are configured as follows (M = Master, A/B indicates which striped pair the drive belongs to, # indicates which part of stripe data):

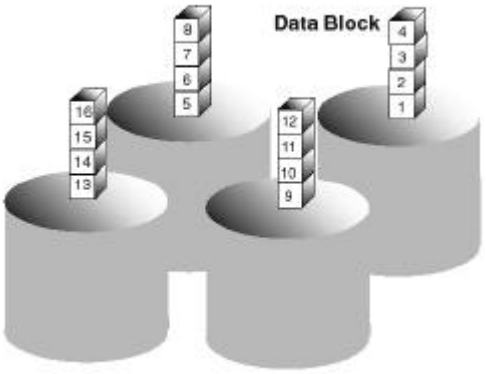
	IDE 1	IDE2
M	Drive A1	Drive B1
S	Drive B2	Drive A2

Under RAID 0+1, the array maintains data integrity if any 1, 2 combination survives.

Event	Failed Drives	Array Status	Why?
1	A1/A2	Working	B1/B2 retain array integrity
2	B2/B1	Working	A1/A2 retain array integrity
3	A1/B2	Working	B1/A2 retain array integrity
4	B1/A2	Working	A1/B2 retain array integrity
5	A1/B1	Offline	B2/A2 contain only half of array data
6	B2/A2	Offline	A1/B1 contain only half of array data

Spanning (JBOD)

A Spanning disk array (also aptly named as JBOD for "Just a Bunch of Drives") is equal to the sum of all drives when the drives used are of different capacities. Spanning stores data on to a drive until it is full, then proceeds to store files onto the next drive in the array. There are no additional performance or fault tolerance array features in this array. When any disk member fails, the failure affects the entire array.



Troubleshooting & Tips

This section is used to assist with troubleshooting conflicts and FastTrak100 installation problems. Also refer to the "README.TXT" file on the FastTrak100 driver and utility diskette for more recent information as well as the **PromiseOnline**™ services listed in Appendix A.

The section is divided into the following categories: Motherboard Issues, System CMOS Issues, Drive Errors, Operating System Errors, and Audio/Video Editing Tips.

Motherboard Issues

Freeing additional IRQ resources

Since the Promise card supports PCI Interrupt sharing, it is possible to use IRQs already assigned to another PCI card. Interrupt Sharing is not supported with onboard IDE controllers. If the onboard IDE controller(s) are not used, you may disable the controllers to free IRQ 14 and/or 15.

Configuring PCI IRQ resources

Setting the IRQ for a particular PCI slot will be different depending on the motherboard BIOS. This setting is usually made in the PCI Configuration and/or Plug and Play (PnP) section of the motherboard BIOS setup. There are three common methods that motherboard BIOS's handle assignment of IRQs to PCI slots:

1. Specifically assigning an IRQ to a particular slot - You can tell the motherboard to use IRQ 10 for PCI slot 1, IRQ 11 for PCI slot 2, etc.
2. Listing which IRQs are available to be assigned to the PCI slots - This BIOS has an option where you specify "1st Available IRQ", "2nd Available IRQ", etc. The BIOS then scans the PCI slots for PCI cards and assigns these IRQs in the order that it finds the PCI cards.
3. Excluding an IRQ from being used by a PCI slot - If you have an ISA card that is using an IRQ, change the setting for this particular IRQ from "Available" to "used by ISA card" so that the motherboard will not assign this IRQ to a PCI slot.

Consult your motherboard manual for information that is specific to your motherboard.

System locks up during bootup or when Windows starts

There may be a possible IRQ conflict with an ISA card. Identify what IRQs are used by ISA cards, enter the Mainboard PCI Setup, and reserve the IRQ for use with ISA. PCI slots cannot share IRQs with ISA cards.

Intermittent data problems

Do not exceed the 100Mhz PCI Bus speed. Pentiums set to higher than default settings or AMD K6 and Cyrix CPUs can exceed these limitations and cause intermittent boot and data problems.

System CMOS Issues

Set Mainboard CMOS Boot sequence to boot to FastTrak100

On some Mainboard BIOS, it is necessary to set the Boot sequence to "SCSI, A:, C:" since the Promise card is identified as a SCSI card.

Mainboard CMOS displays C: or D: drive failure during startup

See Drive-Related Errors section.

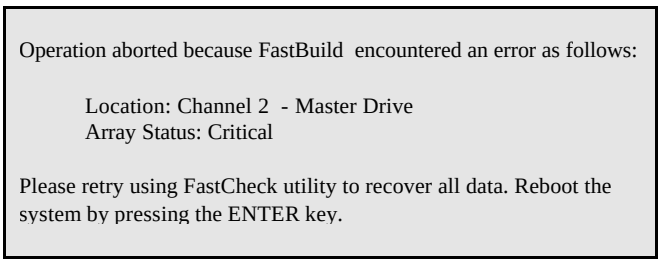
Using an Onboard IDE Controller with FastTrak100

If an onboard IDE controller is installed with hard disks, enable support in the Mainboard Standard CMOS Setup for the drives. Note that the onboard IDE hard drives will then be the bootable hard disk unless the system BIOS has a boot sequence setting with a "SCSI, A:, C:" option.

Drive-Related Errors

Critical Array Status Error Reported during Boot

If a critical status error message appears on the FastTrak100 BIOS startup screen for a mirrored array (see below), there is a drive in the array which has failed or is not responding. FastTrak100 will identify the failed drive by channel number and Master/Slave designation (if 2 drives exist on the same cable). The mirrored array has lost its fault tolerance, but will still perform normal drive reads and writes.



Try powering the system off and on to reset the drive. Also confirm that cables are properly attached and the drive is receiving power. If the drive still appears to have failed, proceed to "Rebuild Array" option of FastCheck detailed on page 52.

Drive cannot be formed into an array

Drives must support Ultra DMA or Multi-word DMA and be free of media defects to be added into an array. Promise recommends using new identical drives for each array. Re-secure data and power cabling while checking for proper alignment. Typically, Pin 1 of the drive is closest to the power connector.

Possible Master/Slave problems

Master/slave problems may exist between two ATA or IDE drives of different brands attached to a single cable. For both compatibility and better performance, choose drives of the same model/brand and install them on separate cables. Refer to the Drive Setup by Connector chart (see page 7) for more recommended drive placements.

System CMOS displays C: or D: drive failure during Startup

Do not reference C: or D: in the Mainboard Standard CMOS for drives attached to the FastTrak100 controller. Only enter drive information in the Mainboard CMOS for drives attached to a conventional add-on or onboard IDE controller.

FDISK reports a much lower drive capacity if a single physical drive or a striped array exceeds 64GB

Due to a limitation with FDISK, the utility reports only the storage capacity that exceeds 64GB. This is a cosmetic, not actual, limitation. Simply create a single DOS drive partition, reboot, then format the partition. The Format command will recognize the total capacity of the partition accurately. Windows NT/2000/98 will now recognize the total capacity of your array.

Unable to partition or format array

The Reserve Sector of one of the drives has become corrupt or bad. Removing the Reserve Sector will remedy any issue related directly to a Bad Reserve Sector.



***WARNING**: Before removing the Reserve Sector of the drive(s), backup any existing data. Removal of the reserve sector of any drive permanently deletes all existing data on the hard drive. For Mirrored arrays (RAID 1), you should remove the Reserve Sector from the "mirrored" drive first (this will appear during Step 3 below) then rebuild the mirrored array. Remove the Sector on the Master Drive only as a last resort. For Striped arrays (RAID 0), removing the Reserve Sector from any of the drives that are striped will destroy the arrayed data.*

To remove the Reserve Sector, follow these steps:

1. When the FastTrak100 BIOS comes up, press Crtl-F to enter the FastBuild.
2. Press 2 to "View Drive Assignments".
3. Using the arrow keys, highlight the drive where you wish to remove the reserve sector.
4. Press ALT-F1. The highlighted drive will start blinking on the screen.
5. Press CTRL-TAB. A message will appear that says the reserved sector (which is where array information is kept) on the disk will be wiped.
6. Press "Y" to confirm.
7. For a mirrored arrays, hit the "ESC" key twice to reboot and skip to step 10.
8. For striped arrays, repeat this process for each member of the particular array that is having a problem.
9. When finished, hit the "ESC" key twice to reboot.

10. After rebooting, use FastBuild to re-create the array. For mirrored arrays, rebuild the mirrored array. For striped arrays, use FDISK and FORMAT after setting up the array.

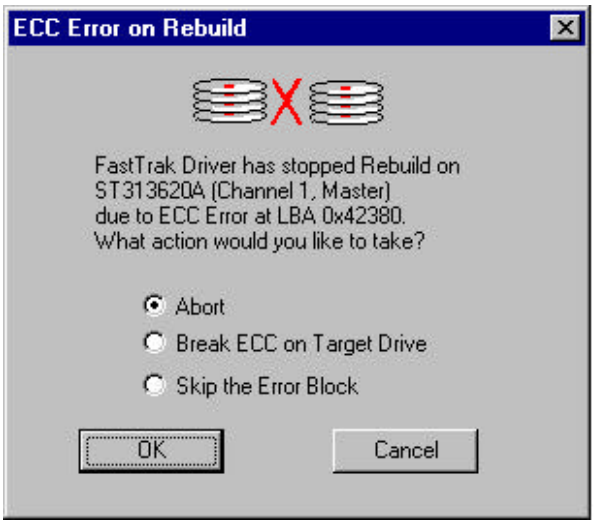
Array Constantly Goes Into Critical or Offline Mode During Reboot
(see "Unable to Partition or Format array" above)

Cannot Rebuild Mirrored (RAID 1) Array
(see "Unable to Partition or Format array" above)

Fatal Errors or Data Corruption Are Constantly Reported When Reading or Writing to Drive Array
(see "Unable to Partition or Format array" above)

ECC Error Reported on Rebuild

The following screen will appear if a data error is detected on either source or target drive during Rebuild if you have set the On Errors setting to "Interactive" within FastCheck's Options Window (see page 59).



Your choices are as follows:

Abort: Halts the rebuild process. You may elect to retry at a later date.

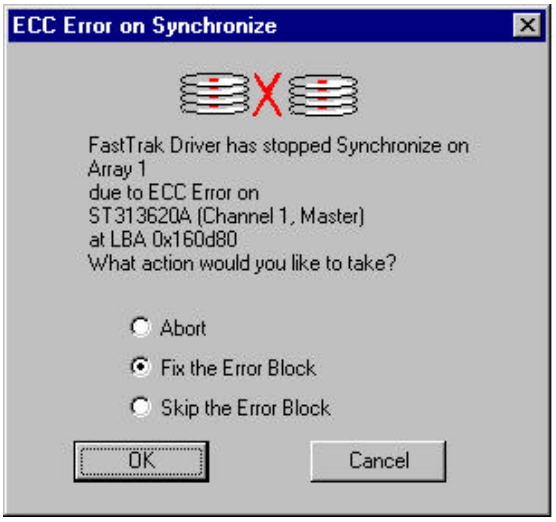
Break ECC on Target Drive: If the error is detected on the source drive, "Break ECC on Target Drive" means that FastTrak will copy the bad data sector on to the target drive to assure that both drives are identical. If the error is detected on the target drive, FastCheck will copy the data contained in the good sector of the source drive again to the target drive.

Skip the Error Block: FastTrak100 will log the event error and continue the rebuild process. Use this setting if you want to detect the presence of

errors, but do not want to fix these errors at the time. You may then decide what to do about the error(s) detected.

ECC Error Reported on Synchronize

The following screen will appear if a data error is detected on either source or target drive during Synchronize if you have set the On Errors setting to "Interactive" within FastCheck's Options Window for Scheduled Synchronization (see page 60) or for Manual Synchronization under Notification options (see page 59).



Your choices are as follows:

Abort: Halts the synchronization process. You may elect to retry at a later date.

Fix the Error Block: FastTrak100 will take a good data block from either drive and copy it to the drive where the error was detected.

Skip the Error Block: FastTrak100 will log the event error and continue the synchronization process. Use this setting if you want to detect the presence of errors, but do not want to fix these errors at the time. You may then decide what to do about the error(s) detected.

Operating System-Related Errors

Different drive lettering under Windows NT

This may happen when using a SCSI card in addition to the Promise card. Windows NT does not necessarily load the driver for the boot device controller first. This results in a drive that in MS-DOS is the C: drive being the D:, or E:, etc. in Windows NT. Use Windows NT's Disk Administrator utility to reassign the letters which NT has assigned to the drives. See your Windows NT documentation for instructions on how to use Disk Administrator.

The Operating System no longer boots after creating a Mirrored Array using your existing boot drive using Windows 98/NT4.0/2000

This is due to Drive Geometry issues. You can verify this if you move the original drive back to the onboard controller and it boots. Each controller can view a drive differently. This can be an issue for a new controller which loads the original Master Boot Record (MBR) and then has a problem translating it or the Operating System boot record.

For Windows NT or Windows 2000, Promise recommends a "clean" install of the Operating System. This restores the MBR and OS boot record. You will then need to repartition and format the drive.

For Windows 98,you can perform the DOS Command "SYS C:" from a bootable floppy or CD-ROM to restore the operating system boot record and transfer the system files to the boot drive. If this does not work, the Windows 98 registry may have become corrupted during the boot process and must be restored. See the Windows documentation to perfrom this procedure.

Promise Windows driver does not appear Device Manager

Windows may already be listing the controller under "Other Devices" instead of "Hard disk controllers" section. In Device Manager under "Other Devices" to see if it lists a "PCI Card", or "RAID Controller". If so, highlight this listing and click on the "Properties" button, and then click on the "Driver" tab. Depending on your version of Windows, choose either "Change Driver" or "Update Driver". Then follow the on-screen prompts to complete installation of the driver. If Windows asks if you want to test if the device can be removed safely click on "CANCEL. Reboot the system to complete installation of the driver.

"Inaccessible Boot Device" Message Appears During Floppyless Install of Windows NT or 2000

The "F6" key was not pressed at the appropriate time. Reboot the system, and press the "F6" key when the message "Setup is inspecting your computer's hardware configuration..". appears in Windows NT4.0 or the message "Press F6 if you need to install third party SCSI or RAID driver" appears in Windows 2000.

“No Hard Drives Found” Message Appears During CD-ROM Install of Windows NT or Windows 2000

The "F6" key was not pressed at the appropriate time. Reboot the system, and press the "F6" key when the message "Setup is inspecting your computer's hardware configuration..." appears in Windows NT4.0 or the message "Press F6 if you need to install third party SCSI or RAID driver" appears in Windows 2000.

Performance Tips

Here are some tips that may optimize performance in a RAID 0 striped array. If you are using an audio/video editing card, we also recommend to review your card' s documentation for additional information.

Use FastTrak100 as D: or other non-bootable drive in a Striped Array

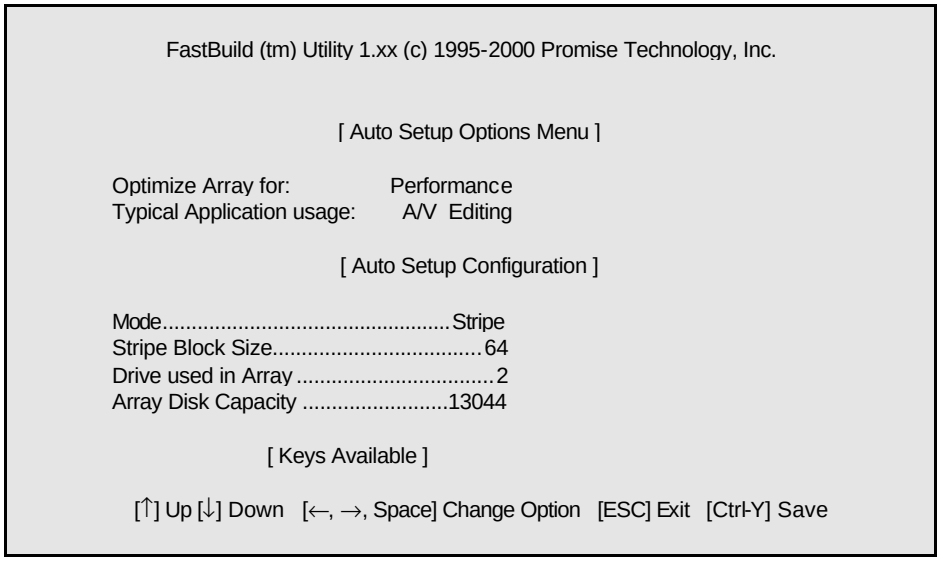
For A/V editing, keep the original system boot drive on the standard IDE controller as C: drive. Partitioning software such as FDISK will see the array as one physical drive, D: drive (or later). This will prevent file fragmentation and provide better accessibility to the array.

Re-Configure PCI Latency Setting

The PCI Latency setting appears in some Mainboard BIOS. The setting governs how much time is allocated to service each PCI slot. Promise recommends a valueof 64. An optimal value is neither too high nor too low and will vary from system to system.

Optimize Array for "Performance"

The Promise FastBuild BIOS Utility auto setup menu allows optimizing the array for A/V Editing . The default Performance setting (Striping) selects a Stripe Block size of 64. This larger block size is recommended for the data streaming requirements of A/V editing. You may select an even larger block size in manual mode (see page 22).



Change Setting of PCI Bus Utilization

Certain brands of video capture cards can produce a "glitch" on play back of .AVI files. A setting of "Less" for PCI Bus utilization reduces the time which FastTrak100 occupies on the PCI bus and frees that time for use by other PCI devices and will remove the "glitch" dropout effect on playback.

Once a bus setting has been selected, click the Apply button to implement changes immediately. No reboot is required.



NOTES

Frequently Asked Questions

This section lists frequently asked questions involving pre-installation, drive issues, installation, and post-installation.

Pre-Installation

(Speed, Device Types, Capacity, Cabling)

Q: What kind of hard drives can I use for a FastTrak100 array?

A: You *can* use any IDE/EIDE hard drive(s) to create arrays on the FastTrak100. You *should* use matching drives for multiple-drive arrays to maximize capacity usage as well as performance. Ultra ATA/100 drives are recommended for highest performance.

Q: Can I use ATAPI devices on the FastTrak100 controller?

A: No. There is no driver layer on the FastTrak100 controller which will support ATAPI packet messages.

Q: Will the FastTrak/100 work with a 37Mhz or 41Mhz PCI bus speed?

A: The current PCI 2.1 specification is for a 33Mhz PCI bus speed. The FastTrak100 is designed around the specification. In most cases, a higher PCI bus speed will result in a variety of different errors. While some people have been able to get these higher speeds to work, since it is out of specification we cannot support it.

Q: How can I change the resources that the FastTrak uses?

A: The FastTrak100 is fully PnP. This means all the resources that it uses are given to it by the PnP BIOS on the motherboard. The FastTrak100 does support IRQ sharing, but this will not work unless ALL the concerned devices support the feature. If your motherboard allows you to control the assignment of these resources, you may be able to remedy the problem by "playing around" with them. You can also try resetting the configuration data in your CMOS. This is usually an option in the PnP section of your CMOS. Otherwise, the only way you might be able to affect these assignments is to switch the PCI slot that the card is in.

Q: How does the FastTrak100 RAID controller provide storage and/or data protection with their arrays?

A: FastTrak100 implements three different types of RAID levels as follows:

RAID 0 (stripe)

For capacity -- The FastTrak100 array will be as big as the smallest HDD in the array times however many HDDs are in the array. Any larger HDDs will simply be truncated. The truncated space on the bigger HDDs will then be unusable.

For sustained data transfers -- Using FastTrak100, a RAID 0 array consisting of two HDDs will transfer at about twice the speed of the slowest HDD in the array. A RAID 0 array consisting of four HDDs will transfer at about three times the speed of the slowest HDD in the array.

RAID 1 (mirror)

For capacity -- The FastTrak100 array will be as big as the smallest HDD in the array. The larger HDD will simply be truncated. The truncated space on the bigger HDD will then be unusable.

For sustained data transfers -- The FastTrak100 array will write data at the rate of the slowest HDD in the array. The FastTrak100 array will read data at twice the rate of the slowest HDD in the array.

JBOD (spanning)

For capacity -- The FastTrak100 array will combine the sizes of the HDDs in the array. As soon as one HDD is filled to capacity, the next HDD will automatically be used.

For sustained data transfers -- There is no performance increase with spanning (reading or writing).

Drive Issues

Q: Can I add a drive to a FastTrak100 RAID array via hot-swap and dynamically adjust the array size/configuration?

A: No. The FastTrak100 system does not support dynamically adjustable RAID size/configurations.

Q: Do the HDDs on the FastTrak100 have to be the same size?

A: The HDDs that you use with the FastTrak100 do not have to be the same size. If the sizes differ, the FastTrak100 will "adjust" the HDDs so that they are compatible. Basically, it will truncate the bigger HDD so the sizes match. Any unused space that results from this is unusable, so don't use HDDs that differ too much. It'll work, but it's a waste.

Q: Can I take a set of drives which make up an array created on one FastTrak100 server and move it to another FastTrak100 server?

A: Yes. All FastTrak100 controllers read the arrays the same way. Once the drives are all connected, you must restart the system for it to recognize the newly-inserted array configuration. Also, you can move an FastTrak33 or FastTrak66 array to the FastTrak100 Controller.

Q: Can I take a drive used in a FastTrak100 array and access it directly with a different controller, such as the one integrated on the motherboard?

A: Yes, but only under certain configurations. The following array configurations will allow the drive(s) to be accessed individually on another controller: mirror (RAID 1), single drive striped (RAID 0), or single drive spanned (JBOD). Multiple drives striped or spanned will not work. Also, the controller must address the drives as LBA, not CHS.

Q: If I have a problem with one of the drives on the FastTrak100, how can I low level format it to correct the problem?

A: Do NOT do this. Low-level formatting IDE drives is unnecessary and generally does not correct problems which might be experienced during use. Errors such as bad sectors or ECC/CRC failure are best remedied by completely replacing the drive. For this reason, drives attached to the FastTrak100 controller should NOT be low level formatted.

Q: Do I have to install disk management software on my array in order to access the full storage capacity of drives?

A: No! Disk management software would only complicate things. The array should be fully addressable by your O/S as it is. Remember that some operating systems have varying limits on the sizes of partitions and logical drives that can be defined. Consult your O/S documentation about partitioning larger drives.

Q: What system BIOS CMOS settings do I use for the drives on the FastTrak100 controller?

A: None. The drives on the FastTrak100 controller are supported by the FastTrak100 BIOS and/or an O/S drivers, not by your system BIOS.

Q: How do I partition/format my FastTrak100 RAID array?

A: The FastTrak100 "fools" the system into thinking that it's dealing with a single HDD. Therefore, anything that you can do to a single HDD can also be done to a FastTrak100 array. You can, and should, use the FDISK and FORMAT utilities to partition/format the array. You can partition the array however you see fit. You can format the array with whatever file system you wish.

Installation Issues

(Capacity, Booting)

Q: Why are some drives recognized by the FastTrak100 Array Setup utilities with only partial capacity?

A: Some hard drive models are shipped with a jumper that reduces the addressable capacity of the drive to prevent problems with older systems which won't support larger drives. Consult the documentation accompanying the hard drive to set the jumper appropriately in order to utilize the full capacity of the drive.

Q: How can I change the system boot sequence in order to boot from the FastTrak100 array?

A: The boot sequence is controlled by the system BIOS. As far as the system BIOS is concerned, the FastTrak100 controller and defined arrays are categorized as a "SCSI" device (even though the BIOS will not attempt to access the FastTrak100 as any type of SCSI device). This allows you to set the boot sequence in your BIOS CMOS setup utility to boot from "SCSI" (an add-in controller like the FastTrak100) first, rather than "IDE" (an IDE controller built onto the motherboard or one which effectively replaces it). If there are multiple SCSI add-in controllers in the system, then the boot sequence among them will be determined exclusively by their PCI slot priority. PCI slot #1 will be first, slot #2 second, etc. Put the FastTrak100 controller in the PCI slot where it will be accessed ahead of other SCSI controllers if you want to boot from the array.

Q: How can I change the boot sequence between a PCI SCSI card and the FastTrak100 RAID array?

A: Since all PCI devices are all PnP, it is difficult to determine which device is addressed first. Some newer motherboard BIOSes may use advanced options that identify devices and allow you to select which device will be assigned resources first. Otherwise you may have to physically switch the device cards

on the PCI slots so that the boot device is in the highest priority slot number (see previous question). If you do not require the FastTrak100 BIOS to boot from an array and it is only to be used through a driver under the O/S. The FastTrak100 BIOS cannot be disabled.

Post-Installation

(Memory Managers, FDISK)

Q: Why does my system reboot after the QEMM driver loads from CONFIG.SYS?

A: The problem lies in the QEMM "Stealth" feature. This feature places the drive information from the DOS System area into the upper reaches of RAM where Windows resides. This causes the FastTrak100 to lose track of its drives when asked to execute the next line in the CONFIG.SYS file. This forces the reboot that you see. Disable QEMM's stealth feature to correct this problem.

Q: Why can't I see the drives on the FastTrak100 under FDISK?

A: The FastTrak100 controller is dedicated to RAID array management and does not provide any means of addressing individual hard drives through the Int 13h interface used by FDISK. In order to access drives on the FastTrak100 from MSDOS at all, you must first create a RAID array.

NOTES

Contacting Promise Support

Promise Technical Support provides several support options for Promise users to access information and updates. We encourage you to use one of our electronic services, which provide product information updates for the most efficient service and support.

If you decide to contact us, please have the following information available:

- Product model and serial number
- BIOS and driver version numbers
- A description of the problem / situation
- System configuration information, including: motherboard and CPU type, hard drive model(s), IDE/ATAPI drives & devices, and other controllers.

Technical Support Services

Promise Online ™ Web Site	http://www.promise.com (tech documents, drivers, utilities, etc.)

USA Tech Support Center

E-mail Support	support@promise.com
Fax Technical Support	(408) 452-9163 Attention: Technical Support
Phone Technical Support	(408) 452-1180 8:30-5:00pm M-F Pacific Standard Time
If you wish to write us for support:	Promise Technology, Inc. Attn: Technical Support 1460 Koll Circle, Suite A San Jose, CA 95112 USA

European Tech Support

E-mail Support	support@promise.nl
Fax Technical Support	+31 (0) 40 256 94 63 Attention: Technical Support
Phone Technical Support	+31 (0) 40 256 94 61 8:30-5:00pm The Netherlands Time
If you wish to write us for support:	Promise Technology Europe B.V. Attn: Technical Support 1European Buisness Centre, Unit 1.25 Luchthavenweg 81 5657 EA Eindhoven, The Netherlands

Pacific Rim Sales Office

E-mail Support Fax Technical Support	support@promise.com.tw +886 3 578 23 90 Attention: Technical Support
Phone Technical Support	+886 3 578 23 95 9:00-6:00pm Taiwan Time
If you wish to write us for support:	Promise Technology, Inc. Attn: Technical Support 4F, No.1, Prosperity 1st Road Science-based Industrial Park Hsinchu, Taiwan

China Office

E-mail Support	support-china@promise.com
Fax Technical Support	+86 (0) 10 6872 3940 Attention: Technical Support
Phone Technical Support If you wish to write us for support:	+86 (0) 10 6872 3942 9:00-6:00pm China Time Promise Technology China Attn: Technical Support Room 3217, No. 15, Bai Shi Qiao Road Hai Dian District Beijing 100081 P.R. China

Limited Warranty

Promise Technology, Inc. ("Promise") warrants that for two(2) years from the time of the delivery of the product to the original end user:

a) the product will conform to Promise's specifications;
b) the product will be free from defects in material and workmanship under normal use and service.

This warranty:

a) applies only to products which are new and in cartons on the date of purchase;
b) is not transferable;
c) is valid only when accompanied by a copy of the original purchase invoice.

This warranty shall not apply to defects resulting from:

a) improper or inadequate maintenance, or unauthorized modification(s), performed by the end user;
b) operation outside the environmental specifications for the product;
c) accident, misuse, negligence, misapplication, abuse, natural or personal disaster, or maintenance by anyone other than a Promise or a Promise-authorized service center.

Disclaimer of other warranties

This warranty covers only parts and labor, and excludes coverage on software items as expressly set above.

Except as expressly set forth above, Promise disclaims any warranties, expressed or implied, by statute or otherwise, regarding the product, including, without limitation, any warranties for fitness for any purpose, quality, merchantability, non-infringement, or otherwise. Promise makes no warranty or representation concerning the suitability of any product for use with any other item. You assume full responsibility for selecting products and for ensuring that the products selected are compatible and appropriate for use with other goods with which they will be used.

Promise does not warrant that any product is free from errors or that it will interface without problems with your computer system. It is your responsibility to back up or otherwise save important data before installing any product and continue to back up your important data regularly.

Promise's sole responsibility with respect to any product is to do one of the following:

a) replace the product with a conforming unit of the same or superior product;
b) repair the product;
c) recover the product and refund the purchase price for the product.

Promise shall not be liable for the cost of procuring substitute goods, services, lost profits, unrealized savings, equipment damage, costs of recovering, reprogramming, or reproducing of programs or data stored in or used with the products, or for any other general, special, consequential, indirect, incidental, or punitive damages, whether in contract, tort, or otherwise, notwithstanding the failure of the essential purpose of the foregoing remedy and regardless of whether Promise has been advised of the possibility of such damages. Promise is not an insurer. If you desire insurance against such damage, you must obtain insurance from another party.

Some states do not allow the exclusion or limitation of incidental or consequential damages for consumer products, so the above limitation may not apply to you.

This warranty gives specific legal rights, and you may also have other rights which vary from state to state. This limited warranty is governed by the State of California.

Returning Product For Repair

If you suspect a product is not working properly, or if you have any questions about your product, contact our Technical Support Staff through one of our Technical Services, making sure to provide the following information:

- Product model and serial number (required);
- Return shipping address;
- Daytime phone number;
- Description of the problem;
- Copy of the original purchase invoice.

The technician will assist you in determining whether the product requires repair. If the product needs repair, the Technical Support Department will issue an RMA (Return Merchandise Authorization) number.

Return only the specific product covered by the warranty (do not ship cables, manuals, diskettes, etc.), with a copy of your proof of purchase to:

Promise Technology, Inc.
Customer Service Dept.
Attn.: RMA # _____
1460 Koll Circle
San Jose, CA 95112

You must follow the packaging guidelines for returning products:

- Use the original shipping carton and packaging
- Include a summary of the product's problem(s)
- Write an attention line on the box with the RMA number
- Include a copy of proof of purchase

You are responsible for the cost of insurance and shipment of the product to Promise. Note that damage incurred due to improper transport or packaging is not covered under the Limited Warranty.

When repairing returned product(s), Promise may replace defective parts with new or reconditioned parts, or replace the entire unit with a new or reconditioned unit. In the event of a replacement, the replacement unit will be under warranty for the remainder of the original warranty term from purchase date, or 30 days, whichever is longer.

Promise will pay for standard return shipping charges only. You will be required to pay for any additional shipping options (such as express shipping).

Your Responsibilities

You are responsible for determining whether the product is appropriate for your use and will interface with your equipment without malfunction or damage. You are also responsible for backing up your data before installing any product and for regularly backing up your data after installing the product. Promise is not liable for any damage to equipment or data loss resulting from the use of any product.

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