PROMISE®
TECHNOLOGY, INC.

FASTTRAK
TX4310
USER MANUAL

Version 1.1

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Recommendations

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Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

* Reorient or relocate the receiving antenna.
* Increase the separation between the equipment and receiver.
* Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
* Consult Promise Technology, Inc. or an experienced radio/TV technician for help.

This device complies with Part 5 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

	Caution
⚠	Only digital device equipment CERTIFIED CLASS B should be attached to this equipment and that must have shielded cables.

Contents

Chapter 5: WebPAM, continued

Chapter 6: Technology, continued

Chapter 1: Introduction

- About This Manual, below
- Product Overview (page 2)
- WebPAM Software (page 3)
- Key Features and Benefits (page 3)
- Specifications (page 5)

Thank you for purchasing one of Promise Technology's FastTrak TX4310 RAID Controller card.

About This Manual

This *User Manual* describes how to setup, use and maintain the FastTrak TX4310 RAID Controller card.

This manual includes a full table of contents, chapter task lists and numerous cross-references to help you find the specific information you are looking for.

Also included are four levels of notices:

Note

A *Note* provides helpful information such as hints or alternative ways of doing a task.

Important

An *Important* calls attention to an essential step or point required to complete a task. Important items include things often missed.

Caution

A *Caution* informs you of possible equipment damage or loss of data and how to avoid them.

Warning

A *Warning* notifies you of probable equipment damage or loss of data, or the possibility of physical injury, and how to avoid them.

Product Overview

The PC which you are using either already contains a FastTrak TX4310 RAID Controller card installed by a third-party or you have acquired a FastTrak TX4310 retail product for your existing PC and plan to install the card yourself.

- For PC owners wishing to install their TX4310 RAID, go to "Chapter 2: Installation" on page 7.

- For PCs with a FastTrak TX4310 already installed, and you are experiencing any difficulties with the disk drives being recognized by the card, go to "Chapter 7: Support" on page 109.

- 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 FastTrak TX4310. See "Chapter 3: Install Drivers" on page 23.

FastTrak TX 4310

Promise originally designed the FastTrak TX4310 RAID Controller card as a cost-effective, high performance RAID controller card that adds performance and reliability to PC desktops and servers using Serial ATA drives. FastTrak TX4310 has four independent data channels to support a maximum of four Serial ATA drives and supports:

- Stripe (RAID 0) – Identical drives can read and write data in parallel to increase performance.

- Mirror (RAID 1) – Mirror increases read performance through load balancing and elevator sorting while creating a complete backup of your files.

- Stripe with Parity (RAID 5) – Combines data striping to increase performance with parity data to provide fault tolerance.

- Mirror / Stripe (RAID 10) – Combining mirror with stripe offers both high read/write performance and fault tolerance

A FastTrak TX4310 striped disk array can double the sustained data transfer rate of Serial ATA drives.

FastTrak TX4310 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.

Should a drive that is part of a mirrored or parity disk array fail, FastTrak TX4310 uses the mirrored drive or the parity to assume all data handling. When a new replacement drive is later installed, FastTrak TX4310 rebuilds data to the new drive from the mirrored driveor parity to restore fault tolerance.

FastTrak TX4310 bootable BIOS supports individual drives larger than 137 GB. With FAT32 and NTFS partitioning, the disk array can be addressed as one large single volume.

WebPAM Software

The Web-based Promise Array Management (WebPAM) RAID management software offers local management and monitoring of FastTrak disk arrays. Browser-based GUI provides email notification of all major events/alarms, memory cache management, logging for Windows servers, disk array maintenance, rebuild, and access to all components in disk array (server, controller, data channels, individual drives, and enclosure). For information on using WebPAM, refer to "Chapter 5: WebPAM" on page 43.

Key Features and Benefits

The following information offers an overview of the major features of your new Promise FastTrak TX4310 RAID Controller card.

Advanced Hardware Design	
Features	**Benefits**
Supports 66 MHz PCI bus motherboards (automatically backward compatible with 33 MHz PCI slots)	Allows maximum data transfers of up to 266MB per second (133 MB/s in 33 MHz slot) over the bus to dramatically reduce the time to save and retrieve large files.
Supports: data stripe (RAID 0), mirror (RAID 1), data stripe plus parity (RAID 5) and mirror/ stripe (RAID 10)	Provides dramatic increase in drive performance and/or fault tolerant options. Offers performance customization and data rebuilds from the BIOS menu.
Serial ATA Specification II	Burst data transfer rates up to 3.0 Gb/s from Serial ATA drives to boost overall system performance.
Independent data channels for Serial ATA drives	Drives can multiply their data transfer performance when striped together and each drive uses a separate data channel.
PCI Plug-n-Play, PCI Interrupt sharing and coexists with motherboard IDE and SCSI controllers	Easy to install; supports up to 4 Serial ATA drives on the FastTrak RAID Controller card while still supporting 4 devices on motherboard ATA controller.
Supports multiple disk arrays	TX4310 supports up to 4 disk arrays.

Advanced Hardware Design	
Features	**Benefits**
Supports online disk array expansion	Add disk drives to the disk array without affecting data availability.
Supports online disk array migration	Change RAID level without affecting data availability.
Supports Hot Spare drive	Uses any free disk to replace a failing disk in a disk array automatically.
Utilizes FastBuild™ automenu from the FastTrak onboard BIOS	Has "Auto Setup" option for quick and easy disk array builds
Displays status and error checking messages during bootup	Notifies user of possible errors and allows for recovery of mirrored drive disk arrays directly from FastBuild™.
Supports S.M.A.R.T. monitoring and reporting	Polls status every 15 minutes, reports through WebPAM.
Employs the latest Promise PCI Serial ATA ASIC technology	Fully supports Serial ATA specifications with 300 MB/sec timing and CRC error-checking at high speeds.
Mirror supports automatic background rebuilds	Fault tolerance can be restored automatically without rebooting.
DOS based flash upgrade of BIOS and Firmware	Verifies proper file, option to backup existing file. Download files from Promise website
Gigabyte Rounding	Allows easier interchangeability among disk drive vendors
System reboot not required after create, delete, migrate or expand disk array	System boot process continues without restarting.

Compatibility	
Features	**Benefits**
Complies with PCI v2.3 Local Bus standard	Provides highest level of hardware compatibility.
Complies with SATA Specification 1.0a	Provides full compatibility with first generation Serial ATA hard drives.

Compatibility	
Features	**Benefits**
Complies with Serial ATA II: Extensions to Serial ATA 1.0a Specification	Provides enclosure and drive monitoring compatibility.
Compliant with PCI Bus Master standard. PCI Bus Master support	Provides 32-bit I/O and, Bus Master, and Serial ATA performance for optimal system performance.
Tested compatibility to coexist with motherboards that have integrated IDE controllers	Improves system performance and minimizes system conflicts for new and existing installations.
Compatible with all major SATA generation 1 and SATA generation 2, phase 1 and phase 2 disk drives	Promise performs verification testing with major drive manufacturers and development partners.
Features LBA support	Supports drives greater than 137 GB capacity.
Supports BIOS Boot Specification	All disk arrays attached to the FastTrak card appear in the BBS-compliant motherboards BIOS boot list.
Compatible with Promise SuperSwap enclosures	Provides enclosure management including fan, temperature and voltages.

Specifications

- Low-profile printed circuit board
- PCI Slot 33 MHz or 66 MHz
- Controller card dimensions (H x W): 2.25 x 4.75 inches (57 x 121 mm)
- Operating temperatures: 32° to 122°F (0°C to 50°C)
- Operating humidity: 5% to 95% non-condensing

Chapter 2: Installation

- Unpack Your FastTrak Card (below)
- Install the FastTrak Card (page 8)
- Install the Disk Drives (page 9)
- Create Your Logical Drive (page 10))
- WebPAM Installation (page 14)

This Chapter is designed to quickly get your FastTrak TX4310 RAID Controller card up and running.

If you plan to run the WebPAM software, you must also install the driver appropriate to your operating system. See "Chapter 3: Install Drivers" on page 23.

Unpack Your FastTrak Card

When you receive the FastTrak TX4310 RAID Controller card, the package should contain the items listed below:

- FastTrak TX4310 RAID Controller Card
- Quick Start Guide
- Four 0.65m (25.6-inch) Serial ATA disk drive data cables
- Two Y power splitter cables
- CD with Drivers, Promise RAID Management (WebPAM) software and *FastTrak TX4310 User Manual*

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

	Warning
	The electronic components on the FastTrak RAID Controller card are sensitive to damage from Electro-Static Discharge (ESD). Observe appropriate precautions at all times when handling the FastTrak card or its subassemblies.

	Warning
	Before installing the adapter into an existing system, backup any important or useful data. Failure to follow this accepted PC practice could result in data loss.

> **Note**
>
> The FastTrak TX4310 RAID Controller card is a PCI Plug-n-Play (PnP) device. No changes are necessary in the motherboard CMOS/BIOS Setup for resources or drive types in most applications.

Install the FastTrak Card

The FastTrak TX4310 RAID Controller card fits into any available PCI slot on your PC's motherboard (below):

- 32-bit PCI slot (must be PCI 2.2 or 2.3 compliant)
- The 32-bit portion of a 64-bit PCI or PCI-X slot.
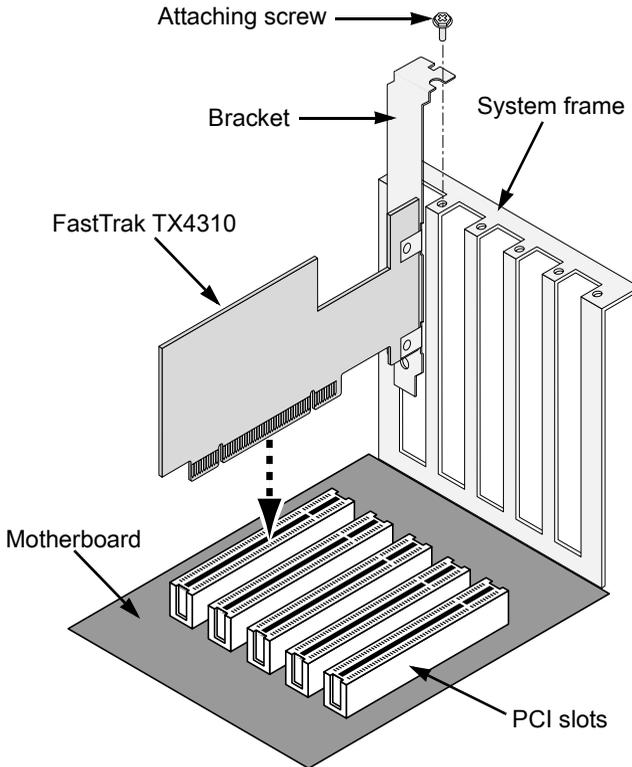
1. Remove the cover of your system.

2. Remove the inside slot cover of an available 32-bit PCI slot on the motherboard.Install the FastTrak Serial ATA RAID card into the open PCI slot. Secure the bracket to the system's frame.

3. Attach your system case's 2- or 4-pin LED cable to the LED connector on the FastTrak card (see *Install the Disk Drives*, below).

4. Fasten the controller card bracket to the system case.

Install the Disk Drives

Important

If you wish to include your current bootable Serial ATA drive using the Windows operating system as part of a bootable Mirrored (RAID 1) logical drive on your FastTrak card, do NOT connect the disk drive to the FastTrak yet. You MUST install the Windows driver software first onto this drive while it is still attached to your existing disk drive controller.

The FastTrak TX4310 RAID Controller card supports only Serial ATA disk drives. For optimal performance, install disk drives of the same model and capacity. The drives' matched performance allows the logical drive to function better as a single drive.

Level	Number of Drives
RAID 0	any number
RAID 1	2 only
RAID 5	3 or 4
RAID 10	4 only
JBOD	any number

The table above shows the number of drives required for each RAID level. If you plan to create a mirror (RAID 1) 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.

1. Install the disk drives into the disk drive bays of your system.

Caution

Use of removable disk drive enclosures other than Promise Technology's SuperSwap is not supported and may result in performance loss or other undesired results.

Port 1 /
Channel 1

Individual LED
Connectors

Aggregate LED
Connectors

Port 2 /
Channel 2

Management
Connector

Port 3 /
Channel 3

Port 4 /
Channel 4

SATA 300

PROMISE®
TECHNOLOGY, INC. **FastTrak** *TX4310*
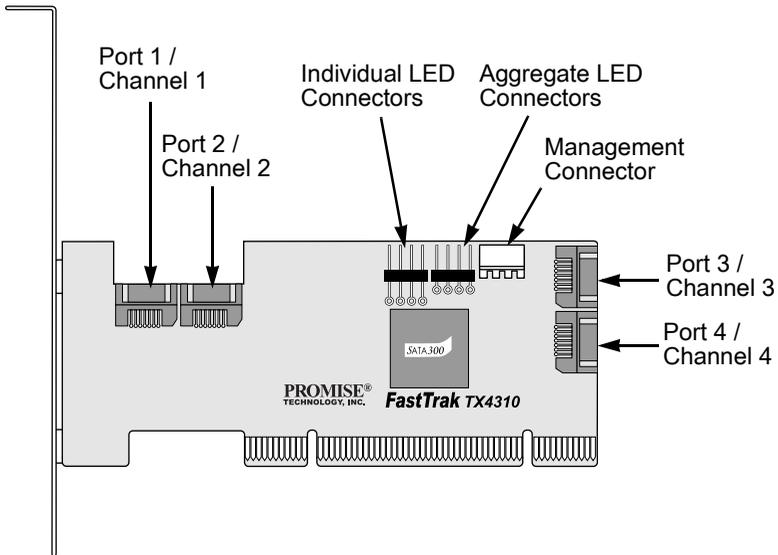
2. Attach one Serial ATA data cable to each disk drive. Then attach the other ends of the cables to the connectors on the FastTrak card (above).

3. Attach the Y-cable power splitters to each of the disk drives.

Create Your Logical Drive

You will now use the onboard FastBuild BIOS utility to create a logical drive with the attached drives.

For an explanation of the logical drive concepts, see Chapter 5

Note

You can omit this step and create your logical drive using the WebPAM software.

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

```
FastTrak TX4310 (tm) BIOS Version 2.5.1.xx
(c) 2004-2005 Promise Technology, Inc. All rights reserved.



No Array is defined...


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

2. Press the Ctrl-F keys to display the FastBuild Utility Main Menu (below).

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
================================= [ Main Menu ] =================================



            View Drive Assignments ........[ 1 ]

            Define LD.....................[ 2 ]

            Delete LD.....................[ 3 ]

            Controller Configuration.......[ 4 ]




=============================== [ Keys Available ] =============================
 Press  1..4  to Select Option                                    [ESC]..Exit
```

3. Press 2 on the Main Menu screen to display the Define LD Menu (below).

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
=============================== [ Define LD Menu ] =============================


   LD No        RAID Mode      Total Drv      Capacity (MB)       Status

   LD 1          ----           ----           ------            ----
   LD 2          ----           ----           ------            ----
   LD 3          ----           ----           ------            ----
   LD 4          ----           ----           ------            ----
   LD 5          ----           ----           ------            ----
   LD 6          ----           ----           ------            ----
   LD 7          ----           ----           ------            ----
   LD 8          ----           ----           ------            ----



=============================== [ Keys Available ] =============================
 [↑] Up   [↓] Down   [ESC] Exit   [Enter] Select
```

4. Press the arrow keys to highlight an logical drive number you want to define and press Enter to select it.

11

The Define LD Menu for the logical drive number you selected will next appear (below).

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
========================[ Define LD Menu ]========================
   LD No           RAID Mode      Total Drv
   LD 1            RAID 5             3

   Stripe Block: 16 KB                         Fast Init: OFF


========================[ Drive Assignments ]========================
   Channel ID        Drive Model           Capacity (MB)      Assignment
        1:Mas ST380013AS                      80027              Y
        2:Mas ST380013AS                      80027              Y
        3:Mas ST380013AS                      80027              Y
        4:Mas ST380013AS                      80027              N




========================[ Keys Available ]========================
 [↑] Up    [↓] Down   [ESC] Exit    [Space] Change Option    [Ctrl-Y] Save
```
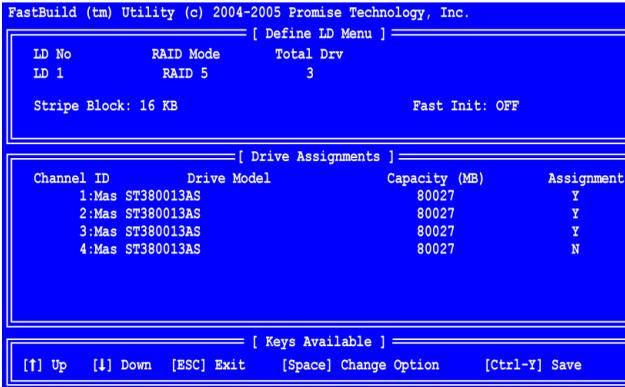
5. Choose the RAID Level you want. In the Define LD Menu section, press the Spacebar to cycle through logical drive types:

    •   RAID 0 (Stripe)

    •   RAID 1 (Mirror)

    •   RAID 5 (Block Striping with Distributed Parity)

    •   RAID 10 (Stripe / Mirror)

    •   JBOD (Single Drive)

6. Press the arrow keys to move to the next option. Option choices depend on the RAID Level you selected.

    •   Fast Init erases the Master Boot Record (MBR) of the disk drives when this feature is set to ON. It applies to RAID 0, 1, 5 or 10.

    •   Stripe Block Size, the default 16KB is the only setting.

7. Press the arrow keys to move to Disk Assignments. Press the spacebar to toggle between N and Y for each available drive. Y means this disk drive will be assigned to the logical drive.

    Assign the appropriate number of disk drives to your logical drive. Refer to the table under "Install the Disk Drives" on page 9.

    A disk drive that is not assigned to a logical drive will automatically function as a Hot Spare Drive.

8. Press Ctrl-Y to save your logical drive configuration.

    You have the option allocating a portion to a second logical drive. This option is discussed under "Create a Logical Drive" on page 34.

9. Press any key (except for Ctrl-Y) to use the full portion of the logical drive for one logical drive.

10. Press Esc to exit to the Main Menu. Press Esc again to exit the Utility.

11. Press Y to restart the computer.

You have successfully created a new RAID logical drive.

	Important
	You must be partition and format your new logical drive before you can use it. Use the same method of partitioning and formatting a logical drive as you would any other fixed disk added to your computer system.

WebPAM Installation

	Important
✓	Install the FastTrak software drives for your operating system before installing WebPAM. See "Chapter 3: Installing Software Drivers" on page 23 for instructions.

WebPAM installation software will install two major components:

• Utility Server – WebPAM RAID monitoring and Networking software

• Java Runtime Environment (if not previously installed)

Utility Server

The Utility Server installs on the PC with the FastTrak RAID Controller card (the "Host PC").
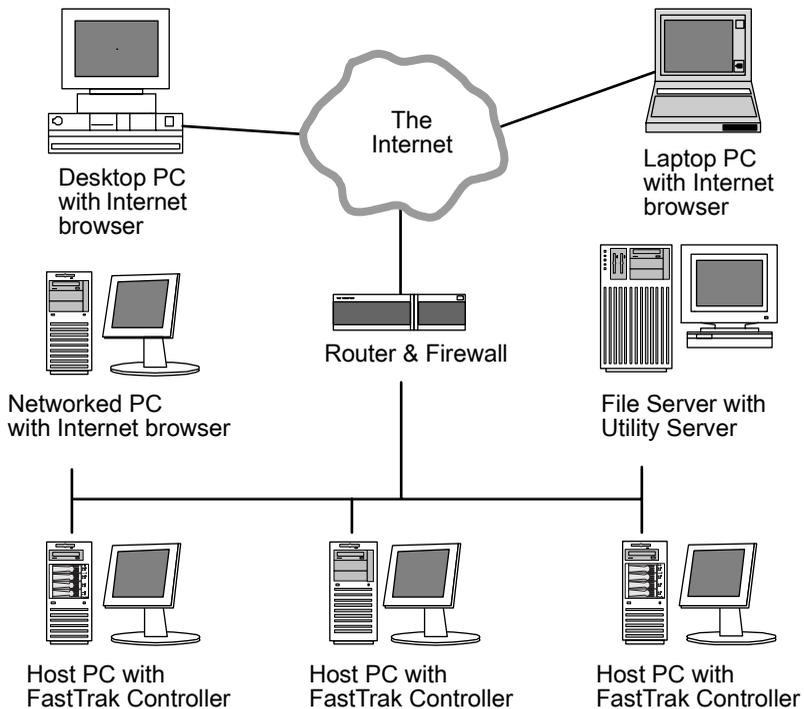
Figure 12. WebPAM on a network

Java Runtime Environment

If you are planning to use other applications that rely on JRE or JDK, always install them first before you install WebPAM. WebPAM will use the existing JRE rather than installing a second one.

WebPAM will install JRE 1.4 on your system unless you already have JRE or JDK versions 1.3.0 or 1.4.

Operating System Support

On the Host PC where you install the FastTrak controller and WebPAM, Promise Technology recommends:

• Windows 2000

• Windows XP Professional

• Windows 2003

• Red Hat EL 4.0

• SuSE ES 9.0

The Utility Server supports these operating systems. Choose one of them to take full advantage of all the features of WebPAM.

Install WebPAM

Windows

Follow these steps to install WebPAM on your Windows-based PC or Server.

1. Boot up the PC/server and launch Windows.

   If the computer is already running, exit all programs.

2. Insert the software CD into your CD-ROM drive.

3. Double-click on the Install CD's icon to open it.

4. Double-click on the Installer icon to launch it (right).

   The first WebPAM installation dialog box appears. Go to "WebPAM Installation for Windows and Linux, continued" on page 16

PromiseWebPAM

Linux

Follow these steps to install WebPAM on your Linux-based PC or Server.

1. Boot up the PC/server and launch the Linux GUI.

   If the computer is already running, exit all programs.

2. Insert the software CD into your CD-ROM drive.

3. In the CD window, double-click on the **webpam...bin** icon to begin installation (right).

webpamxxxx.bin

4. When the Run or Display? dialog box appears, click *Run in Terminal*.

After several moments, the Terminal window closes and the first WebPAM PRO installation dialog box appears.

WebPAM Installation for Windows and Linux, continued

The first WebPAM installation dialog box appears, as shown below.
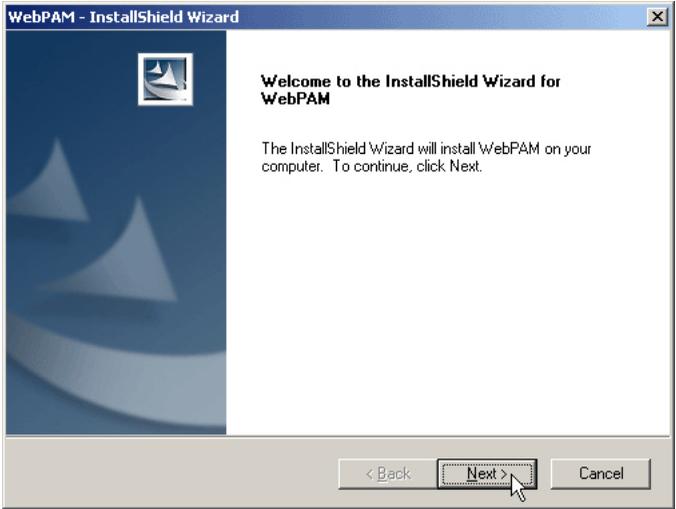

5. When the Introduction screen appears (above), click the **Next** button.

6. When the License Agreement appears (above), click the "I accept the terms of the license agreement" radio button. Then click the **Next** button.
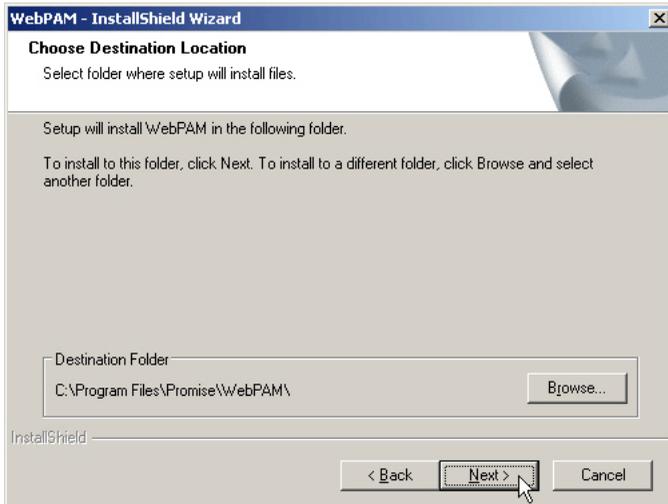
7. When the Choose Install Folder screen appears (above), make your selection of a folder for the WebPAM applications you are installing. The default folder is **C:\Program Files\Promise\WebPAM**. If you want a

different folder, type its location or click the **Browse** button and select a new location.

If you change your mind and want the default location, click on the **Back** button, then the **Next** button.

Click the **Next** button when you are finished.

8. When the SSL Security Options screen appears (above), you can check External Security. An explanation follows.

External SSL Security – Applies security to all connections involving the Internet or outside your company firewall.

Security options are invisible to authorized users.

Promise Technology provides a default certificate for the server as well as for internal data communication. However, in some cases it is always better to install and verify your own certificate for the webserver. And, and if possible, verify certificate by certificate authority like Verisign or Thwate. See your MIS Administrator for guidance.

Click the **Next** button when you have made your choice.
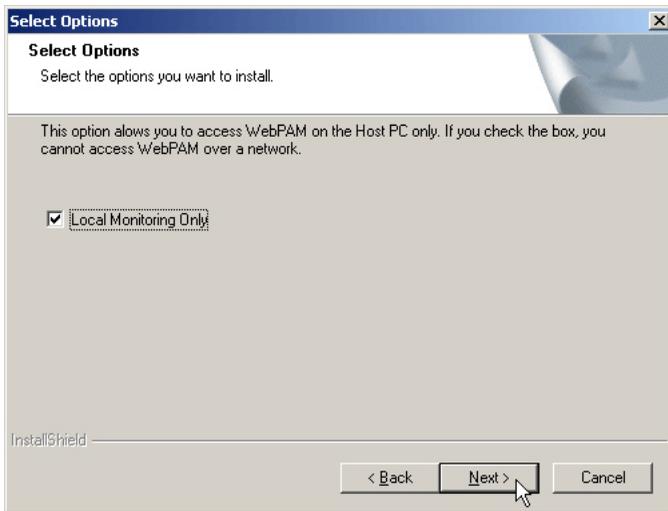
9.   When the Select Options screen appears (above), you have the option of choosing *Local Monitoring Only*.

   •   If you check this option, you can only log into WebPAM from the Host PC. You cannot log into WebPAM over a network.

   •   If you do not check this option, you can log into WebPAM from the Host PC or over a network.

   To continue, click the **Next** button.
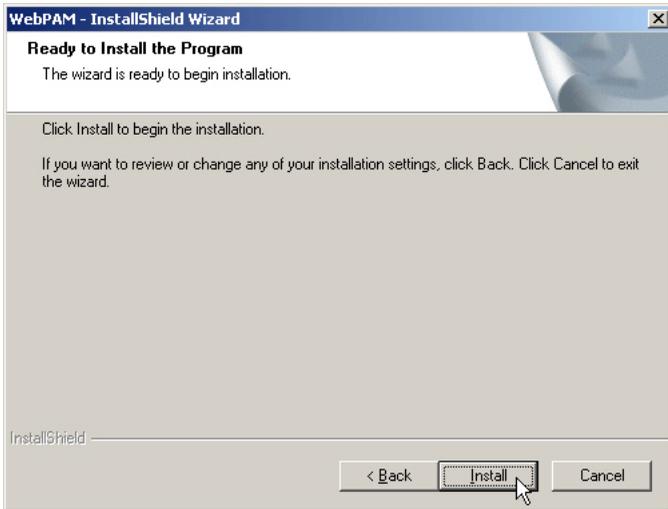
10. When the Ready to Install screen appears (above), click the **Install** button.
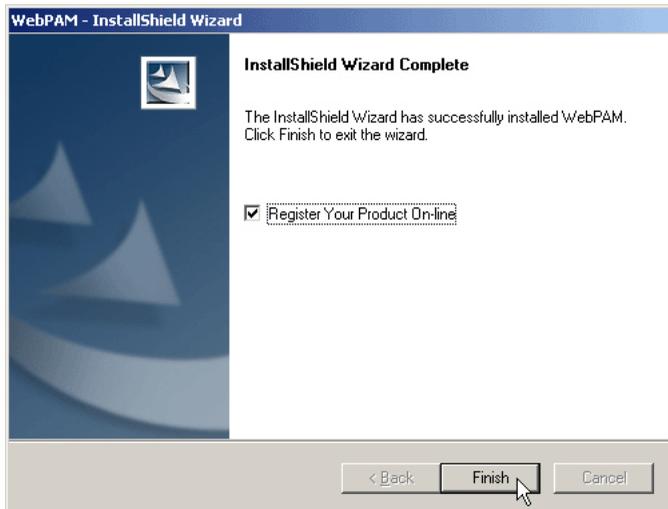
11. When the Install Complete screen appears (above), the installation process is finished. Click the **Finish** button to go to the Promise Registration website.

Important

Registration of your FastTrak and WebPAM provides useful information that helps Promise Technologies to offer better products and support. Please take a few minutes to register. Thanks!

This completes the WebPAM installation. Go to "Chapter 5: WebPAM" on page 49 for information about using WebPAM.

Chapter 3: Install Drivers

Following are driver installation procedures for the Windows operating systems that support the FastTrak TX4310 RAID Controller card. The FastTrak drivers for Windows are included on the CD.

Drivers and installation instructions for Linux are downloadable from the Promise website at www.promise.com.

Important

If you wish to include your current bootable drive using the Windows 2000, XP or Server 2003 operating system as part of a bootable Mirrored (RAID 1) disk array, you MUST install the FastTrak driver to this drive while it is still attached to your existing disk drive controller.

Make an Installation Floppy Diskette

This procedure requires one write-enabled blank 3.5-inch diskette.

1. Place your blank diskette in the appropriate drive.

2. Insert the Promise CD into your CD-ROM drive.
   The display screen should open automatically.
   If the display screen does not open, click on MyComputer > CD Drive D: and double-click on the *Launch.exe* icon.

3. Click on the **Windows Driver** button.
   The Disk Copy Utility opens.

4. Click the **Create** button in the Utility.
   A confirmation box appears.

5. Click the **Yes** button in the confirmation box.
   The utility prepares your driver installation diskette.
   When the utility is finished, it displays a message.

6. In the message, click the **OK** button.

7. Click the **Exit** button to close the Promise CD.

Windows Server 2003

New Installation

The following details the installation of the FastTrak TX4310 RAID Controller drivers while installing Windows Server 2003.

1. Start the installation:
   - Floppy Install: Boot the computer with the Windows Server 2003 installation diskettes.
   - 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 Server 2003 Setup window is generated, press S to specify an Additional Device(s).

3. Insert the FastTrak driver diskette into drive A: and press Enter.

4. Choose *Windows Promise FastTrak TX4310 (tm) Controller* from the list that appears on screen, and then press the Enter.

5. Press S to use the driver on the floppy disk and then press Enter to continue with installation.

6. The Windows Server 2003 Setup screen will appear again saying "Setup will load support for the following mass storage devices:" The list will include "Windows Promise FastTrak TX4310 (tm) Controller".

   NOTE: If there are any additional devices to be installed, specify them now. When all devices are specified, continue to the next step.

7. From the Windows Server 2003 Setup screen, press the Enter. Setup will now load all device files and then continue the Windows Server 2003 installation.

Existing Installation

After installing the FastTrak TX4310 RAID Controller card and rebooting your system, Windows Server 2003 setup will show a "Found New Hardware" dialog box. Under Windows 2003, "RAID Controller" will be displayed.

1. Insert the FastTrak driver diskette into the A:\ drive.
2. Choose *Install the software automatically* and press the Enter key.
3. Choose *Windows Promise FastTrak TX4310 (tm) Controller* from the list that appears on screen, and then press the Enter key.
4. If using a driver that has not been digitally signed by Microsoft, you will be asked if you want to continue the installation. Click Continue anyway.
5. When the New Hardware Wizard has finished installing the FastTrak driver, click Finish.

Confirm Installation

1. Right-click on the My Computer icon and select Manage from the popup menu.
2. From the left panel, select Device Manager.
3. Click the "+" in front of SCSI and RAID controllers. "Windows Promise FastTrak TX4310 (tm) Controller" and "Promise RAID Console SCSI Processor Device" should appear.

Windows XP

New Installation

The following details the installation of the FastTrak TX4310 RAID Controller drivers while installing Windows XP.

1. Start the installation:

    •   Floppy Install: Boot the computer with the Windows XP installation diskettes.

    •   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 XP Setup window is generated, press S to specify an Additional Device(s).

3. Insert the FastTrak driver diskette into drive A: and press Enter.

4. Choose *Windows Promise FastTrak TX4310 (tm) Controller* from the list that appears on screen, and then press the Enter.

5. Press S to use the driver on the floppy disk and then press Enter to continue with installation.

6. The Windows XP Setup screen will appear again saying "Setup will load support for the following mass storage devices:" The list will include "Windows Promise FastTrak TX4310 (tm) Controller".

    NOTE: If there are any additional devices to be installed, specify them now. When all devices are specified, continue to the next step.

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

Existing Installation

After installing the FastTrak TX4310 RAID Controller card and rebooting your system, Windows XP setup will show a "Found New Hardware" dialog box.

1. Insert the FastTrak driver diskette into the A:\ drive.
2. Choose Install the software automatically and press the Enter key.
3. Choose *Windows Promise FastTrak TX4310 (tm) Controller* from the list that appears on screen, and then press the Enter key.
4. If using a driver that has not been digitally signed by Microsoft, you will be asked if you want to continue the installation. Click Continue anyway.
5. When the New Hardware Wizard has finished installing the FastTrak driver, click Finish.

Confirm Installation

1. Right-click on the My Computer icon and select Manage from the popup menu.
2. From the left panel, select Device Manager.
3. Click the "+" in front of SCSI and RAID controllers. "Windows Promise FastTrak TX4310 (tm) Controller" and "Promise RAID Console SCSI Processor Device" should appear.

Windows 2000

New Installation

The following details the installation of the FastTrak TX4310 RAID Controller drivers while installing Windows 2000.

1. Start the installation:
    - Floppy Install: Boot the computer with the Windows 2000 installation diskettes.
    - 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. Insert the FastTrak driver diskette into drive A: and press Enter.
4. Choose *Windows Promise FastTrak TX4310 (tm) Controller* from the list that appears on screen then press Enter.
5. The Windows 2000 Setup screen will appear again saying "Setup will load support for the following mass storage devices:" The list will include "Windows Promise FastTrak TX4310 (tm) Controller".

    NOTE: If there are any additional devices to be installed, specify them now. When all devices are specified, continue to the next step.
6. From the Windows 2000 Setup screen, press Enter. Setup will now load all device files and then continue the Windows 2000 installation.

Existing Installation

After installing the FastTrak TX4310 RAID Controller card and rebooting your system, Windows 2000 setup will show a "New Hardware Found" dialog box. Under Windows 2000, "PCI Mass Storage Controller" will be displayed.

1. Choose Add New Hardware Wizard from the list, and then press Enter.
2. Choose Add/Troubleshoot a device and click Next. The new hardware wizard will show device list
3. Choose Mass Storage controller and click Next. At the following screen click Finish.
4. Choose Display a list the known drivers for this device so that I can choose a specific driver then click Next.
5. When the Windows 2000 supported SCSI adapter drivers list appears, click Have disk.
6. Insert the FastTrak driver diskette in drive A:\.
7. Type A:\Win2000 in the text box. Click OK.
8. Choose *Windows Promise FastTrak TX4310 (tm) Controller* from the list that appears on screen, then click Next.
9. Click Yes to confirm continue the installation and copy the driver to system.
10. Remove the diskette and click Finish to restart the system.

    Windows 2000 will then restart for the driver installation to take effect.

Confirm Installation

1. Right-click on the My Computer icon and select Manage from the popup menu.
2. From the left panel, select Device Manager.
3. Click the "+" in front of SCSI controllers. "Windows Promise FastTrak TX4310 (tm) Controller" and "Promise RAID Console SCSI Processor Device" should appear.

Chapter 4: FastBuild™ Utility

- FastTrak BIOS (below)
- Main Menu (page 32)
- View Drive Assignments (page 33)
- Create a Logical Drive (page 34)

- Delete Logical Drive (page 39)
- Controller Configuration (page 40)
- Logical Drive Problems (page 41)

FastTrak BIOS

The FastTrak BIOS is a built-in component of the FastTrak TX4310 RAID Controller card.

When the FastTrak BIOS loads during bootup, it displays pertinent information about the RAID logical drives that it finds. At this point, you can press Ctrl-F to enter the FastBuild Configuration Utility.

```
FastTrak TX4310 (tm) BIOS Version 2.5.1.xx
(c) 2004-2005 Promise Technology, Inc. All rights reserved.


ID      MODE            SIZE            TRACK-MAPPING       STATUS

1       2+1 RAID 5      159918M         19442/255/63        Functional



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

When the FastTrak BIOS screen appears, press Ctrl-F to enter the FastBuild Utility.

The FastTrak BIOS screen displays the following information:

ID – An identification number assigned to each logical drive by the BIOS.

Mode – The RAID mode (level) configuration of the logical drive

Size – The data capacity of the logical drive in MB (Megabytes).

Track-Mapping – This is the CHS (Cylinder/Head/Sector) equivalent of the logical drive geometry as hosted by the FastTrak BIOS int 13h disk services.

Status – Shows one of three logical drive conditions:

Functional – The logical drive is fully operational, and no problems are present.

Critical – The logical drive is operational, but has lost its fault tolerance. For RAID levels 1, 5 and 10, the logical drive contains a failed drive. If there is a

---

hot spare drive, the logical drive will rebuild automatically. You must identify and replace the failed disk drive.

Offline – The logical drive is no longer operational and the FastBuild utility cannot rebuild it. You must identify and replace the failed drive(s). Then you can create a new logical drive and copy your data to it from the last tape backup or other device.

For RAID levels 1, 5 and 10, at least two or more disk drives in the logical drive have failed.

For a RAID 0 or JBOD logical drive, at least one disk drive has failed.

Main Menu

When the FastTrak BIOS displays on your computer screen, press Ctrl-F to launch the FastBuild utility and display the Main Menu.

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
                       [ Main Menu ]


            View Drive Assignments ........[ 1 ]

            Define LD....................[ 2 ]

            Delete LD....................[ 3 ]

            Controller Configuration.......[ 4 ]



                       [ Keys Available ]
Press  1..4  to Select Option                        [ESC]..Exit
```
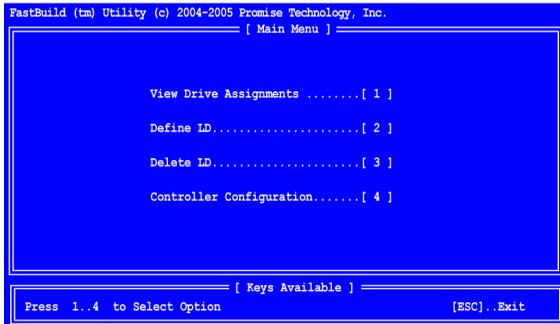
The Main Menu (above) has five options:

- Press 1 to view disk drive assignments
- Press 2 to create a logical drive or view information about an existing logical drive.
- Press 3 to delete a logical drive.
- Press 4 to view and change controller configuration.
- Press Esc (Escape) to exit the menu.

View Drive Assignments

From the Main Menu screen, press 1 to see the View Drive Assignments screen (below).

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
══════════════════════ [ View Drives Assignments ] ══════════════════════

    Channel:ID         Drive Model          Capacity (MB)      Assignment
           1:Mas ST380023AS                      80027
                  Extent 1                       79960            LD 1-1
           2:Mas ST380023AS                      80027
                  Extent 1                       79960            LD 1-2
           3:Mas ST380023AS                      80027
                  Extent 1                       79960            LD 1-3
           4:Mas ST380023AS                      80027
                  Extent 1                       79960             Free




══════════════════════════ [ Keys Available ] ══════════════════════════

 [↑] Up     [↓] Down      [PgDn] Next Page  [PgUp] Previous Page    [ESC] Exit
```

This screen reports disk drive assigments and provides the following information:

Channel: ID – Shows the FastTrak Controller channel ID (1 through 4) to which a particular disk drive is attached.

Drive Model – Identifies the manufacturer, model, and model number (if applicable) of each disk drive.

Capacity (MB) – Reflects the capacity in MB (megabytes) of the disk drive.

Assignment – This field identifies the logical drive to which the disk drive belongs. In the example above, there is one logical drive composed of three disk drives. LD 1-2 means logical drive 1, disk drive 2.

Unassigned drives are labeled *free* and are considered *hot spares* to provide fault tolerance. Unassigned drives may also be used to create a new logical drive at any time.

Extent – An extent is a portion of the disk drive. The FastTrak TX4310 RAID Controller card allows you to split the capacity of a disk drives between two logical drives. The portion of a disk drive available to be used in a logical drive is called an *extent*. The extent, or sum of two extents, is slightly smaller than the total capacity of the disk drive.

See "View Drive Assignments, Split Disk Drives" on page 38 for an example of two extents for each disk drive.

Create a Logical Drive

1. From the Main Menu screen, press 2 to display the Define LD Menu (below).
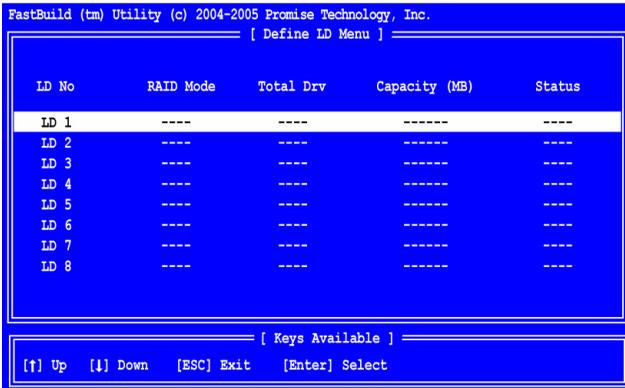
```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
══════════════════════ [ Define LD Menu ] ══════════════════════

  LD No        RAID Mode     Total Drv     Capacity (MB)      Status

  LD 1          ----          ----          ------           ----
  LD 2          ----          ----          ------           ----
  LD 3          ----          ----          ------           ----
  LD 4          ----          ----          ------           ----
  LD 5          ----          ----          ------           ----
  LD 6          ----          ----          ------           ----
  LD 7          ----          ----          ------           ----
  LD 8          ----          ----          ------           ----


═══════════════════════ [ Keys Available ] ═══════════════════════
[↑] Up    [↓] Down    [ESC] Exit    [Enter] Select
```

2. Press the arrow keys to highlight an logical drive number you want to define and press Enter to select it.

    The Define LD Menu for the logical drive number you selected will next appear (below).
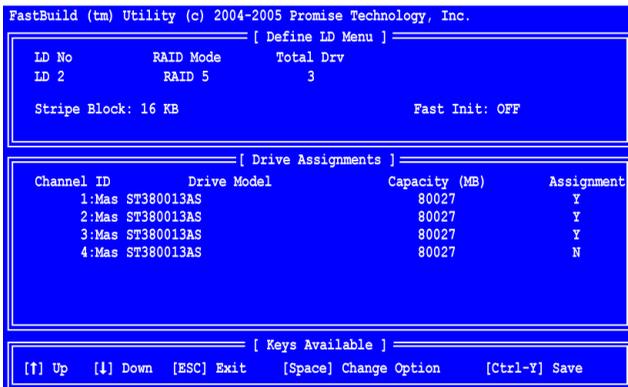
```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
══════════════════════ [ Define LD Menu ] ══════════════════════
  LD No        RAID Mode     Total Drv
  LD 2          RAID 5          3

  Stripe Block: 16 KB                      Fast Init: OFF

═══════════════════════ [ Drive Assignments ] ═══════════════════════
Channel ID         Drive Model          Capacity (MB)      Assignment
    1:Mas ST380013AS                        80027               Y
    2:Mas ST380013AS                        80027               Y
    3:Mas ST380013AS                        80027               Y
    4:Mas ST380013AS                        80027               N



═══════════════════════ [ Keys Available ] ═══════════════════════
[↑] Up    [↓] Down    [ESC] Exit    [Space] Change Option    [Ctrl-Y] Save
```

3. Choose the RAID Level you want. In the Define LD Menu section, press the Spacebar to cycle through logical drive types:

    •   RAID 0 (Stripe)

    •   RAID 1 (Mirror)

    •   RAID 5 (Block Striping with Distributed Parity)

    •   RAID 10 (Stripe / Mirror)

    •   JBOD (Single Drive)

    See for more information.

4. Press the arrow keys to move to the next option. Option choices depend on the RAID Level you selected.

    •   Initialize logical drive, zero the disk drives. RAID 1, 5 or 10 only.

    •   Stripe Block Size, the default 64KB is best for most applications.

5. Press the arrow keys to move to Disk Assignments. Press the spacebar to toggle between N and Y for each available drive. Y means this disk drive will be assigned to the logical drive.

    Assign the appropriate number of disk drives to your logical drive.

    A disk drive that is not assigned to a logical drive will automatically function as a Hot Spare Drive.

6. Press Ctrl-Y to save your logical drive configuration.

    You have the option of using all of the disk drive capacity for one logical drive or allocating a portion to a second logical drive.

> Press Ctrl-Y to Modify Array Capacity or press any
> other key to use maximum capacity...

7. Choose one of the following:

    •   Use the full capacity of the disk drives for a single logical drive. Go to "One Logical Drive" below.

    •   Split the disk drives among two logical drives. This option does not apply to JBOD. Go to "Two Logical Drives" on page 35.

One Logical Drive

Continued from *Create Logical Drive* step 7, above.

1. Press any key (except for Ctrl-Y) to use the full portion of the logical drive for one logical drive.

2. Press Esc to exit to the Main Menu. Press Esc again to exit the Utility.

3. Press Y to restart the computer.

You have successfully created a new RAID logical drive.

You must be partition and format your new logical drive before you can use it. Use the same method of partitioning and formatting a logical drive as you would any other fixed disk added to your computer system.

Two Logical Drives

Continued from *Create Logical Drive* step 7, above.

1. Press Ctrl-Y to allocate a portion of the disk drives to the first logical drive.

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
══════════════════════[ Define LD Menu ]══════════════════════
  LD No           RAID Mode      Total Drv      Capacity(MB)
  LD 1            RAID 5           3              159919

  Stripe Block: 16 KB                            Fast Init: OFF

═════════════════════[ Drives Assignments ]═════════════════════
  Channel ID        Drive Model            Capacity (MB)      Assignment
      1:Mas ST380013AS                         80027              Y
      2:Ma  ┌───────────────────────────────────────────┐        Y
      3:Ma  │ Enter array capacity (in MB) here: 80000   │        Y
      4:Ma  └───────────────────────────────────────────┘        N




════════════════════════[ Keys Available ]════════════════════════
 [0-9] Input Capacity    [Enter] Save    [BackSpace] Delete    [ESC] Escape
```

2. Enter the desired capacity in MB for the first logical drive and press Enter. The Define LD Menu displays again.

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
══════════════════════[ Define LD Menu ]══════════════════════

  LD No           RAID Mode      Total Drv      Capacity (MB)      Status

  LD 1            RAID 5           3              80000         Functional
  LD 2            ----            ----           ------            ----
  LD 3            ----            ----           ------            ----
  LD 4            ----            ----           ------            ----
  LD 5            ----            ----           ------            ----
  LD 6            ----            ----           ------            ----
  LD 7            ----            ----           ------            ----
  LD 8            ----            ----           ------            ----



════════════════════════[ Keys Available ]════════════════════════
 [↑] Up    [↓] Down    [ESC] Exit    [Enter] Select
```
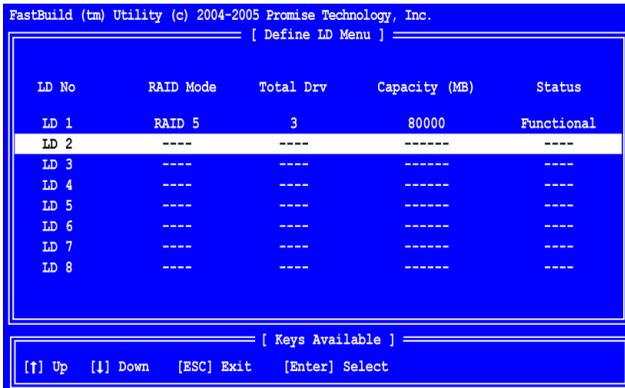
3. Press the up and down arrow keys to select an available logical drive number and press Enter.

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
=============================[ Define LD Menu ]=============================
  LD No          RAID Mode       Total Drv
  LD 2            RAID 5            3

  Stripe Block: 16 KB                          Fast Init: OFF

===========================[ Drive Assignments ]===========================
  Channel ID         Drive Model            Capacity (MB)        Assignment
      1:Mas ST380013AS                         39960                 Y
      2:Mas ST380013AS                         39960                 Y
      3:Mas ST380013AS                         39960                 Y
      4:Mas ST380013AS                         80027                 N



=============================[ Keys Available ]============================
 [↑] Up   [↓] Down  [ESC] Exit   [Space] Change Option   [Ctrl-Y] Save
```

4. Choose the RAID level and options for the second logical drive.

    Note that the disk drives in Channels 1, 2 and 3 reflect smaller capacities because a portion of their original capacity belongs to a different logical drive.

    In this example the disk drive in Channel 4 is not assigned to a logical drive in order to use it as a hot spare drive.

5. Press Ctrl-Y to save your logical drive configuration.
6. Press Esc to exit to the Main Menu. Press Esc again to exit the Utility.
7. Press Y to restart the computer.

You have successfully created a new RAID logical drive.

You must partition and format your new logical drive before you can use it. Use the same method of partitioning and formatting a logical drive as you would any other fixed disk added to your computer system.

View Drive Assignments, Split Disk Drives

After you create two logical drives from the same set of disk drives, press 1 on the Main Menu screen to see the View Drive Assignments screen (below).

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
========================= [ View Drives Assignments ] =========================

  Channel:ID          Drive Model          Capacity (MB)      Assignment
          1:Mas ST380023AS                     80027
                 Extent 1                       40000            LD 1-1
                 Extent 2                       39960            LD 2-1
          2:Mas ST380023AS                     80027
                 Extent 1                       40000            LD 1-2
                 Extend 2                       39960            LD 2-2
          3:Mas ST380023AS                     80027
                 Extent 1                       40000            LD 1-3
                 Extent 2                       39960            LD 2-3
          4:Mas ST380023AS                     80027
                 Extent 1                       79960             Free


============================== [ Keys Available ] =============================

 [↑] Up    [↓] Down      [PgDn] Next Page  [PgUp] Previous Page     [ESC] Exit
```

In this example, observe how each of the disk drives in Channels 1, 2 and 3 are split between two logical drives. Extent 1 belongs to logical drive 1 (LD 1). Extent 2 belongs to logical drive 2 (LD 2).

Under Assignment, the disk drive is divided into LD 1 and LD 2. For example, LD 1-2 means logical drive 1, disk drive 2. LD 2-3 means logical drive 2, disk drive 3.

Note that the combined size of the extents is slightly smaller than the total capacity of the disk drive.

Unassigned drives are labeled *free* and are considered *hot spares* to provide fault tolerance in the event of a disk drive failure. Alternatively, you can use an unassigned drive to create a new logical drive.

Delete Logical Drive

Caution

Deletion of an existing logical drive will result in the loss of all data saved on the logical drive.

Record all logical drive information, including RAID level, disk members, stripe block size and gigabyte boundary, in case you wish to undo a deletion.

Logical drives may possibly be recovered after deletion by immediately re-defining the logical drive with information identical to the original configuration.

To delete a logical drive:

1. From the Main Menu screen, press 3 to display the Delete LD Menu (below).

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
========================= [ Delete LD Menu ] =========================


     LD No          RAID Mode      Total Drv      Capacity (MB)       Status

     LD 1           RAID 5            3               80000           Functional
     LD 2           RAID 5            3               78000           Functional
     LD 3            ----            ----            ------             ----
     LD 4            ----            ----            ------             ----
     LD 5            ----            ----            ------             ----
     LD 6            ----            ----            ------             ----
     LD 7            ----            ----            ------             ----
     LD 8            ----            ----            ------             ----



========================= [ Keys Available ] =========================
 [↑] Up    [↓] Down    [ESC] Exit    [Del or Alt+D] Delete
```

2. Highlight the logical drive you wish to delete and press the Del key or Alt-D. The Delete LD Menu for the selected logical drive appears (below).

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
═══════════════════════════ [ Delete LD Menu ] ═══════════════════════════
   LD No         RAID Mode      Total Drv     Capacity(MB)
   LD 2          RAID 5                        3  78000

   Stripe Block: 64 KB                         Fast Init: OFF
   Gigabyte Boundary: ON                       Cache Mode: WriteBack

════════════════════════ [ Drives Assignments ] ═════════════════════════
   Channel ID           Drive Model              Capacity (MB)
        1:Mas ST380023AS                             39960
        2:Mas ST380023AS                             39960
        3:Mas ST380023AS                             39960




   ┌──────────────┐ ┌────────────────────────────────────────┐ ┌──────────┐
   │              │ │ Press Ctrl-Y to delete the data in the disk! │ │          │
   │              │ │ or press any other key to abort...     │ │          │
   └──────────────┘ └────────────────────────────────────────┘ └──────────┘
```

3.   Press Ctrl-Y to confirm and complete logical drive deletion.

     The screen returns to the Delete LD Menu. Press Esc to return to the Main Menu.

Controller Configuration

From the Main Menu screen, press 4 to display the Controller Configuration Options screen (below).

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
═══════════════════ [ Adapter Configuration - Options ] ═══════════════════
                  No Parameters Defined for Current Disk(s)

═════════════════════ [ System Resources Configuration ] ═════════════════

   Controller IRQ: 10

   ATA IO Address: CC80
   XOR and HDMA IO Address: 0
   Sequence Control IO Address: C800
   Flash and SRAM Memory Address: DF7FF000




═══════════════════════════ [ Keys Available ] ═══════════════════════════
[ESC] Exit
```
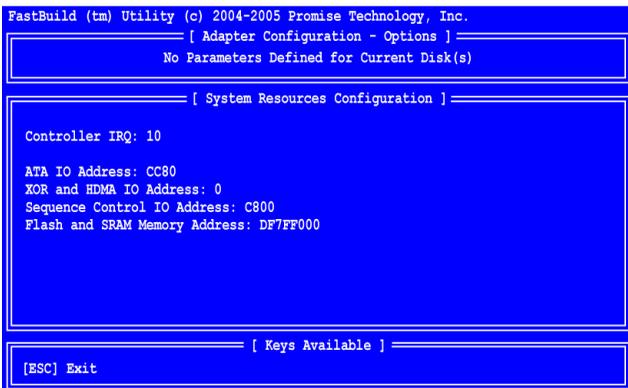
the Controller Configuration Options screen provides diagnostic information.

System Resources

The information in the System Resources section might be helpful for troubleshooting purposes:

- The system IRQ used by the FastTrak card
- ATA IO Address
- XOR and HDMA IO Address
- Sequence Control IO Address
- Flash and SRAM IO Address

Logical Drive Problems

While disk drives are highly reliable, on occasion a disk drive can fail. Fault-tolerant (RAID 1, 5 and 10) logical drives go *Critical* when a disk drive fails. Non-fault-tolerant logical drives (RAID 0) and JBOD go *Offline* when a disk drive fails.

```
FastTrak TX4310 (tm) BIOS Version 2.5.1.xx
(c) 2004-2005 Promise Technology, Inc. All rights reserved.


ID      MODE            SIZE           TRACK-MAPPING          STATUS

1       2+1 RAID 5      159918M        19442/255/63           Critical


Problem is detected with Array : 1
Critical Status:
A disk member of an array has failed or is not responding.
Pleae refer to your Promise User Manual for further details.


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

When you boot your system, the FastTrak BIOS screen informs you if there is a critical or offline logical drive. Allow your PC to finish booting and use WebPAM to identify the failed drive and to rebuild your logical drive.

See "Logical Drive Critical / Offline" on page 85.

Chapter 5: WebPAM

WebPAM is a RAID management software application. If you have not installed WebPAM on your PC, see "WebPAM Installation" on page 14.

Log-in to WebPAM

Double-click on the WebPAM icon on your desktop (right). Or,

1. Launch your Browser.
2. In the Browser address field, type in the IP address of the Host PC, as explained below.

   If you did *not* choose the External Security option during WebPAM installation (see page 18), use the *Regular* connection.

   If you chose the External Security option during WebPAM installation, use the *Secure* connection.

Regular Connection

- WebPAM uses an HTTP connection . . . . .http://
- Enter the Host PC's IP address . . . . .127.0.0.1 or localhost
- Enter the Port number . . . . :8080
- Add to launch WebPAM . . . . /promise

Together, your entry looks like this:

http://127.0.0.1:8080/promise or **https://localhost:8443/promise**

Secure Connection

- WebPAM uses a secure HTTP connection . . . . .https://
- Enter the Host PC's IP address . . . . .127.0.0.1 or localhost
- Enter the Port number . . . . :8443
- Add to launch WebPAM . . . . /promise

Together, your entry looks like this:

https://127.0.0.1:8443/promise or **https://localhost:8443/promise**

Note that the IP address shown above applies to a log-in at the Host PC. When you log in over a network, you will enter the Host PC's actual IP address.
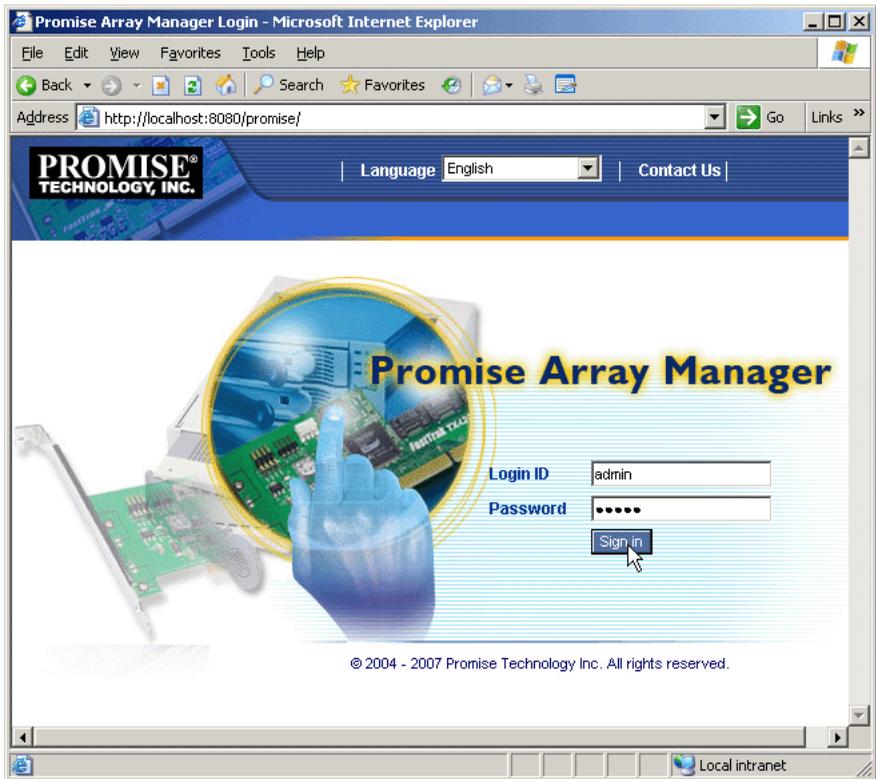
When the opening screen appears (above):

1. Type **admin** in the Login ID field.
2. Type **admin** in the Password field.
3. Click the **Sign in** button.

This is the default login for the Administrator. Each user will have their own Login ID (the User ID) and password. See "Add a User" on page 46 and "Change a User's Password" on page 50 for more information.

The Login ID and Password are case sensitive.

Log-out of WebPAM

There are two ways to log out of WebPAM PRO:

- Close your browser window
- Click **Logout** on the WebPAM banner (below)

| Language English ▾ | Show Event | Contact Us | Logout | Help |

After logging out, you must enter your user name and password to log in again. Clicking **Logout** brings you back to the Login Screen.

User Management

- Add a User (below)
- Event Notification (page 47)
- Delete a User (page 50)

- Change a User's Password (page 50)
- Change a User's Email Address (page 51)
- Change a User's Access Rights (page 52)

Add a User

1. In Tree View, click on the User Management icon.
2. Click on the Create tab.

3. Type a User ID into the User ID field.

   This will be the User's login name.
4. Type the user's display name into the Display Name field.

   This could be the User's actual name.
5. Type a password into the Password field.

   Use up to 8 letters and numbers but no spaces or other characters.
6. Type the same password into the Retype Password field.
7. If you plan to set up Event Notification, type the user's email address in the Email field.

8.   Under Host User Rights, check the boxes to select rights for this user.

Right	Meaning
Creation	Permission to create a logical drive and a spare drive
Deletion	Permission to delete a logical drive and a spare drive
Maintenance	Permission to migrate, rebuild and synchronize a logical drive; to run Media Patrol on a physical drive; make controller and physical drive settings
Notification	Permission to receive notification of events affecting the logical drive

9.   Click on the **Submit** button.

Event Notification

1.   In Tree View, click on the User Management 🖳 icon.

2.   Click on the User ID link.
3.   Click on the Settings tab.

The image above was shortened to fit into the available space.

4. Check the boxes of the notification events that you want to have reported to you via email and popup messages.

   To select events by their severity, check one of the four Select Events boxes at the top of the window. See the table on the next page.

5. Click on the **Submit** button.

Event Notification Severity Levels

Information Events

Disk Plugged In
Disk BSL Update
Disk BSL Cleared
Disk Error Fixed
Disk Patrol Progress
Disk Media Patrol Started
Disk Media Patrol Completed
Disk Media Patrol Paused
Disk Media Patrol Resumed
Disk Media Patrol Aborted
Array Online
Array Created
Array Deleted
Synchronization Started
Synchronization Completed
Synchronization Paused
Synchronization Resumed
Synchronization Aborted
Synchronization Progress
Synchronization Inconsistency Fixed
Redundancy Check Started
Redundancy Check Completed
Redundancy Check Paused

Information Events, continued

Redundancy Check Resumed
Redundancy Check Aborted
Redundancy Check Progress
Rebuild Started
Rebuild Completed
Rebuild Paused
Rebuild Resumed
Rebuild Aborted
Rebuild Restarted
Rebuild Progress
Background Initialization Progress
Background Initialization Started
Background Initialization Completed
Background Initialization Paused
Background Initialization Resumed
Background Initialization Aborted
Migration Started
Migration Completed
Migration Paused
Migration Resumed
Migration Aborted
Migration Progress

Warning Events

Disk Unplugged
Disk Timeout
Task Error
Disk Media Patrol Aborted with Error
Array Critical
Array Degrade
Synchronization Requested
Redundancy Check Rejected
Fan Error
Voltage 3.3 Out Of Range
Voltage 5 Out Of Range
Voltage 12 Out Of Range
Temperature Above Threshold
PCI Parity Error

Error Events

Disk Setdown
Disk S.M.A.R.T. Error
Array Offline
Synchronization Aborted with Error
Redundancy Check Aborted with Error
Redundancy Check Inconsistency
Found
Rebuild Aborted with Error
Background Initialization Aborted with
Error
Migration Aborted with Error
PCI System Error
Unknown (error)

Delete a User

1. In Tree View, click on the User Management 🖥 icon.
2. Click on the Delete tab.
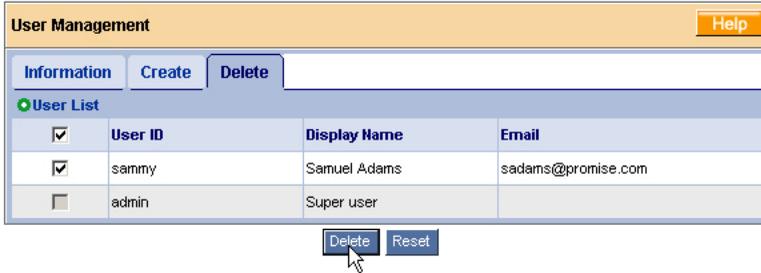
3. Check the box to the left of the user you want to delete.
4. Click the **Delete** button.
5. In the Confirmation box, click the **OK** button.

Change a User's Password

In WebPAM, each user can change his/her own password. To change a user's password:

1. Log into WebPAM under the User name.
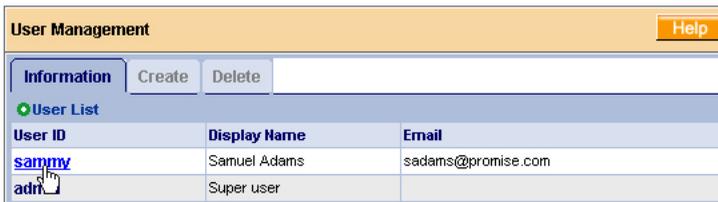
2. Click on your User ID link.
3. Click on the Settings tab.

4. Type a new password in the New Password field.

5. Retype the new password in the Retype Password field.

6. Click the **Submit** button.

	Important
✓	If a user forgets his/her password, the Administrator must delete that User and create a new User, as described above.

Change a User's Email Address

In WebPAM, each user can change his/her own email address or the Administrator can do it. To change a user's email address:

1. Click on the User ID link for the user whose email address will change.

2. Click on the Settings tab.

3. Type a new email address in the Email field.
4. Click the **Submit** button.

Change a User's Access Rights

In WebPAM, the Administrator can change a user's access rights. To change a user's access rights:

1. Log in as the Administrator.

2. Click on the User ID link for the user whose access rights will change.
3. Click on the Settings tab.

4. Under Host User Rights, check the boxes to select rights for this user.

Right	Meaning
Creation	Permission to create a logical drive and a spare drive
Deletion	Permission to delete a logical drive and a spare drive
Maintenance	Permission to migrate, rebuild and synchronize a logical drive; to run Media Patrol on a physical drive; make controller and physical drive settings
Notification	Permission to receive notification of events affecting the logical drive

5. Uncheck the boxes of rights to be deleted.
6. Click the **Submit** button.

Host Management

This function provides information only. There are no user settings. To access Host Management:

1. Under Administrative Tools in Tree View, click on the Host Management 🖳 icon.
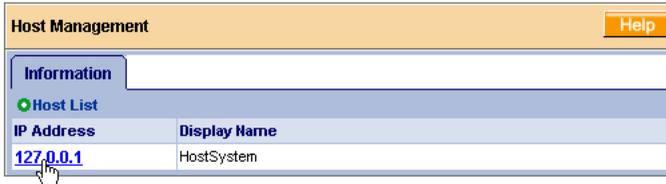
2. Under Host List, click on the link to the host you want to see.

    The Host IP address is always 127.0.0.1. If you log in over a network, the actual IP address of the PC or server with the FastTrak card is shown..
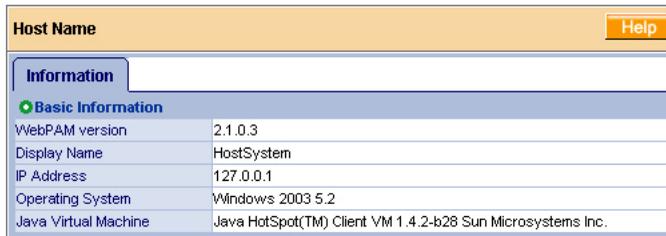
The Information tab displays with information about the Host PC.

*   WebPAM Version – The version number of the WebPAM software.
*   Display Name – The display name of the Host PC. "localhost" is the default.
*   IP Address – 127.0.0.1 is the IP address of the Host PC, accessed at the Host PC. Other addresses, such as 192.168.1.184, refer to a Host PC accessed over the network.
*   Operating System – The Operating System running on the Host PC.
*   Java Virtual Machine – The version number of JVM running on the Host PC.

Utility Configuration

Use this function to make email settings for WebPAM and also to set the refresh interval for the Event Frame.

1. Under Administrative Tools in Tree View, click on the Utility Configuration icon.

2. Enter the Sender's address in the Email Sender field.

    Be sure the sender has an account in your email system. See your IT administrator.

3. Enter your email server in the Email Server field.

4. Keep or change the Email Subject line.

5. Type a new interval (in seconds) in the Event Frame Refresh Time field.

    30 seconds is the default interval.

6. Click the **Submit** button when you are done.

FastTrak

The FastTrak–Information tab displays a photograph of the FastTrak TX4310 RAID Controller card installed in your system.

WebPAM will display the FastTrak controller installed in your system.

To display this screen in Management View, click on the FastTrak ![icon] icon in Tree View.

If you have multiple FastTrak controller cards in the same system, they will appear under the FastTrak icon as Controller 1, Controller 2, and so on.

Controller

- Controller Information (below)
- Controller Settings (page 58)
- Controller Schedule (page 59)
- Controller Lock (page 60)

The term Controller refers to the device that controls your RAID. To access the

controller, click on the Controller 🖥 icon in Tree View.

Controller Information

Controller				Help
Information	Settings	Schedule	Lock	
🔽 **Basic Information**				
Product Name	FastTrak TX4310			
BIOS Version	2.5.1.3113			
Driver Version	2.6.1.309			
🔽 **Hardware Information**				
Maximum Number of Port(s)	4			
Maximum Physical Drive(s)	4			
Maximum Logical Drive(s)	8			

The Information tab displays with information about the controller.

- **Product Name** – The Promise product name for this controller.
- **BIOS Version** – Version number of the controller's BIOS.
- **Driver Version** – Version number of the controller's software driver.
- **Maximum Number of Ports** – The number of ports on the controller.
- **Maximum Physical Drives** – The maximum number of physical (disk) drives the controller can support.
- **Maximum Logical Drives** – The maximum number of logical drives (arrays) the controller can support.

Controller Settings

Click on the Settings tab to access controller settings.

- **Rates** – Allocates system resources between the background process (such as Rebuild, Media Patrol, Expansion/Migration, Initialization and Synchronization) and the data read/write activity.

  A *High* setting assigns most of the system resources to background processes. The process will finished sooner but read/write requests are handled slower.

  A *Medium* setting tries to balance system resources between the background processes and data input/output activity.

  A *Low* setting assigns most of the system resources to handling read/write requests. Read/write requests are handled at nearly normal speed while the background processes take longer.

- **Automatic Rebuild Status** – When enabled, and a hot spare drive is available, a critical or degraded logical drive will rebuild itself automatically. Automatic Rebuilding applies to RAID 1 and 3-drive RAID 5 logical drives only.

- **Buzzer** – When enabled, the FastTrak controller's buzzer will sound to report a problem.

- **S.M.A.R.T. Status** – SMART, an acronym for Self-Monitoring Analysis and Reporting Technology, is a feature of the disk drive software. When enabled, the FastTrak controller polls the disk drives for SMART information and reports it to you.

- **S.M.A.R.T. Check Polling Interval** – The FastTrak controller periodically polls the physical drives for SMART information and displays it in WebPAM.

Choose an interval from the dropdown menu. The range is 0 to 120 seconds. A setting of 0 seconds disables the polling function.

Controller Schedule

Controller				Help
Information	**Settings**	**Schedule**	**Lock**	
🟢 **Schedule List**				

Select	Target	Action Name	Description
☐	All Logical Drive(s)	Synchronization	Start at 03:00 every Sunday.
☐	ST380013AS	Media Patrol	Start at 05:30 every Sunday.

Delete Reset

Click on the Schedule tab to access scheduled background processes (such as Rebuild, Media Patrol, Expansion/Migration, Initialization and Synchronization).

To access or schedule a Rebuild, Expansion, Migration, Initialization or

Synchronization, click on the Logical Drive 🗄 icon in Tree View then select the appropriate tab in Management View.

To access or schedule a Media Patrol, click on the Physical Drive 🖴 icon in Tree View then select the Media Patrol tab in Management View.

Delete a Scheduled Process

Controller				Help
Information	**Settings**	**Schedule**	**Lock**	
🟢 **Schedule List**				

Select	Target	Action Name	Description
☐	All Logical Drive(s)	Synchronization	Start at 03:00 every Sunday.
☑	ST380013AS	Media Patrol	Start at 05:30 every Sunday.

Delete Reset
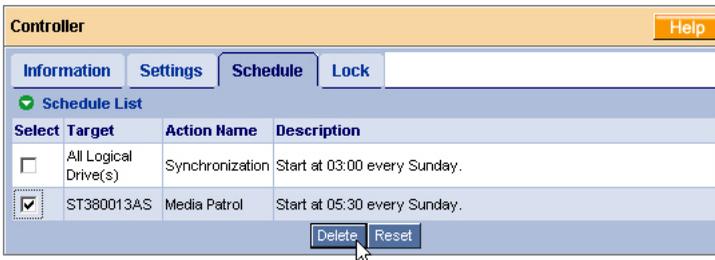
To delete a scheduled process:

1. Click on the Controller 🖥 icon in Tree View.
2. Select the Schedule tab in Management View.
3. Check the box to the left of the process you want to delete.
4. Click the **Delete** button.
5. In the Confirmation box, click the **OK** button.

Alternative method to delete a scheduled process:

1. Go to its function tab under the Physical Drive 🔲 icon or Logical Drive 🗃 icon.
2. Under Schedule, click the **Disable** radio button.

Controller Lock

The Lock tab displays lock status and enables you to lock or unlock a subsystem controller. The locking mechanism isolates the controller during maintenance operations and other periods when you want to avoid interruption from other users trying to access the logical drives under this controller.

To lock the Controller on the Host PC:

1. Click on the Controller 🔧 icon in Tree View.
2. Select the Lock tab in Management View.
3. From the dropdown menu, select a period of time to hold the lock.

    The lock time range is 1 to 30 minutes.
4. Click on the **Lock** button to set the lock.

    The lock will release itself automatically at the end of the period you specified.
5. To release the lock before the scheduled time, click the **Unlock** button.

Physical Drives

- Physical Drive View (below)
- Media Patrol Schedule (page 61)
- Physical Drive Information (page 63)
- Physical Drive Settings (page 64)

- Physical Drive Media Patrol (page 64)
- Physical Drive Bad Sector Log (page 66)
- Locate a Physical Drive (page 67)

Physical Drive View

Physical Drive View			Help
Information	Merge	**Media Patrol Schedule**	

Physical Drive Overview
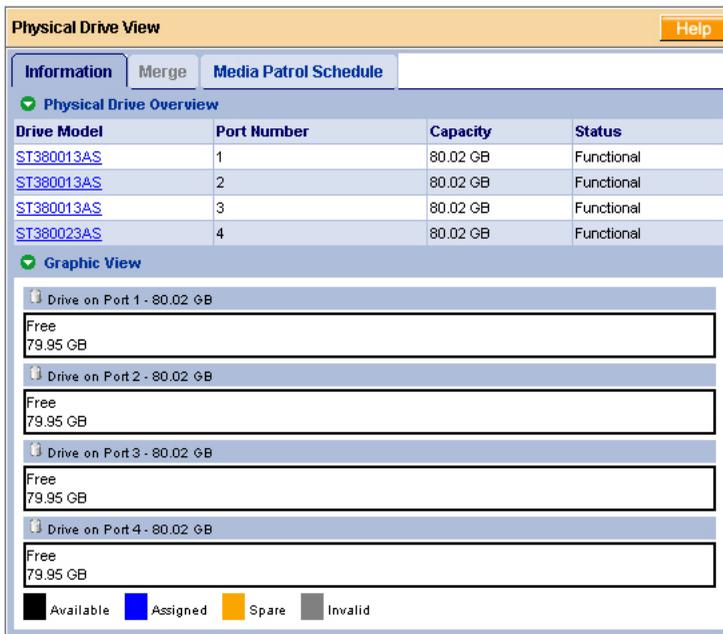
Drive Model	Port Number	Capacity	Status
ST380013AS	1	80.02 GB	Functional
ST380013AS	2	80.02 GB	Functional
ST380013AS	3	80.02 GB	Functional
ST380023AS	4	80.02 GB	Functional

Graphic View

Drive on Port 1 - 80.02 GB
Free
79.95 GB

Drive on Port 2 - 80.02 GB
Free
79.95 GB

Drive on Port 3 - 80.02 GB
Free
79.95 GB

Drive on Port 4 - 80.02 GB
Free
79.95 GB

Available   Assigned   Spare   Invalid

To access Physical Drive View, click on the Physical Drive View [icon] icon in Tree View. From this window, you can click on the links to access information and functions of individual physical drives and use the Split and Merge feature.

Media Patrol Schedule

The Physical Drive View–Media Patrol tab allows you to start Media Patrol on all physical drives. You can also run Media Patrol on individual physical drives, see page 64.

Media Patrol is a routine maintenance procedure that checks the magnetic media on each disk drive, sector by sector. Media Patrol checks physical drives

assigned to logical drives, spare drives and currently unassigned physical drives that were once part of a logical drive or a spare. Media Patrol does not check new physical drives that have never been configured nor physical drives assigned as JBOD.

Unlike Synchronization and Redundancy Check, Media Patrol is concerned with the condition of the media itself, not the data recorded on the media. If Media Patrol encounters a suspect sector, it will attempt to regenerate the data and write to the suspect sector. If the write operation is successful, Media Patrol continues checking other sectors. If the write operation fails, Media Patrol reports the error to your PC's system log and to the physical drive's Bad Sector Log (see page 66). This action triggers a BSL update message and an email message if you enabled that notification option (see page 47).

To schedule Media Patrol:

1.   Click on the Physical Drive View 🔲 icon in Tree View.

2.   Click on the Media Patrol tab in Management View.

3.   Click on the **Enable** radio button.

4.   Click on the **by Day**, **by Week** or **by Month** radio button.

5.   From the dropdown menus, select a start time and a day of the Week or Month, if applicable.

      Start time is based on a 24-hour clock.

6.   Click the **Schedule** button.

To cancel the scheduled Media Patrol operation:

1.   Click on the Physical Drive View 🔲 icon in Tree View.

2.   Click on the Media Patrol tab in Management View.

3.   Click the **Disable** radio button.

Physical Drive Information

To access information about a physical drive:

1. Click on the Physical Drive View 🖼 icon in Tree View.

2. Click on the Physical Drive 🖼 icon.

The information tab displays the following information:

- **Drive Model** – The disk drive manufacturer's model name or number.
- **Serial Number** – The serial number of this disk drive.
- **Firmware Version** – The version number of the firmware on this disk drive.
- **Enclosure** – The model of SuperSwap enclosure in which the disk drive is installed. If there is no SuperSwap enclosure, the field says None.
- **Drive Status** – The operational of this disk drive. Functional means normal. Others include Offline.
- **Background Activity** – The current background activity affecting this disk drive. Idle means no activity. Others include Initializing and Rebuilding.
- **Capacity** – The data capacity of this disk drive in GB.
- **Ultra DMA Mode** – The UDMA mode in which this disk drive currently operates.

- • **S.M.A.R.T. Status** – SMART, an acronym for Self-Monitoring Analysis and Reporting Technology, is a feature of the disk drive software. When this feature is supported, the drive will pass SMART information to the FastTrak controller when it polls the physical drives.
- • **Write Cache Status** – Indicates whether the disk drive's write cache is Enabled or Disabled. You can change this status under the Settings tab (see below).

Physical Drive Settings

Physical Drive Settings allows you to enable or disable the Write Cache and Native Command Queuing (NCQ) on an individual physical drive. To access the physical drive setting:

1. Click on the Physical Drive View ![icon] icon in Tree View.

2. Click on the Physical Drive ![icon] icon.

3. Click on the Settings tab in Management View.

4. Click the Write Cache **Enable** or **Disable** radio button.
5. Click the NCQ **Enable** or **Disable** radio button.
6. Click the **Submit** button.

Physical Drive Media Patrol

The Physical Drive–Media Patrol tab allows you to start Media Patrol on an individual physical drive. You can also run Media Patrol on all physical drives at the same time, see page 61.

Media Patrol is a routine maintenance procedure that checks the magnetic media on each disk drive, sector by sector. Media Patrol checks physical drives assigned to logical drives, spare drives and currently unassigned physical drives that were once part of a logical drive or a spare. Media Patrol does not check new physical drives that have never been configured nor physical drives assigned as JBOD.

Unlike Synchronization and Redundancy Check, Media Patrol is concerned with the condition of the media itself, not the data recorded on the media. If Media

Patrol encounters a suspect sector, it will attempt to regenerate the data and write to the suspect sector. If the write operation is successful, Media Patrol continues checking other sectors. If the write operation fails, Media Patrol reports the error to your PC's system log and to the physical drive's Bad Sector Log (see page 66). This action triggers a BSL update message and an email message if you enabled that notification option (see page 47).

To start Media Patrol immediately:

1. Click on the Physical Drive View ![icon] icon in Tree View.

2. Click on the Physical Drive ![icon] icon.

3. Click on the Media Patrol tab in Management View.

4. Click the **Start Now** button.

To schedule Media Patrol to run at a later time:

1. Click on the Physical Drive View ![icon] icon in Tree View.

2. Click on the Physical Drive ![icon] icon.

3. Click on the Media Patrol tab in Management View.
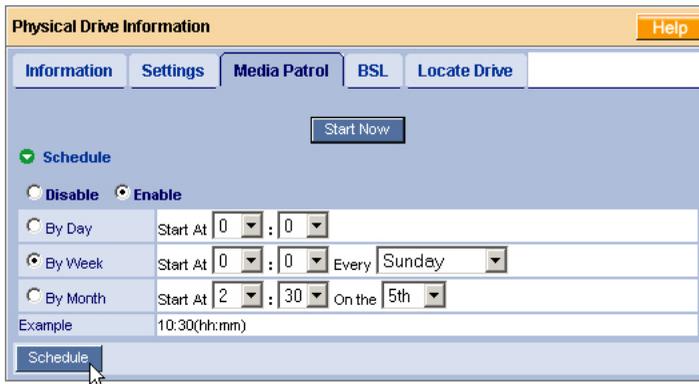
4. Click on the Enable radio button.

5. Click on the **by Day**, **by Week** or **by Month** radio button.

From the dropdown menus, select a start time and a day of the Week or Month, if applicable.

Start time is based on a 24-hour clock.

6.   Click the **Schedule** button.

To cancel the scheduled Media Patrol operation:

1.   Click on the Physical Drive View 🖼️ icon in Tree View.

2.   Click on the Physical Drive 🖼️ icon.

3.   Click on the Media Patrol tab in Management View.

4.   Click the **Disable** radio button.

Physical Drive Bad Sector Log

On occasion, an error can arise with the media on a physical drive. WebPAM keeps track of bad sectors in order to inform you of the condition of individual physical drives.

To access a physical drive's bad sector log:

1.   Click on the Physical Drive View 🖼️ icon in Tree View.

2.   Click on the Physical Drive 🖼️ icon.

3.   Click on the BSL tab in Management View.

Physical Drive Information				Help
Information	**Settings**	**Media Patrol**	**BSL**	**Locate Drive**
🟢 **Bad Sector Log List**				
No Bad Sector(s) logged.				
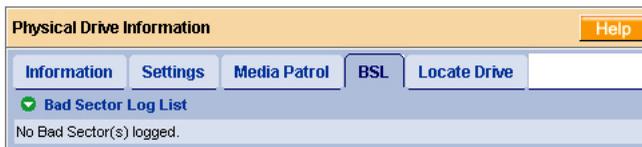
If any bad sectors are found, they are listed here. WebPAM informs you by popup and email messages when a bad sector error is logged (see page 47).

After 10 bad sectors have been discovered on a physical drive, WebPAM issues a warning to replace the drive.

After 20 bad sectors have been discovered:

•   On fault-tolerant (RAID 1, 5 or 10) logical drives, the FastTrak controller will set down the physical drive (take it offline) and the logical drive will go critical.

    Replace the physical drive and rebuild your logical drive.

•   On non-fault-tolerant (RAID 0) logical drives, the physical drive remains online.

Backup your data, replace the physical drive, create a new logical drive and copy your data to it.

See "Logical Drive Rebuild" on page 78 and "Logical Drive Critical / Offline" on page 85.

See the *FastTrak User Manual* and *SuperSwap User Manual* for more information about replacing a physical drive.

Locate a Physical Drive

When it becomes necessary to access a physical drive installed in a SuperSwap enclosure, this function will help you identify the physical drive you want. To locate a physical drive:

1.   Click on the Physical Drive View ![icon] icon in Tree View.

2.   Click on the Physical Drive ![icon] icon.

3.   Click on the Locate Drive tab in Management View.

4.   Click the **Locate Drive** button.

The Management Window will display the message "Identified started" and the Status LED for this physical drive will flash rapidly on the SuperSwap enclosure.

If you remove the physical drive, the Status LED stops blinking, the Activity LED goes dark and WebPAM will report that the physical drive was unplugged. When you replace the drive, the LEDs will return to normal operation.

If you do not remove the physical drive, click on the **Located Release** button to stop the Status LED from blinking. For more information, see the *SuperSwap User Manual*.

Logical Drives

- Logical Drive View (below)
- Create a Logical Drive (page 68)
- JBOD (page 72)
- Delete a Logical Drive (page 72)
- Logical Drive Information (page 73)
- Logical Drive Settings (page 74)
- Logical Drive Migration and Expansion (page 75)

- Logical Drive Rebuild (page 78)
- Synchronize/Redundancy Check All Logical Drives (page 81)
- Logical Drive Synchronization/ Redundancy Check (page 83)
- Logical Drive Initialization (page 85)
- Logical Drive Activation (page 85)

Logical Drive View

Logical Drive View provides a list of all logical drives currently on the Host PC. To access Logical Drive View, click on the Logical Drive View 🗃 icon in Tree View.
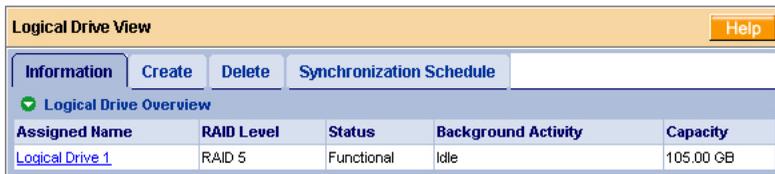
Logical Drive View				Help
Information	**Create**	**Delete**	**Synchronization Schedule**	
🟢 **Logical Drive Overview**				
Assigned Name	**RAID Level**	**Status**	**Background Activity**	**Capacity**
Logical Drive 1	RAID 5	Functional	Idle	105.00 GB

From this screen, you can click on the links to access information and functions of individual logical drives and use the Create and Delete features.

Create a Logical Drive

A logical drive is a collection of physical drives in a RAID.

To create a new logical drive:

1.   Click on the Logical Drive View 🗃 icon.
2.   Click on the Create tab.

Select RAID Level

Redundant Array of Independent Disks (RAID) combines multiple physical drives to form one logical drive.

○ **RAID 0** - Data striped across 2 or more drives for increased performance but no data protection
○ **RAID 1** - Mirrored pairs of drives for data protection with increased read performance
◉ **RAID 5** - Striped parity on 3 or more drives, ultimate data protection, capacity and performance balance
○ **RAID 10** - Data mirrored then striped across 4 drives, for double drive failure protection
○ **JBOD** - Just a Bunch Of Drives: independent connected drives with no RAID interconnection

<< Prev   Next >>

3. Select the radio button beside the RAID level you want for your logical drive.

    WebPAM displays the RAID levels you can use with the available disk drives. You can also select JBOD on this screen.

    See "Choosing a RAID Level" on page 101 for information about the advantages and requirements of the available RAID levels and JBOD.

Select Drive Group

Please select free drives or one logical drive that still have available space.

Select Drive Type
○ Free Drives
◉ Logical Drive 1

<< Prev   Next >>

4. In the Select Drive Group
5.   screen, click on the radio button for one of the following:
    •   **Free Drives** – Select all Free (unassigned) disk drives
    •   **Logical Drive** – Select the Free portion of disk drives whose other portion is assigned to a Logical Drive

    The available choices depend on the RAID level you selected and the disk drives available.
6. Click the **Next** button.
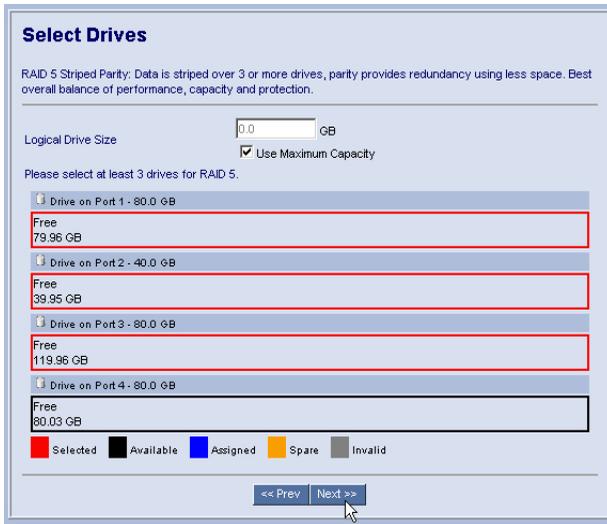
7. If you want to create a logical drive with unused capacity, enter the assigned (used) capacity in the Logical Drive Size field.

    To use the maximum capacity, check the Use Maximum Capacity box.

8. Click on the disk drives to select them.

    Available drives have a black frame. Selected drives have a red frame.

9. Click the **Next** button.

    If you selected JBOD, click the **Finish** button on the Select Drives screen. This completes the creation process for JBOD.

10. Enter a name for the logical drive in the field provided.

11. Click the **Next** button.

Final Settings

Confirm your choices. Make any changes here.

Name	Logical Drive 1
RAID Level	RAID 5
Logical Drive Size	100.0 GB
Stripe Block Size	16 KB
Write Cache	None
Gigabyte Boundary	None
Initialization	Fast Initialization

<< Prev   Finish

12. Select an Initialization policy from the dropdown menu.

   • **Fast Initialization** – Erases the Master Boot Record (MBR) of the physical drives being added to the logical drive.

   • **Full Initialization** – Erases all sectors of the physical drives being added to the logical drive.

   • **None** – No initialization. This choice is not recommended.

13. Click the **Finish** button.

   If there are physical drives available, the Select RAID Level screen appears again, where you can create an additional logical drive.

Logical Drive Information   Help

Information	Settings	Migration	Rebuild	Synchronization	Initialization	Activation

Basic Information

Assigned Name	Logical Drive 1
RAID Level	RAID 5
Stripe Size	16 KB
Capacity	100.00 GB
Status	Functional
Background Activity	Idle

Graphic View

Drive on Port 1 - 80.02 GB

Assigned LD 1-1 50.00 GB	Free 29.95 GB

Drive on Port 2 - 80.02 GB

Assigned LD 1-2 50.00 GB	Free 29.95 GB

Drive on Port 3 - 80.02 GB

| Assigned LD 1-3 50.00 GB	Free 29.95 GB

■ Available   ■ Assigned   ■ Assigned to Logical Drive 1   ■ Spare   ■ Invalid

Click on the Logical Drive 🗄 Icon to see all of the information about your new logical drive.

Before you can use your new logical drive, you must partition and format the logical drive using your PC's operating system. See "Appendix A: Partition and Format" on page 123 for more information.

JBOD

In WebPAM, JBOD is created, managed and deleted the same as a logical drive. You can also use the FastTrak BIOS for this purpose. See the *FastTrak User Manual* for more information on the BIOS.
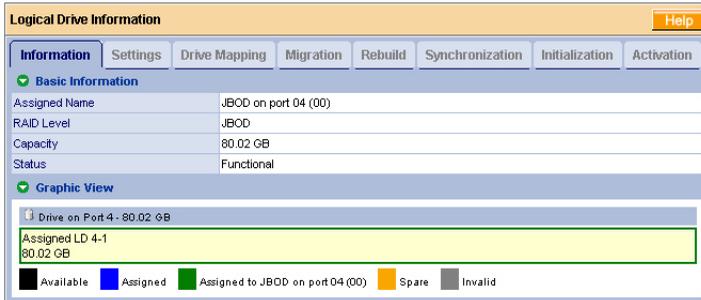
JBODs do not have Settings, Rebuild, Migration, Synchronization or other functions that pertain to Logical Drives.

If you attach a physical drive that was initialized using Windows disk management, that drive will be automatically recognized as a JBOD by the FastTrak controller and WebPAM.

Delete a Logical Drive

⚠️	**Warning**
	When you delete a logical drive, you delete all data on the logical drive. Be sure to backup any important data before you delete a logical drive!

To delete a logical drive:

1. Click on the Logical Drive View 🗄️ icon.

2.   Select the Delete tab.

Logical Drive View					Help
Information	**Create**	**Delete**	**Synchronization Schedule**		
⊙ Logical Drive Overview					
Select	**Assigned Name**	**RAID Level**	**Status**	**Background Activity**	**Capacity**
☑	PROMISE LD 1	RAID 0	Functional	Idle	149.06 GB
		Submit Reset			
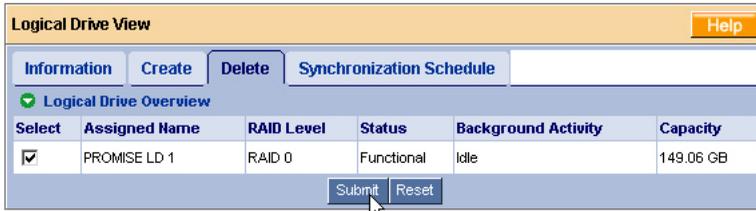
3.   Check the box to the left of the logical drive you want to delete.

4.   Click the **Submit** button.

5.   In the Confirmation box, click the **OK** button.

6.   In the Warning box, click the **OK** button.

The selected logical drive is deleted.

Logical Drive Information

Logical Drive View provides a list of all logical drives currently on the Host PC. To access Logical Drive View:

1.   Click on the Logical Drive View 🗄 icon in Tree View.

2.   Click on the Logical Drive 🗄 icon of the logical drive you want to see.

From this screen, you can click on the links to access the Settings, Drive Mapping, Migration, Rebuild, Synchronization, Initialization and Activation features. The features that apply to this logical drive have blue tabs. Features that do not apply have grayed tabs.

Logical Drive Settings

Logical Drive Settings allows you to assign a name to a logical drive and to change its controller cache settings. To access logical drive settings:

1. Click on the Logical Drive View 📚 icon in Tree View.

2. Click on the Logical Drive 📚 icon of the logical drive you want to see.

3. Click on the Settings tab in Management View.

4. Enter a name in the Assigned Name field, as desired.
5. Click the **Submit** button when you are done.

Logical Drive Migration and Expansion

The Logical Drive–Migration tab enables you to migrate or expand a logical drive. Migration is the process of changing the RAID level of an existing logical drive. Expansion is the process of adding more physical drives to a logical drive while keeping the same RAID level.

The Migration feature applies to certain combinations of RAID level and number of physical drives, as described in the table below.

From	To	Result
RAID 0: 1 or 2 drives	RAID 5: 3 or 4 drives	Increased performance and capacity, adds redundancy
	RAID 10: 4 drives	
RAID 0: 3 drives	RAID 5: 4 drives	Increased performance and capacity, adds redundancy
RAID 1: 2 drives	RAID 5: 3 or 4 drives	Increased performance and capacity
	RAID 10: 4 drives	
RAID 10: 4 drives	RAID 5: 4 drives	Increased capacity

The Expansion feature applies only to RAID 0 and RAID 5 logical drives. You can add physical drives to a logical drive, up to eight drives, the maximum number supported by the FastTrak controller.

Migration and Expansion are not available for JBOD.

For more information, see "Logical Drive Expansion" on page 104 and "RAID Level Migration" on page 105.

You can set up an Migration to begin immediately (on demand) or schedule a Migration for a time when there is less demand on the RAID system.

On Demand

To migrate a logical drive:

1. Click on the Logical Drive View icon in Tree View.

2. Click on the Logical Drive icon of the logical drive you want to migrate.

3. Click on the Migration tab in Management View.
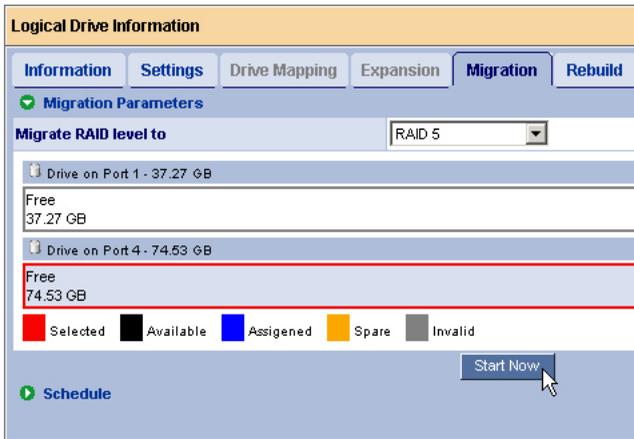
4. If the Migration or Expansion requires additional physical drives, click on a free physical drive to select it.

   Available drives have a black frame. Selected drives have a red frame.

5. Click the **Start Now** button.
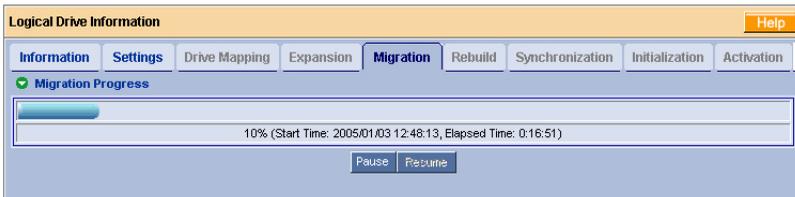
You can monitor Migration or Expansion progress on the Logical Drive Migration tab. Click the respective buttons to pause and resume the Migration.

Scheduled

To schedule a Migration or Expansion:

1. Click on the Logical Drive View 📚 icon in Tree View.

2. Click on the Logical Drive 📚 icon of the logical drive you want to migrate or expand.

3.   Click on the Migration tab in Management View.

4.   Click on a free physical drive to select it.

Available drives have a black frame. Selected drives have a red frame.

5.   Click on the **Enable** radio button.

6.   From the dropdown menus, select a start time.

Start time is based on a 24-hour clock.

7.   Click in Start At field to display a popup calendar.

8.   Click on the start date in the calendar or enter a date manually.

9.   Click the **Schedule** button.

Cancel a Schedule

If you want to cancel the scheduled Migration, do the following:

1.   Click on the Logical Drive View 🗃 icon in Tree View.

2.   Click on the Logical Drive 🗃 icon.

3.   Click on the Migration tab in Management View.

4.   Click on the **Disable** radio button.

Logical Drive Rebuild

Rebuild refers to the process of repairing a logical drive by reconstruction the data on one of its physical drives.This feature only applies to logical drives with redundancy, RAID 1, RAID 5 and RAID 10.

You can set up a Rebuild to:

• Begin immediately (on demand)
• Schedule a Rebuild for a time when there is less demand on the RAID system
• Begin automatically when a logical drive goes critical or degraded (see "Create a Spare Drive" on page 91)

On Demand

To rebuild a logical drive:

1. Click on the Logical Drive View ![icon] icon in Tree View.

2. Click on the Logical Drive ![icon] icon of the logical drive you want to rebuild.

3. Click on the Rebuild tab in Management View.

4. Select physical drive to use in the rebuild.

   Available drives have a black frame. Selected drives have a red frame.

5. Click the **Start Now** button.

You can monitor Rebuild progress on the Logical Drive Rebuild tab.

Click the respective buttons to pause and resume the Rebuild.

Click the Abort button to stop the Rebuild. After an abort, click the Restart button to start the Rebuild from the beginning (zero percent).

Scheduled

To schedule a Rebuild:

1.   Click on the Logical Drive View 📚 icon in Tree View.

2.   Click on the Logical Drive 📚 icon of the logical drive you want to rebuild.

3.   Click on the Rebuild tab in Management View.
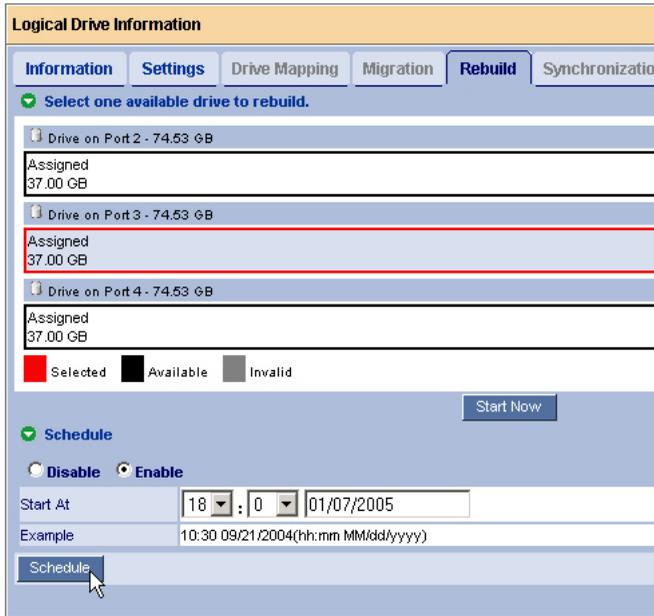
4. Select the physical drive you want to rebuild.

   Available drives have a black frame. Selected drives have a red frame.

5. Click on the **Enable** radio button.

6. From the dropdown menus, select a start time.

   Start time is based on a 24-hour clock.

7. Click in Start At field to display a popup calendar.

8. Click on the start date in the calendar or enter a date manually.

9. Click the **Schedule** button.

Cancel a Schedule

If you want to cancel the scheduled Rebuild, do the following:

1. Click on the Logical Drive View 🗄 icon in Tree View.

2. Click on the Logical Drive 🗄 icon.

3. Click on the Rebuild tab in Management View.

4. Click on the **Disable** radio button.

Automatic Rebuild

Automatic rebuilding of a logical drive is possible under the following conditions:

- The logical drive is a RAID 1 or a 3-drive RAID 5.
  See "Create a Logical Drive" on page 68.

- There is a spare drive present in the RAID system.
  See "Create a Spare Drive" on page 91.

- Automatic Rebuild Status is enabled in the Controller Settings.
  See "Controller Settings" on page 58.

If the three above conditions are met, a logical drive will replace a faulty disk drive and rebuild itself automatically. WebPAM will report the critical logical drive and automatic rebuild in its user interface as well as via popup messages. Depending on your Event Notification settings (see page 47), WebPAM can also notify you via email message.

When the automatic rebuild operation is completed, you must remove and replace the faulty physical drive with a new one.

See "Replace the Failed Disk Drive" on page 87 and the *FastTrak User Manual* and *SuperSwap User Manual* for more information on replacing a physical drive.

Synchronize/Redundancy Check All Logical Drives

The Logical Drive View–Synchronization Schedule tab enables you to synchronize all logical drives. You can also synchronize an individual logical drive, see page 83.

Synchronization refers to an automated process of checking and correcting data and parity. Unlike a Rebuild, Synchronization is a maintenance operation.

Redundancy Check is an automated process of checking data and parity but it only reports and does not correct, any inconsistencies that it finds.

Synchronization and Redundancy Check apply to RAID 1, RAID 5 and RAID 10 logical drives. When an logical drive is first created and you select Full Initialization, the same action as Synchronization takes place.

To schedule Synchronization for all logical drives:

1. Click on the Logical Drive View 🗄 icon in Tree View.

2. Click on the Synchronization Schedule tab in Management View.

3. In the Policy dropdown menu, select *Fix* if you want Synchronization or *Redundancy Check* if you do not want to correct inconsistencies.

4. Click on the **Enable** radio button.

5. Click on the **by Day**, **by Week** or **by Month** radio button.

6. From the dropdown menus, select a start time and a day of the Week or Month, if applicable.

   Start time is based on a 24-hour clock.

7. Click the **Schedule** button.

If you want to cancel the scheduled Synchronization, do the following:

1. Click on the Logical Drive View 📚 icon in Tree View.

2. Click on the Synchronization tab in Management View.

3. Click on the **Disable** radio button.

Logical Drive Synchronization/Redundancy Check

Synchronization refers to an automated process of checking and correcting data and parity. Unlike a Rebuild, Synchronization is a maintenance operation. You can also synchronize all logical drives at the same time, see page 81.

Redundancy Check is an automated process of checking data and parity but it only reports and does not correct, any inconsistencies that it finds.

Synchronization and Redundancy Check apply to RAID 1, RAID 5 and RAID 10 logical drives. When an logical drive is first created and you select Full Initialization, the same action as Synchronization takes place.

You can set up a Synchronization or Redundancy Check to begin immediately (on demand) or schedule a Synchronization or Redundancy Check for a time when there is less demand on the RAID system.

On Demand

To Synchronize or Redundancy Check a logical drive:

1.   Click on the Logical Drive View 🗃 icon in Tree View.

2.   Click on the Logical Drive 🗃 icon of the logical drive you want to synchronize.

3.   Click on the Synchronization tab in Management View.

4.   In the Policy dropdown menu, select *Fix* if you want Synchronization or *Redundancy Check* if you do not want to correct inconsistencies.

5.   Click the **Start Now** button.

You can monitor Migration progress on the Logical Drive Migration tab. Click the respective buttons to pause, resume or abort the Synchronization or Redundancy Check.

Scheduled

To schedule a Synchronization or Redundancy Check:

1.   Click on the Logical Drive View 📚 icon in Tree View.

2.   Click on the Logical Drive 📚 icon of the logical drive you want to synchronize.

3.   Click on the Synchronization tab in Management View.

4.   In the Policy dropdown menu, select *Fix* if you want Synchronization or *Redundancy Check* if you do not want to correct inconsistencies.

5.   Click on the **Enable** radio button.

6.   Click on the **by Day**, **by Week** or **by Month** radio button.

7.   From the dropdown menus, select a start time and a day of the Week or Month, if applicable.

Start time is based on a 24-hour clock.

8.   Click the **Schedule** button.

Cancel a Schedule

If you want to cancel the scheduled Synchronization or Redundancy Check, do the following:

1.   Click on the Logical Drive View 📚 icon in Tree View.

2.   Click on the Logical Drive 📚 icon.

3.   Click on the Synchronization tab in Management View.

4.   Click on the **Disable** radio button.

Logical Drive Initialization

When logical drive is first created, you can select one of three choices for initialization:

•   **Quick Initialization** – Erases the reserve and master boot sectors of the physical drives being added to the logical drive.

•   **Full Initialization** – Erases all sectors of the physical drives being added to the logical drive.

•   **None** – No initialization. This choice is not recommended.

When you select full initialization, the process takes some time, depending on the size of the physical drives selected for the logical drive. The Initialization tab enables you to pause the initialization process so that more of FastTrak's resources are available for other operations. When the other operations are done, you can resume the initialization of your new logical drive.

1.   Click on the Logical Drive View ![icon] icon in Tree View.

2.   Click on the Logical Drive ![icon] icon of the logical drive whose initialization you want to pause.

3.   Click on the Initialization tab in Management View.

4.   Click the **Pause** button.

     The initialization process stops.

5.   Click the **Resume** button.

     The initialization resumes from the point where you paused it.

Logical Drive Activation

This feature enables you to designate a hot plug-and-play logical drive. It will become available in a future release of the FastTrak Controller card.

Logical Drive Critical / Offline

A fault-tolerant logical drive—RAID 1, 5 or 10—goes critical when a disk drive is removed or fails. Due to the fault tolerance of the logical drive, the data is still available and online. However, once the logical drive goes critical, it has lost its fault tolerance and performance may be adversely affected.

If the fault was caused by a failed disk drive that was removed, the drive must be replaced by another drive, either identical or larger, in order for the RAID system to rebuild and restore optimal configuration.

A non-fault tolerant logical drive—RAID 0—goes offline when a disk drive is removed or fails. Since the logical drive is not fault tolerant, the data stored in the disk array is no longer accessible.

If one disk drive fails, all of the data on the logical drive is lost. You must replace the failed drive. Then, if the logical drive had more than one disk drive, delete the logical drive and re-create it. Restore the data from a backup source.

When a Disk Drive Fails

The following will occur when a disk drive fails or goes offline:

- The FastTrak Controller's audible alarm, if enabled, will sound
- The SuperSwap Status LED changes from green to red
- WebPAM reports the condition in Tree View, with popup messages and, if Event Notification is set up, email messages
- If you have a RAID 1 or a 3-drive RAID 5 logical drive with a hot spare drive properly configured, the logical drive will automatically rebuild itself using the spare drive
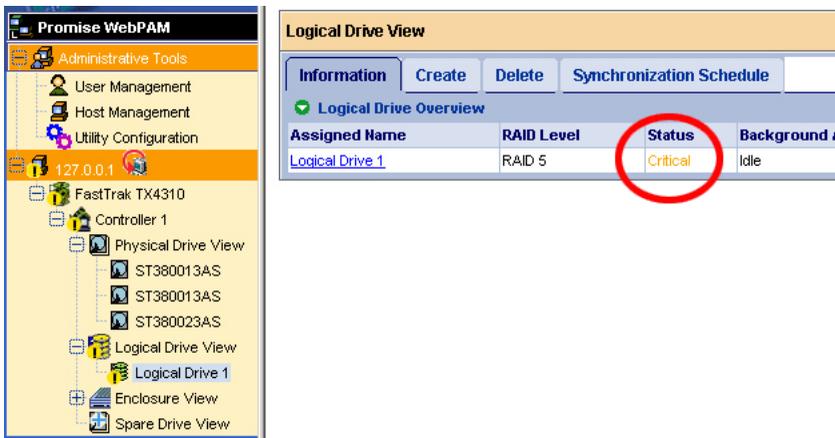
In the example above, amber **!** icons appear over the FastTrak, Controller, Logical Drive View and Logical Drive icons. Click on the Logical Drive View 🗃 or Logical Drive 🗃 icons to verify the condition of the logical drive.

In this example, the Status is *Critical* and Background activity is *Idle*. This indicates that there is no automatic rebuild, so you must take action to restore the logical drive:

1. Identify the failed disk drive.
2. Replace the failed disk drive.
3. Rebuild your logical drive.

Identify the Failed Disk Drive

Click on the Physical Drive View icon in the WebPAM user interface. Look for a missing physical drive. A drive that used to be present but is suddenly absent is the failed disk drive.
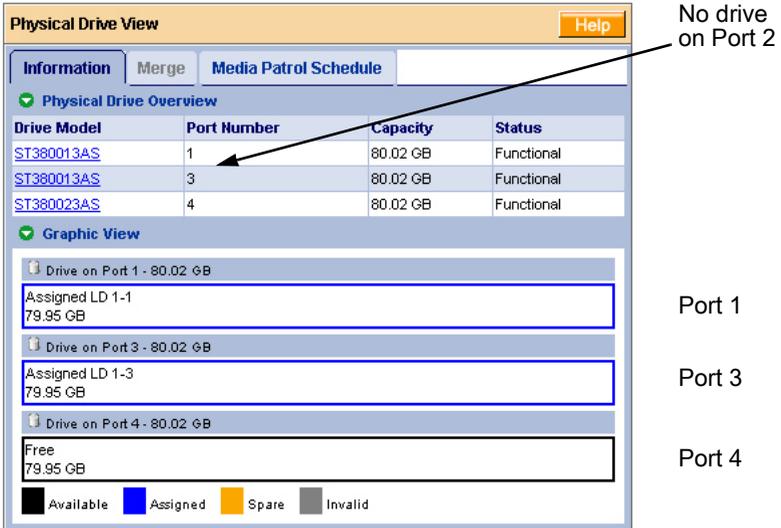
No drive on Port 2

Physical Drive View			Help

Information | Merge | Media Patrol Schedule

🟢 Physical Drive Overview

Drive Model	Port Number	Capacity	Status
ST380013AS	1	80.02 GB	Functional
ST380013AS	3	80.02 GB	Functional
ST380023AS	4	80.02 GB	Functional

🟢 Graphic View

Drive on Port 1 - 80.02 GB

Assigned LD 1-1
79.95 GB — Port 1

Drive on Port 3 - 80.02 GB

Assigned LD 1-3
79.95 GB — Port 3

Drive on Port 4 - 80.02 GB

Free
79.95 GB — Port 4

⬛ Available	🟦 Assigned	🟧 Spare	⬜ Invalid

In this example, there were four disk drives connected to the FastTrak Controller. Notice that there is no drive on Port 2. This is the failed drive.

Replace the Failed Disk Drive

Replace the failed disk drive with a new one of equal or greater capacity. Then rebuild the logical drive. See "Install the Disk Drives" on page 9 and the *SuperSwap User Manual* for more information about replacing a disk drive.

Rebuild Your Logical Drive

1. Click on the Logical Drive View icon in Tree View.

2. Click on the Logical Drive icon of the logical drive you want to rebuild.

3. Click on the Rebuild tab in Management View.

4.   Select the physical drive you just replaced or an available Free drive.

5.   Click the **Start Now** button.

You can monitor Rebuild progress on the Logical Drive Rebuild tab. Click the respective buttons to pause and resume the Rebuild. When the Rebuild is finished, your logical drive will be Functional again.

Enclosures

Enclosure View

Enclosure View provides a list of all enclosures currently on the Host PC. To access Enclosure View, click on the Logical Drive View ▦ icon in Tree View.
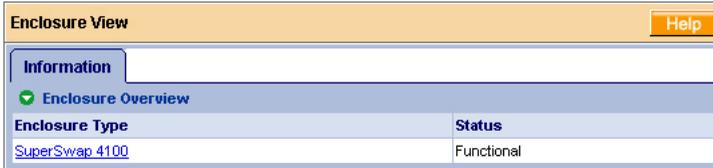
Enclosure View		Help
Information		
◉ **Enclosure Overview**		
Enclosure Type	**Status**	
SuperSwap 4100	Functional	

From this window, you can click on the links to access information and functions of individual Enclosures.

Enclosure

To access information about an Enclosure:

1. Click on the Enclosure View ▦ icon in Tree View.

2. Click on the Enclosure ▦ icon.

Enclosure Information		Help
Information		
◉ **Basic Information**		
Enclosure Type	SuperSwap 4100	
Fan Speed(RPM) (normal range >= 2000 RPM)	Fan1 - 6108 RPM Fan2 - 5844 RPM	
Temperature("C/"F) (normal range <= 52°C/125.6°F)	22.0°C / 71.6°F 23.0°C / 73.4°F	
Power Status 12V (11.4V <= normal range <= 12.96V)	12.02V	
Power Status 5V (4.75V <= normal range <= 5.25V)	5.10V	
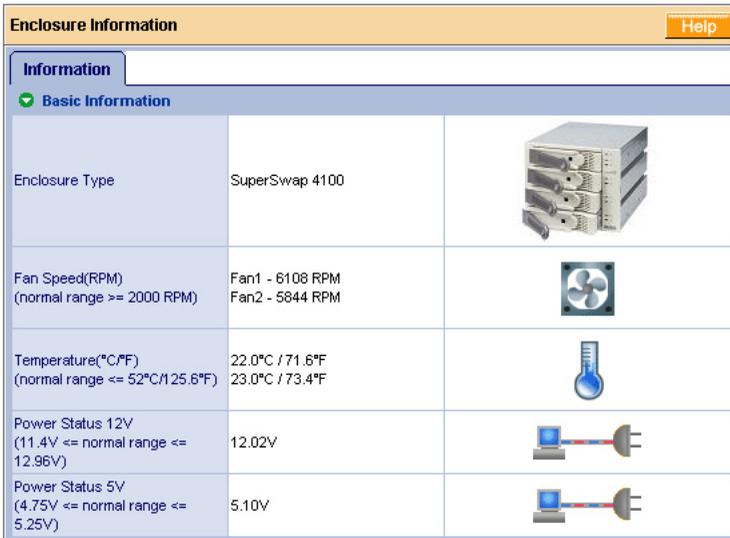
The information tab displays the following information:

- **Enclosure Type** – The manufacturer's model name or number.
- **Fan Speed** – The RPM of the enclosure's cooling fans.
- **Temperature** – The internal temperature of the enclosure. Each reading reflects a separate measurement.
- **Power Status** – The voltages supplied by the enclosure's 12V and 5V systems.

  The Fan, Temperature and Power icons change color when an error is indicated, as shown below.

Fan Error   Temperature Error   Power Error

	LEDs		
State	☼ Status	▢ Activity	◍ Enclosure
Green	Disk drive is present and ready	Disk drive is present and ready	Normal status
Blinking	n/a	Read/write activity	n/a
Amber	Disk drive: • is spinning up • is critical • is rebuilding • reports a SMART error	n/a	1 incident (see below) Enclosure is critical but still functional Attention required
Red	Disk drive: • is offline • is not installed	n/a	2 or more incidents (see below)
Dark	Power is off	Disk drive: • has failed • is not installed	Disk drives are spinning up
An incident refers to one occurrence of out-of-range voltage, temperature or fan speed. Any incident requires immediate attention.			

For more information on Enclosures, replacing disk drives and other repair operations, refer to the *SuperSwap User Manual*.

Spare Drives

A spare drive is a physical drive designated to function as a hot spare drive. A hot spare drive automatically replaces a failed physical drive. You can also set the Controller to rebuild a logical drive from a Free disk drive. See "Controller Settings" on page 58 and "Logical Drive Rebuild" on page 78 for more information on how spare drives work.

Spare Drive View

Spare Drive View provides a list of all spare drives currently on the Host PC. To

access Spare Drive View, click on the Spare Drive View ⊞ icon in Tree View.
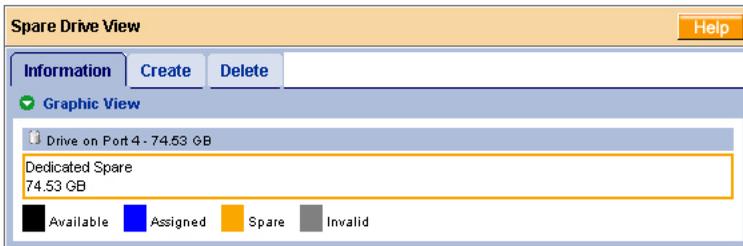
From this screen, you can view the current Spare Drives and click on the tabs to access the Create and Delete features.

Create a Spare Drive

To create a spare drive:

1. Click on the Logical Drive View ⊞ icon.
2. Click on the Create tab.
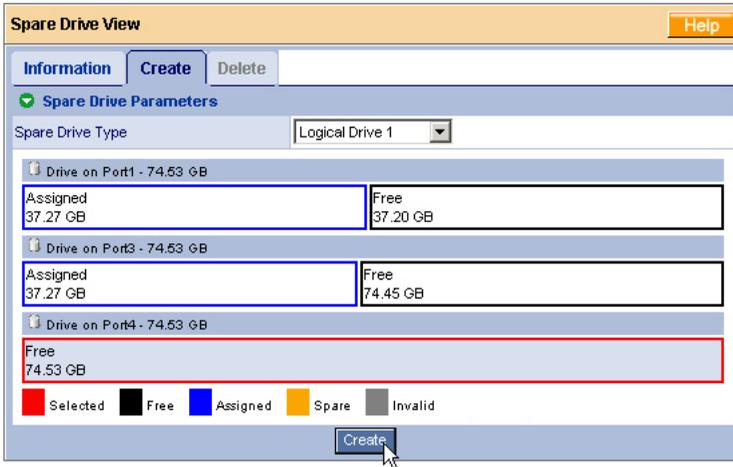
3. From the Logical Drive dropdown menu, select

    *   **Global Spare** – This Spare Drive can be used by any qualified Logical Drive.
    *   **Logical Drive** – The name of the logical drive to which this Spare Drive will be assigned or dedicated.

4. Click on a disk drive to select it.

    Available drives have a black frame. Selected drives have a red frame. Drives with a blue frame are assigned to a logical drive.

    You cannot assign a split drive as a spare drive.

5. Click the **Create** button.

The new Spare Drive appears under Physical Drive View and Spare Drive View.

Delete a Spare Drive

To delete a spare drive:

1. Click on the Logical Drive View icon.
2. Select the Delete tab.
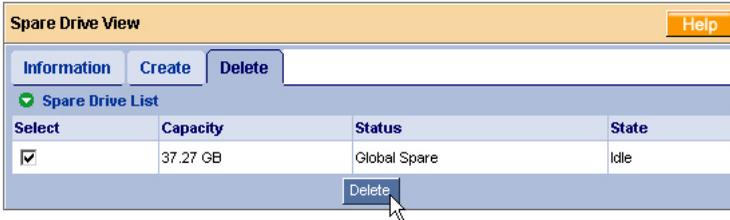
3. Check the box to the left of the spare drive you want to delete.
4. Click the **Delete** button.
5. In the Confirmation box, click the **OK** button.

    The selected spare drive is deleted.

Chapter 6: Technology

- About FastTrak, below
- Introduction to RAID, below
- Choosing a RAID Level (page 101)
- Other Logical Drive Features (page 103)

About FastTrak

FastTrak TX4310 RAID controller card features concurrent data channel operation and onboard BIOS. The channels on the FastTrak card support concurrent operation that allows for overlapped I/O under multi-tasking operating systems and sharing the workload between multiple drives.

Adapter BIOS

The FastTrak card contains a BIOS code that extends the standard disk service routine provided through Int13. The BIOS is bootable for DOS and other operating systems that rely on the system BIOS for drive operation. When the FastTrak BIOS appears during bootup, press Ctrl-F to enter the FastBuild setup to select from menu settings.

Introduction to RAID

RAID (Redundant Array of Independent Disks) allows multiple hard drives to be combined together into a logical drive. The operating system sees the logical drive as a single storage device, and treats it as such. The RAID software and/or controller handle all of the individual drives on its own. The benefits of a RAID can include:

- Higher data transfer rates for increased server performance
- Increased overall storage capacity for a single drive designation (such as, C, D, E, etc.)
- Data redundancy/fault tolerance for ensuring continuous system operation in the event of a hard drive failure

Different types of logical drives use different organizational models and have varying benefits. Also see Choosing RAID Level on page 101. The following outline breaks down the properties for each type of RAID logical drive:

RAID 0 – Stripe

When a logical drive is striped, the read and write blocks of data are interleaved between the sectors of multiple disk drives. Performance is increased, since the workload is balanced between drives or "members" that form the logical drive. Identical drives are recommended for performance as well as data storage efficiency. The logical drive's data capacity is equal to the number of drive members multiplied by the smallest logical drive member's capacity.
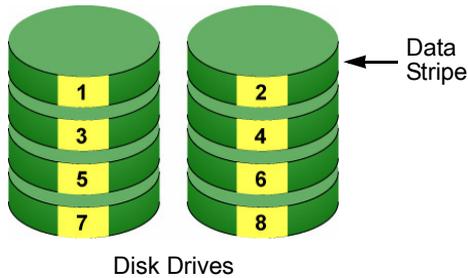
Disk Drives

Figure 1. RAID 0 Stripe interleaves data across multiple drives

For example, one 100GB and three 120GB drives will form a 400GB (4 x 100GB) logical drive instead of 460 GB.

RAID 0 logical drives on the FastTrak TX4310 consist of one or more disk drives.

RAID 1 – Mirror

When a logical drive is mirrored, identical data is written to a pair of disk drives, while reads are performed in parallel. The reads are performed using elevator seek and load balancing techniques where the workload is distributed in the most efficient manner. Whichever drive is not busy and is positioned closer to the data will be accessed first.

With RAID 1, if one disk drive fails or has errors, the other mirrored disk drive continues to function. This is called Fault Tolerance. Moreover, if a spare disk drive is present, the spare drive will be used as the replacement drive and data will begin to be mirrored to it from the remaining good drive.
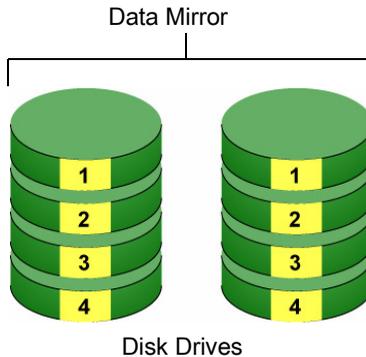
Figure 2. RAID 1 Mirrors identical data to two drives

Due to the data redundancy of mirroring, the capacity of the logical drive is only the size of the smallest disk drive. For example, two 100GB disk drives which have a combined capacity of 200GB instead would have 100GB of usable storage when set up in a mirrored logical drive. Similar to RAID 0 striping, if disk drives of different capacities are used, there will also be unused capacity on the larger drive.

RAID 1 logical drives on the FastTrak TX4310 consist of two disk drives.

When two drives do not offer sufficient data capacity, consider a RAID 10 logical drive,

RAID 5 – Block Striping with Distributed Parity

RAID level 5 organizes data across the disk drives of the logical drive, and distributes parity information across the disk drives along with the data blocks. This organization allows increased performance by accessing multiple disk drives simultaneously for each operation, as well as fault tolerance by providing parity data. In the event of a disk drive failure, data can be re-calculated by the RAID system based on the remaining data and the parity information.

The adjustable block size of the RAID 5 logical drive allows for performance tuning based on the typical I/O request sizes for your system. The block size must be set at the time the logical drive is created and cannot be adjusted dynamically.

RAID 5 makes efficient use of hard drives and is the most versatile RAID Level. It works well for file, database, application and web servers.

Distributed Parity
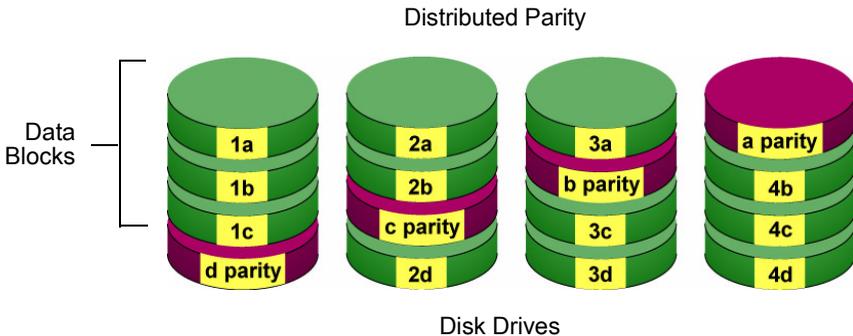
Disk Drives

Figure 3. RAID 5 Stripes all drives with data and parity information

The capacity of a RAID 5 logical drive is the smallest disk drive size multiplied by the number of disk drives, less one. Hence, a RAID 5 logical drive with four 100 GB disk drives will have a capacity of 300 GB. A logical drive with two 120 GB disk drives and one 100 GB disk drive will have a capacity of 200 GB.

RAID 5 logical drives on the FastTrak TX4310 consist of 3 or 4 disk drives.

RAID 10 – Mirror / Stripe

Mirror/Stripe combines both of the RAID 0 and RAID 1 logical drive types. It can increase performance by reading and writing data in parallel while protecting data with duplication. At least four disk drives are needed for RAID 10 to be installed. With a four-disk-drive logical drive, one drive pair is mirrored together then striped over a second drive pair.

Data Stripe

Data Mirror

Disk Drives
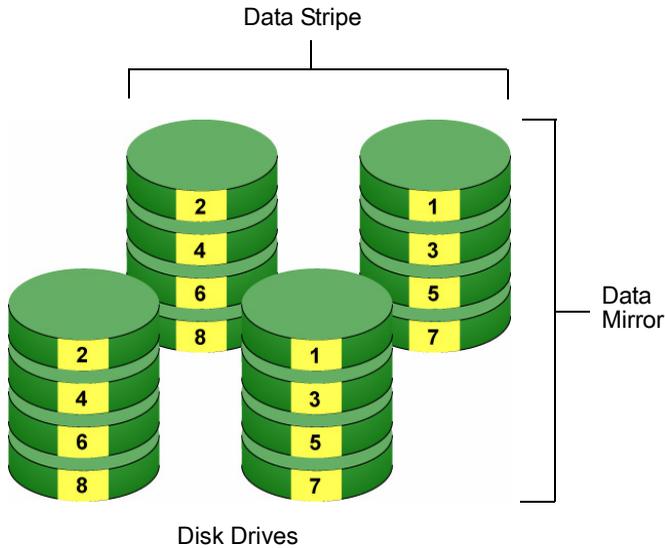
Figure 4. RAID 10 takes a data mirror on one drive pair and stripes it over two drive pairs

The data capacity is similar to a RAID 1 logical drive, with half of the total storage capacity dedicated for redundancy. An added plus for using RAID 10 is that, in many situations, such a logical drive offers double fault tolerance. Double fault tolerance may allow your logical drive to continue to operate depending on which two disk drives fail.

RAID 10 logical drives on the FastTrak TX4310 consist of 4 disk drives.

About Dual Data Redundancy

One unique (though rarely occurring) feature of RAID 10 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. The FastTrak TX4310 protects your data array in four of those cases. Assume the drives are configured as follows:

• CH indicates channels on the FastTrak Controller card.

• A/B indicates which striped pair the drive belongs to.

• 1/2 indicates which part of stripe data.

CH1	CH2	CH3	CH4
Drive A1	Drive A2	Drive B1	Drive B2

Under RAID 10, the array maintains data integrity if any 1, 2 combination survives.

Event	Failed Drives	Logical Drive Status	Why?
1	A1/A2	Functional	B1/B2 retain integrity
2	B1/B2	Functional	A1/A2 retain integrity
3	A1/B2	Functional	B1/A2 retain integrity
4	B1/A2	Functional	A1/B2 retain integrity
5	A1/B1	Offline	B2/A2 contain only half the data
6	B2/A2	Offline	A1/B1 contain only half the data

JBOD – Single Drive

An alternative to RAID, JBOD capacity is equal to the size of the disk drive itself.

JBOD appears in the User Interface as one individual drive.

There are no performance or fault-tolerance features. When one disk fails, all data on that disk is lost. The other disks are unaffected.
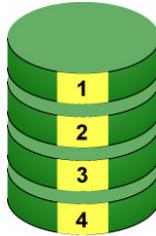
Disk Drive

Choosing a RAID Level

There are several issues to consider when choosing the RAID Level for your FastTrak logical drive. The following discussion summarizes some advantages, disadvantages and applications for each choice.

RAID 0

Advantages	Disadvantages
Implements a striped disk logical drive, the data is broken down into blocks and each block is written to a separate disk drive I/O performance is greatly improved by spreading the I/O load across many channels and drives No parity calculation overhead is involved	Not a true RAID because it is not fault-tolerant The failure of just one drive will result in all data in an logical drive being lost Should not be used in mission critical environments

Recommended Applications for RAID 0

- Image Editing
- Pre-Press Applications
- Any application requiring high bandwidth

RAID 1

Advantages	Disadvantages
Simplest RAID storage subsystem design Can increase read performance by processing data requests in parallel since the same data resides on two different drives	Very high disk overhead - uses only 50% of total capacity

Recommended Applications for RAID 1

- Accounting
- Payroll
- Financial
- Any application requiring very high availability

RAID 5

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate	Disk failure has a medium impact on throughput

Recommended Applications for RAID 5

- File and Application servers
- WWW, E-mail, and News servers
- Intranet servers
- Most versatile RAID level

RAID 10

Advantages	Disadvantages
Implemented as a mirrored logical drive whose segments are RAID 0 logical drives High I/O rates are achieved thanks to multiple stripe segments	Very high disk overhead - uses only 50% of total capacity

Recommended Applications for RAID 10

- Imaging applications
- Database servers
- General fileserver

JBOD

Advantages	Disadvantages
Enables you to manage a large number of disk drives from a single controller	An alternative to RAID without any RAID advantages
The failure of one drive has no effect upon the data in other disk drives	Should not be used in mission critical environments

Recommended Applications for JBOD

- Any application requiring multiple disk drives but where read/write speed or fault-tolerance are not important

- Applications were low-cost operation critical

Other Logical Drive Features

Stripe Block Size

Stripe Block size is set to 16 KB for the FastTrak TX4310 RAID controller card.

Initialization

Fast Initialization erases the Master Boot Record (MBR) in all of the selected disk drives. Use this function when one or more disk drives has been used in a previous logical drive. This function is available in the FastBuild utility and in WebPAM.

Full Initialization erases all the data on the selected disk drives, including the MBR. Use this function when one or more disk drives has been used in a previous logical drive and you want to remove all data stored on the drive. This function is available in WebPAM.

Hot Spare Drive

Any extra drive that is not assigned to an array is designated *Free* in the View Drive Assignments screen (see below). In order for a free drive to serve as a hot spare drive, you must designate the free drive as a spare using the WebPAM software.

```
FastBuild (tm) Utility (c) 2004-2005 Promise Technology, Inc.
========================= [ View Drives Assignments ] =========================

   Channel:ID          Drive Model          Capacity (MB)      Assignment
           1:Mas ST380023AS                     80027
                 Extent 1                       79960            LD 1-1
           2:Mas ST380023AS                     80027
                 Extent 1                       79960            LD 1-2
           3:Mas ST380023AS                     80027
                 Extent 1                       79960            LD 1-3
           4:Mas ST380023AS                     80027
                 Extent 1                       79960            Free




============================== [ Keys Available ] ==============================

  [↑] Up    [↓] Down      [PgDn] Next Page  [PgUp] Previous Page    [ESC] Exit
```

Spare Drives are 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, the FastTrak Controller performs 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 and a new drive added in its place to function as the spare drive.

Cache Settings

Sets the FastTrak controller's cache mode for each logical drive. The choices are **WriteBack** and **WriteThru** (write through). A write-back cache holds data after an I/O operation and tells the controller the data has been written. The data is written as soon as the disk drive is no longer busy.

This action increases availability of the logical drive. If the power fails before the data is written to the disk drive, the data will be lost.

The alternative is a write-through cache policy, which reports that the data has been written to the disk only when it actually has.

Logical Drive Expansion

To *expand* a logical drive is to increase the number of disk drives.

The FastTrak TX4310 RAID Controller card supports logical drive expansion. However, you must use the WebPAM software to access this function.

See "Logical Drive Migration and Expansion" on page 75.

Expansion takes place on an existing Functional logical drive without disturbing the existing data. While the logical drive is expanding, you can access the data as before. When expasion is complete, your logical drive will have a larger capacity.

Level	Current Number of Drives	Possible Number of Drives
RAID 5	3	4
RAID 0	3	4
	2	3 or 4
	1	2, 3 or 4

RAID Level Migration

To *migrate* a logical drive is to change its RAID level. The FastTrak TX4310 RAID controller card supports RAID Level Migration. You must use the WebPAM software to access this function.

See "Logical Drive Migration and Expansion" on page 75.

Migration takes place on an existing Functional logical drive without disturbing the existing data. While the logical drive is migrating, you can access the data as before. When migration is complete, your logical drive will have a different RAID level and/or a larger capacity.

Different types of logical drives use different organizational models and have varying benefits. The following outline breaks down the properties for each type of RAID supported by FastTrak TX4310.

From	To	Increase		Add Redundancy
		Capacity	Performance	
RAID 10	RAID 5	•		
RAID 1	RAID 10	•	•	
	RAID 5	•	•	
RAID 0	RAID 10	•	•	•
	RAID 5	•	•	•
	RAID 1			•

Important

• The Target logical drive may require more disk drives than the Source logical drive

• If the Target logical drive requires an EVEN number of disk drives but the Source logical drive has an ODD number, ADD a disk drive as part of the migration process

• You cannot reduce the number of disk drives in your logical drive, even if the Target logical drive requires fewer disk drives than the Source logical drive

• RAID 1 (mirror) works with two disk drives only

• You cannot migrate a logical drive when it is Critical or performing activities such as Synchronizing, Rebuilding and PDM

• RAID level migration is not possible to or from JBOD

Ranges of Disk Array Expansion

There are limitations to how large you can expand a logical drive, depending on the size of your current logical drive.

The current PC Operating Systems support a 10-byte LBA format. This means that a logical drive can have up to 4 billion address blocks or sectors.

Multiply the number of blocks by the sector size to find the capacity of a logical drive:

4,000,000,000 blocks x 512 bytes per sector = 2,048,000,000,000 bytes of data for a 2TB drive.

Note that you cannot change the size of the sectors nor can you increase the number of address blocks above 4 billiion.

As a result, there are range limits imposed upon logical drive expansion as shown in the table above. For example:

• You can expand a 2.5 TB logical drive up to 4 TB

• You can only expand a 1.9 TB logical drive up to 2 TB

See the table below.

Current LD Size	Maximum LD Expansion Size	Sector Size
8 to 16 TB	16 TB	4096 bytes
4 to 8 TB	8 TB	2048 bytes
2 to 4 TB	4 TB	1024 bytes
0 to 2 TB	2 TB	512 bytes

You can direct WebPAM to expand a logical drive beyond the maximum expansion size. However, when expansion is finished, your logical drive will be the maximum size listed in the table.

If you require a logical drive larger than the maximum expansion size:

1. Backup the data from the current logical drive.
2. Delete the current logical drive.
3. Create a new logical drive with the desired capacity.
4. Restore the data to the new logical drive.

Caution

Before you begin logical drive Expansion or RAID Level Migration, always back up your important data.

Chapter 7: Support

Frequently Asked Questions

This section lists frequently asked questions and other issues with the FastTrak TX4310 RAID Controller card.

Pre-Installation

(Speed, Device Types, Capacity, Cabling)

What kind of hard drives can I use for a FastTrak TX4310 disk array?

You can use any Serial ATA disk drive(s) to create disk arrays on the FastTrak Serial ATA RAID Controller card. Use matching drives for multiple-disk arrays to maximize capacity usage as well as performance.

Will ACPI work with disk drives on the FastTrak TX4310?

Yes.

Can I use ATAPI devices on the FastTrak TX4310?

No. The FastTrak 4310 does not support ATAPI devices.

How can I change the resources that the FastTrak TX4310 uses?

The FastTrak TX4310 is fully PnP. This means all the resources that it uses are given to it by the PnP BIOS on the motherboard. The FastTrak Serial ATA RAID Controller 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:

- Changing the IRQ assignments to the PCI slots in the motherboard BIOS during boot up.
- Reset the configuration data in your CMOS. This is usually an option in the PnP section of your CMOS.
- Otherwise, switch the FastTrak card to a different PCI slot.

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.

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

System CMOS Issues

Set motherboard CMOS Boot sequence to boot to FastTrak Controller

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

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

See the Drive-Related Errors section.

Using an onboard IDE card with FastTrak Controller

If an onboard IDE controller is installed with hard disks, enable support in the Motherboard 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 the option to specify booting to a different device.

Drive Issues

Can I add a drive to a FastTrak TX4310 disk array via hot-swap and dynamically adjust the disk array size?

Yes. The FastTrak TX4310 supports dynamically adjustable RAID size and RAID level. See "Logical Drive Migration and Expansion" on page 75.

Do the disk drives on the FastTrak TX4310 have to be the same size?

The disk drives connected to the FastTrak TX4310 do not have to be the same size. If the sizes differ, the FastTrak controller will truncate the bigger drive so the drives match. The resulting difference in drive space is unusable, so avoid using disk drives of significantly different capacities.

I already have a disk array on an older FastTrak controller. Can I move that disk array to my new FastTrak TX4310?

Yes, provided your disk array was build using Serial ATA disk drives. All FastTrak controllers read the disk arrays the same way so you can move them from one controller to another.

Can I take a drive used in a FastTrak TX4310 disk array and access it directly with a different controller, such as the one integrated on the motherboard?

Only Single-drive striped (RAID 0) and mirrored (RAID 1) disk array configurations allow the drive(s) to be accessed individually on another controller. Multiple-drive striped (RAID 0) or mirrored/striped (RAID 10) drives will not work.

If I have a problem with one of the drives on the FastTrak Controller, how can I low-level format it to correct the problem?

Do NOT do this. Low-level formatting is unnecessary and generally does not correct problems commonly experienced. If you think the disk drive is faulty, run the drive manufacturer's diagnostic utility on it.

Errors such as bad sectors or ECC/CRC failure are best remedied by completely replacing the drive. For this reason, do NOT low-level format the drives attached to the FastTrak controller.

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

No! Disk management software will only complicate things. The disk array should be fully addressable by your OS as it is. Remember that some operating systems have varying limits on the sizes of partitions and disk arrays that can be defined. Consult your OS documentation about partitioning larger drives.

What system BIOS setup settings do I use for the drives on the FastTrak TX4310?

None. The drives on the FastTrak TX4310 are supported by the FastTrak BIOS and/or OS drivers, not by your system BIOS.

How do I partition/format my FastTrak TX4310 disk array?

The FastTrak TX4310 represents the disk array as a single disk drive to your system. Therefore, anything that you can do to a single disk drive you can do to a FastTrak disk array. You can partition the disk array as you see fit using any file system you want.

Critical disk array (array) status error reported during boot

```
FastTrak TX4310 (tm) BIOS Version 2.5.1.xx
(c) 2004-2005 Promise Technology, Inc. All rights reserved.


ID    MODE         SIZE         TRACK-MAPPING      STATUS

1     2+1 RAID 5   159918M      19442/255/63       Critical


Problem is detected with Array : 1
Critical Status:
A disk member of an array has failed or is not responding.
Pleae refer to your Promise User Manual for further details.

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

If a critical status error message appears on the FastTrak BIOS startup screen for a RAID1, RAID 5 or RAID 10 disk array, there is a drive in the disk array that has failed or is not responding. The mirrored disk array has lost its fault tolerance, but will still perform normal drive reads and writes. See "Logical Drive Critical / Offline" on page 85.

Disk drives cannot be formed into a disk array

Disk drives must support Serial ATA and be free of media defects in order to be added to a disk array. Promise recommends using new identical disk drives for each disk array. Also, re-check the data and power cabling and connections.

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

Do not reference C: or D: in the Motherboard Standard CMOS for drives attached to the FastTrak Serial ATA RAID Controller. Only enter drive information in the Motherboard CMOS for drives attached to the onboard IDE controller.

The disk array constantly goes critical or offline during reboot

This condition may occur when the *Master Boot Record (MBR)* of one of the drives has become corrupt or bad. Removing (erasing) the MBR will remedy any issue related directly to a bad MBR.

Warning

> Before removing the MBR of the drive(s), backup any existing data. Removal of the MBR of any disk drive permanently deletes all existing data on the drive.

To erase the MBR, follow these steps:

1. Backup any important data from the disk array.
2. Note the disk array information, including which drives are used, the number of drives, RAID Level, etc.
3. Delete the disk array.
4. Create a new disk array using the specifications from the previous disk array.
5. During the disk array creation process:
    • In FastBuild, set the Fast Init feature to ON
    • In WebPAM, select Fast or Full Initialization
6. Partition and format the disk array using your PC's operating system. See "Appendix A: Partition and Format" on page 123.

Unable to partition or format disk array

See "The disk array constantly goes critical or offline during reboot," above.

Cannot rebuild mirrored (RAID 1) disk array

See "The disk array constantly goes critical or offline during reboot," above.

Fatal errors or data corruption are constantly reported when reading or writing to the disk array

See "The disk array constantly goes critical or offline during reboot," above.

Operating System-Related Issues

The Operating System no longer boots after creating a Mirrored disk array using your existing boot drive using Windows

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 successfully. Each controller can view a drive differently. This can be an issue for a new

controller that loads the original Master Boot Record (MBR) and then has a problem translating it or the Operating System boot record.

Promise recommends a clean install of the Operating System. This action restores the MBR and OS boot record. This action requires partitioning and formatting the drive.

Promise Windows driver does not appear in Device Manager

Windows may already be listing the controller under Other Devices instead of the 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 then click on the Driver tab. Depending on your version of Windows, choose either Change Driver or Update Driver. 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 installation of Windows

The F6 key was not pressed at the appropriate time. Reboot the system, and press the F6 key when the message "Press F6 if you need to install third party SCSI or RAID driver" appears in Windows.

"No Hard Drives Found" message appears during CD-ROM installation of Windows

The F6 key was not pressed at the appropriate time. Reboot the system, and press the F6 key when the message "Press F6 if you need to install third party SCSI or RAID driver" appears in Windows.

Installation Issues

How can I change the system boot sequence in order to boot from the FastTrak disk array?

The boot sequence is controlled by the system BIOS. As far as the system BIOS is concerned, the FastTrak Serial ATA RAID Controller and its defined disk arrays are categorized as a SCSI device. This allows you to set the boot sequence in your BIOS setup utility to boot from SCSI first, rather than IDE.

If there are multiple SCSI add-in controllers in the system, then the boot sequence among is determined by their PCI slot priority. PCI slot #1 will be first, slot #2 second, etc. If you want to boot from the disk array, put the FastTrak Controller in the PCI slot where it will be accessed before the other SCSI controllers.

How can I change the boot sequence between a PCI SCSI card and the FastTrak disk array?

Since all PCI devices are PnP, it is difficult to determine which device is addressed first. Some newer motherboard BIOSes have 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, as described in the previous answer.

Post-Installation

Why can't I see the drives on the FastTrak Controller card under FDISK?

You have not created a disk array yet. If no disk array has been created, the system will not recognize drive(s) attached to the FastTrak card.

Why can't I log into WebPAM over the network?

Verify that you have the correct IP address for the Host PC where the FastTrak controller card is installed.

If you checked the Local Monitoring Only option when you installed WebPAM, you can only access WebPAM from the Host PC. To obtain network access, reinstall WebPAM and be sure you do NOT check the Local Monitoring Only option. See "Install WebPAM" on page 15.

Performance Tips

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

Use FastTrak array as D: or other non-bootable drive in a striped disk array

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

Re-Configure PCI Latency Setting

The PCI Latency setting appears in some Motherboard BIOS. The setting governs how much time is allocated to service each PCI slot. Promise recommends a value of 64. An optimal value will vary from system to system.

Contact Technical 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
- Firmware, BIOS and driver version numbers
- A description of the problem / situation
- System configuration information, including: motherboard and CPU type, hard drive model(s), SATA/ATA/ATAPI drives & devices, and other controllers.

Technical Support Services

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

United States

E-mail Support	e-Support On-Line
Fax Support	(408) 228-1097 Attn: Technical Support
Phone Support	(408) 228-1400 option 4
If you wish to write us for support:	Promise Technology, Inc. 580 Cottonwood Drive Milpitas, CA 95035, USA

The Netherlands

E-mail Support	e-Support On-Line
Fax Support	+31 (0) 40 256 9463 Attn: Technical Support
Phone Support	+31 (0) 40 235 2600
If you wish to write us for support:	Promise Technology Europe B.V. Science Park Eindhoven 5542 5692 EL Son, The Netherlands

Germany

E-mail Support	e-Support On-Line
Fax Technical Support	+49 (0) 2 31 56 76 48 - 29 Attn: Technical Support
Phone Technical Support	+49 (0) 2 31 56 76 48 - 10
If you wish to write us for support:	Promise Technology Germany Europaplatz 9 44269 Dortmund, Germany

Italy

E-mail Support	e-Support On-Line
Fax Support	0039 06 367 12400 Attn: Technical Support
Phone Support	0039 06 367 12626
If you wish to write us for support:	Promise Technology Italy Piazza del Popolo 18 00187 Roma, Italia

Taiwan

E-mail Support	e-Support On-Line
Fax Support	+886 3 578 2390 Attn: Technical Support
Phone Support	+886 3 578 2395 (ext. 8811)
If you wish to write us for support:	Promise Technology, Inc. 2F, No. 30, Industry E. Rd. IX Science-based Industrial Park Hsin-Chu 30075, Taiwan (R.O.C.)

China

E-mail Support	e-Support On-Line
Fax Support	+86-10-8857-8015 Attn: Technical Support
Phone Support	+86-10-8857-8085/8095
If you wish to write us for support:	Promise Technology China Room 1205, Tower C Webok Time Center, No.17 South Zhong Guan Cun Street Hai Dian District, Beijing 100081, China

Limited Warranty

Promise Technology, Inc. ("Promise") warrants that for three (3) 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.

    d)   Is not valid on spare parts, fans, and power supplies

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.

No other document, statement or representation may be relied on to vary the terms of this limited warranty.

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.

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 that vary from state to state. This limited warranty is governed by the State of California.

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.

Return 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.

> **Important**
>
> Obtain an RMA number from Technical Support *before* you return the product and write the RMA number on the label. The RMA number is essential for tracking your product and providing the proper service.

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:

USA and Canada: Promise Technology, Inc.
Customer Service Dept.
Attn.: RMA # _____
47654 Kato Road
Fremont, CA 94538

Other Countries: Return the product to your dealer or retailer.

Contact them for instructions before shipping the product.

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).

Appendix A: Partition and Format

In order for your operating system to recognize and work with the disk drives attached to your FastTrak TX4310 RAID controller card, the drives must be partitioned and formatted.

- If your drives were previously partitioned and formatted they are ready to use and you can skip this procedure
- If your drives have not been partitioned and formatted, you must do that job before you can use them

The actions of partitioning and formatting create a file structure on the disk drives with which your operating system can work. In the example below, we show how this is done in Windows. A similar procedure is required for Linux PC's. However, partitioning and formatting in Linux is not automated, therefore please refer to your system documentation for the exact procedure.

Note

If you plan to boot your computer from this disk array, go to Windows and Device Driver Installation under the Installation section for instructions. The instructions here are for data disk arrays only.
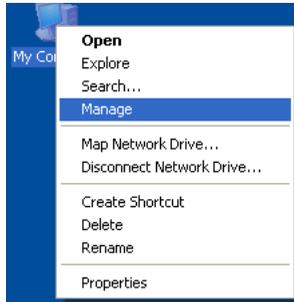

1. From the desktop, right-click on the My Computer icon and select *Manage* from the popup menu. The Computer Management window opens.
2. From the left menu, click on Disk Management. The Disk Management window opens with your new disk array identified as Disk 1. The Initialize Wizard appears automatically.
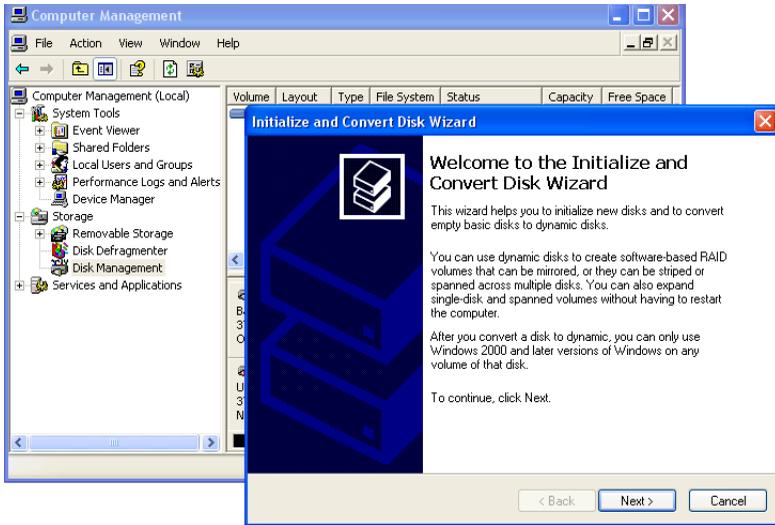
3. Click the **Next** button to start the Wizard.

4. In the following windows, select Disk 1 to Initialize. Do not select any disks to Convert. Click the **Finish** button to Initialize the disk array.
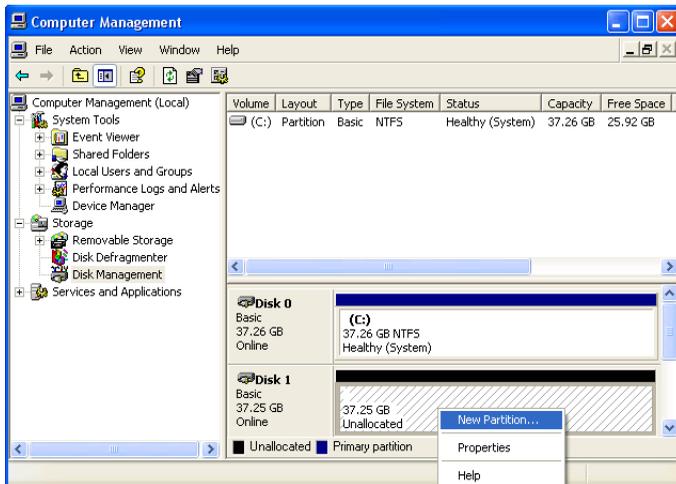

5. Right-click on the Unallocated portion of Disk 1 and select *New Partition...* from the popup menu. The New Partition Wizard appears.
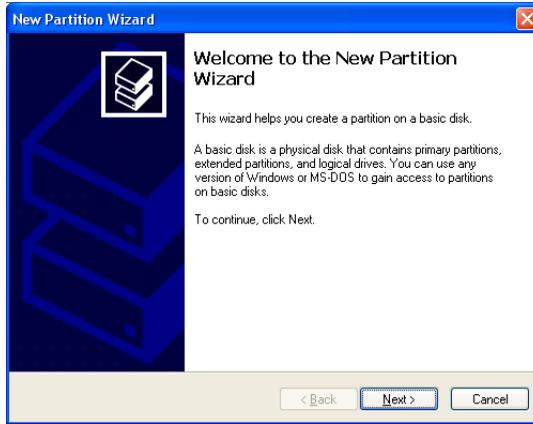
6. Click the **Next** button to start the wizard.

7. In the following windows, do the following actions. Click **Next** to move to the next window.

    •   Select Primary Partition

    •   Specify the maximum available partition size in MB

    •   Assign the available drive letter of your choice

    •   Choose Format this partition with the following settings

    •   File system: NTFS

    •   Allocation unit size: Default

    •   Volume label: Enter your choice of name

    •   Do not check "Perform a quick format" or "Enable file and folder compression"

8. Review your selections and click **Finish**. The New Partition Wizard will disappear while partitioning and formatting begin.

    This process will take some time. The Disk Management window displays the progress.
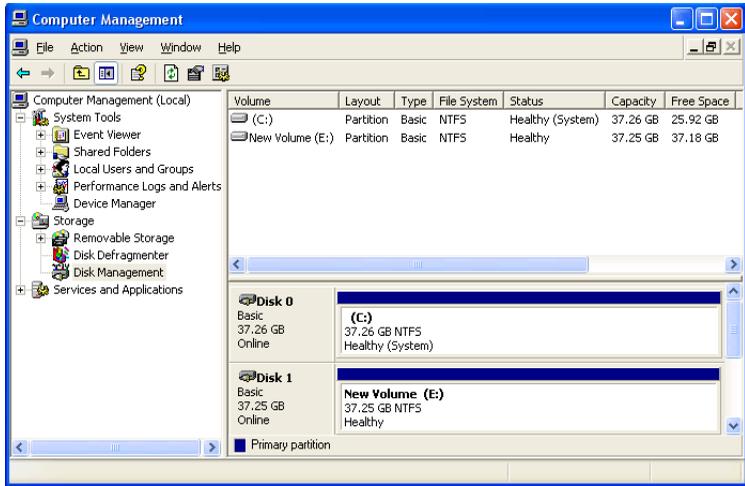
When formatting is complete, your disk array will appear as a hard drive in the Disk Management window (above) and the My Computer window (below).