



VTRAK
M310p, M210p
PRODUCT MANUAL

Version 1.0

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Chapter 1: Introduction

- About This Manual (below)
- Overview (page 2)
- Architectural Description (page 3)
- Specifications (page 5)

Thank you for purchasing Promise Technology's VTrak M310p or M210p external disk array subsystem.

About This Manual

This *Product Manual* describes how to setup, use, and maintain the VTrak M310p and M210p external disk array subsystem. It also describes how to use the built-in command-line interface (CLI), command-line utility (CLU), and embedded Web-based Promise Array Management—Professional (WebPAM PROe) software.

This manual includes a full table of contents, index, 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.

Overview

VTrak provides data storage solutions for applications where high performance and data protection are required. The failure of any single drive will not affect data integrity or accessibility of the data in a RAID protected logical drive.

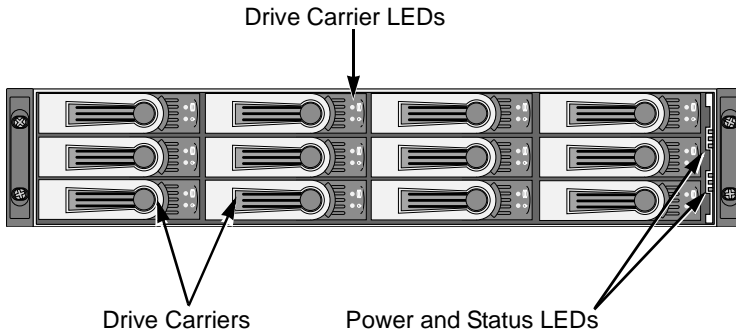


Figure 1. VTrak M310p front view (M210p is similar)

A defective drive may be replaced without interruption of data availability to the host computer. If so configured, a hot spare drive will automatically replace a failed drive, securing the fault-tolerant integrity of the logical drive. The self-contained hardware-based RAID logical drive provides maximum performance in a compact external chassis.

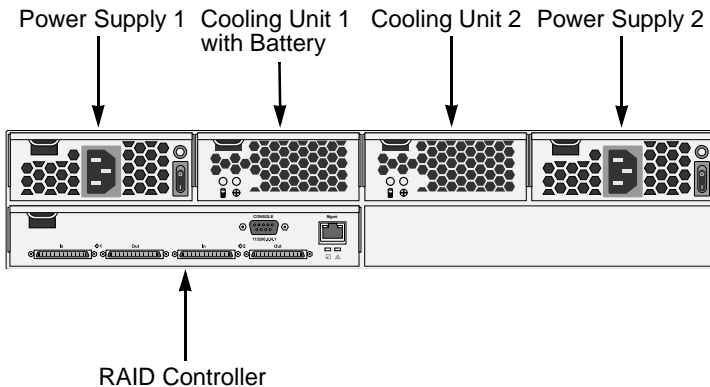


Figure 2. VTrak M310p/M210p Rear View

Architectural Description

The VTrak M310p and M210p are Direct Attached Storage (DAS) subsystems. The subsystems support 1.5 Gb/s and 3.0 Gb/s SATA disk drives:

- VTrak M310p supports up to 12 disk drives in a 2U enclosure
- VTrak M210p supports up to 8 disk drives in a 2U enclosure

All M310p and M210p enclosures include a mid-plane, RAID controller, power and cooling units, and enclosure processor all in one cable-less chassis design. Multiple fans and power supplies provide redundancy to ensure continued usage during component failure. The RAID controller is hardware based and controls all logical drive functions transparently to the host system. VTrak appears to the computer's operating system as a standard SCSI drive or drives.

Features and Benefits

Feature	Benefit
M310p and M210p: 2U 19-inch wide enclosure	Installs easily in any standard rackmount.
Supports RAID levels 0, 1, 1E, 5, 6, 10, and 50	Allows system to be tuned for maximum performance.
Supports online logical drive (array) expansion	Lets you add disk drives to an existing logical drive without interrupting data accessibility.
Supports online RAID migration	Allows you to convert a logical drive from one RAID level to another without interrupting data accessibility.
Supports Serial ATA drives	Allows you to use existing SATA disk drives.
Supports logical drive migration from other Promise RAID products	Allow you to seamlessly move your existing logical drives to VTrak without recreating them.
S.M.A.R.T. monitoring	Warns of disk drive degradation and potential failure.
Hardware-assisted XOR engine	High-speed parity calculation for parity type logical drives.
Supports SNMP (v2) CIM and WBEM standards	API-ready for enterprise management integration.

Feature	Benefit
Tagged Command Queuing (TCQ) up to 128 commands	Maximum performance in Multi-Threaded Operating Systems.
Supports SATA II Native Command Queuing	High performance and efficiency through efficient command re-ordering.
Supports DDF compliant metadata on disk	Enabled disk array migration from one controller to another.
Hot-swap feature for drive carriers, power supplies, fans, and battery	Allows a defective component to be replaced without interrupting data accessibility to the host system.
Tool-less field-replaceable units (FRUs)	All FRUs can be replaced without tools, saving time and effort for support personnel.
Hot-spare drives	Maintains full fault tolerant integrity by automatically rebuilding the data from a failed drive to an installed hot spare drive. Supports multiple, designated and global spares.
Automatic background data reconstruction when a drive is replaced	Logical drive is quickly back on-line with minimal user intervention.
Redundant, hot-swappable cooling units	Load sharing and full operation even with multiple failed fans.
N+1 Redundant, hot-swappable power supplies	Load sharing and full operation even with a failed power supply.
Redundant SCSI ports	Load sharing and full operation even with a failed SCSI port.
Cluster support	Supports two-node server clusters for performance and availability.
Complete cable-less design	All components easily plug directly into boards. No cables to complicate setup or maintenance.
Cache battery backup	Up to 72-hour backup for controller cache to retain data in case of power failure.

Feature	Benefit
Command-line and Graphic-user interfaces	Choice of control and monitoring methods for greater flexibility.

Specifications

Drive Capacity (M310p): 12 SATA disk drives (3.5" x 1" form factor only).

Drive Capacity (M210p): 8 SATA disk drives (3.5" x 1" form factor only).

External I/O Ports: Dual 320-MB SCSI ports

Sustained Throughput: Up to 640 MB/s (over two SCSI ports)

Data Cache: 256MB predictive data cache with automatic write cache destaging and 72-hour battery backup protection.

Supported RAID Levels:

- RAID 0
- RAID 1
- RAID 1E
- RAID 5
- RAID 6
- RAID 10
- RAID 50

Any combination of these RAID levels can exist at once on separate logical drives. See page 179 for more information on RAID.

RAID Flexibility: Configurable RAID stripe size – 8, 16, 32, 64, 128, 256, 512 KB, and 1 MB sectors per disk.

Rebuild priority tuning: Adjustment of minimum I/O reserved for server use during rebuild.

Hot-spares: Multiple global and designated hot spares.

Maximum LUNs: 32 in any combination of RAID levels and drive types.

Supported Disk Interfaces: Serial ATA (SATA)

Supported Operating Systems:

- Windows 2000
- Windows XP Professional
- Windows 2003
- RedHat Linux
- SuSE Linux
- Sun Solaris
- Mac OS X

Current: 8 A @ 100 VAC; 4 A @ 200 VAC (max. rating with two power cords)

Power Supply: Dual power supplies. M310p, 360W. M201p, 260W. 100–240 VAC auto-ranging, 50–60 Hz, dual hot-swap and redundant with PFC, N+1 design

Operating Temperature: 41° to 104°F (5° to 40°C)

Non-operational Temperature: -40° to 140°F (-40° to 60°C)

Relative Humidity: Maximum 90%

Vibration: Random, 0.21 grms, 5 to 500Hz, 30Mins, X, Y, Z axis

Management Tools: WebPAM PROe, Command Line Utility, Command Line Interface

Management Interfaces: Ethernet, RS232 (Serial)

Management Protocols: SNMP, SSL, CIM/WBEM, Telnet

Notification: Email, audible, and visible alarms

Dimensions: Height, 3.50 in (8.90 cm); Width, 17.56 in (44.60 cm); Depth, 22.09 in (56.10 cm)

Weight: M310p, 55.12 lbs (25.00 Kg) without drives; 66.1 lbs (30.0 Kg) with 12 drives installed

Weight: M210p, 50.71 lbs (23.00 Kg) without drives; 61.7 lbs (28.0 Kg) with 8 drives installed

Safety Certifications: CE, FCC Class B, BSMI, VCCI, cUL, TUV, MIC

Limited Warranty: 3 Years (See page 242 for details)

FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two 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.

Chapter 2: Installation

- Unpack the VTrak storage subsystem (below)
 - Mount VTrak in a Rack (page 8)
 - Install Disk Drives (page 10)
 - Connect Network and Data Cables (page 13)
 - Set Up Serial Cable Connections (page 14)
 - Connect the Power (page 15)
-

Unpack the VTrak

The VTrak box contains the following items:

- VTrak Unit
- *Quick Start Guide*
- Null Modem Cable
- 1.0m External VHDCI SCSI cable (2 for M310p; 1 for M210p)
- Screws for disk drives (52 for M310p; 36 for M210p; including 4 spares)
- 1.5m (4.9 ft) Power cords (2 for US and 2 for Europe)
- Mounting rail sets (1 pair)
- CD with SNMP files, *Product Manual* and *Quick Start Guide*



Warning

The electronic components within the VTrak disk array are sensitive to damage from Electro-Static Discharge (ESD). Observe appropriate precautions at all times when handling the VTrak or its subassemblies.



Important

Use the following categories of network cables with VTrak:

- Cat 6, preferred
 - Cat 5E, minimum
-

Mount VTrak in a Rack

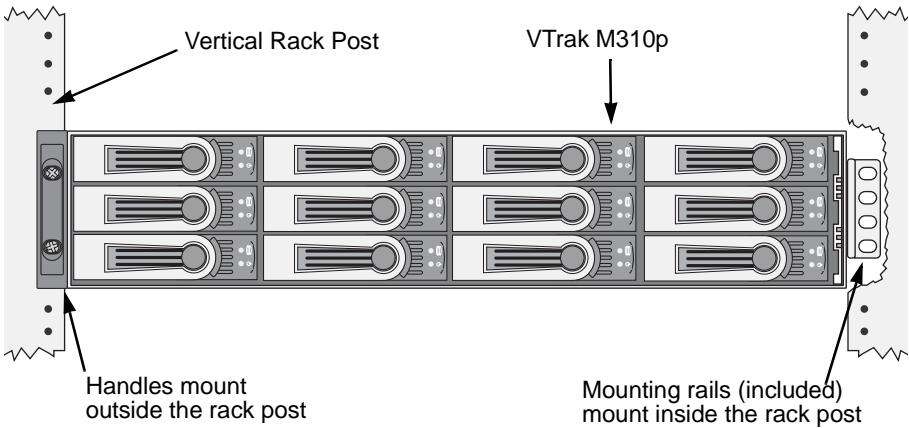


Figure 1. Rackmounted VTrak M310p (M210p is similar)

The VTrak M310p or M210p installs to the rack using the supplied mounting rails. You can also use your existing rails.

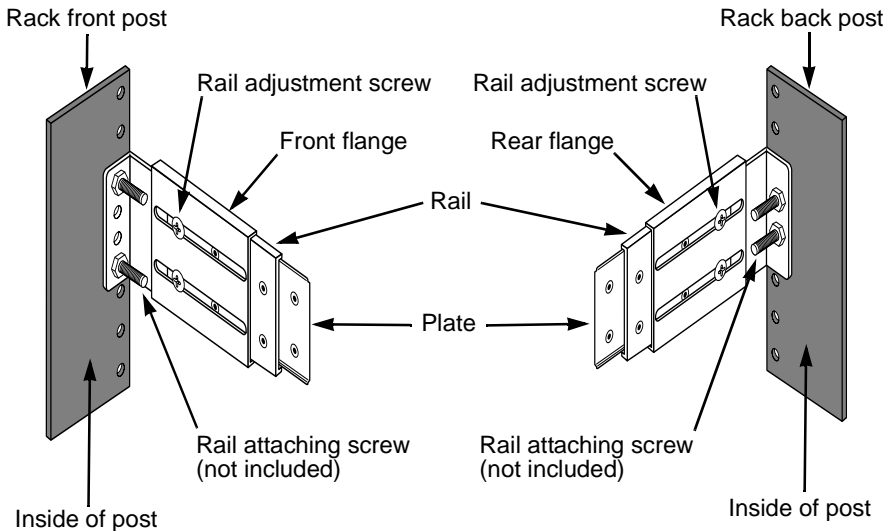


Figure 2. Mounting rail installation



Cautions

- At least two persons are required to safely lift, place, and attach the VTrak enclosure into a rack system.
 - Do not lift or move the VTrak enclosure by the handles, power supplies or the controller units. Hold the enclosure itself.
 - Do not install the VTrak enclosure into a rack without rails to support the enclosure.
-

To install the VTrak enclosure into a rack with the supplied mounting rails (see Figure 2):

1. Check the fit of the mounting rails in your rack system.
2. Slide the plates out of the mounting rails.
3. Attach one plate to each side of the VTrak enclosure.
Line-up the two studs and six holes in the plate with the corresponding holes in the enclosure. Attach each plate with six screws (included).
4. Slide one of the rails over the plate on one side of the enclosure.
The rail is designed to slide freely over the plate.
5. Attach a four-hole flange to the rail, with the flange toward the front (disk drive end) of the enclosure.
Install four rail adjustment screws (included) through the flange into the rail.
6. Attach a two-hole flange to the rail, with the flange toward the back (connector end) of the enclosure.
Install four rail adjustment screws (included) through the flange into the rail.
7. Repeat steps 4 through 6 to attach the other rail and flanges to the enclosure.
8. Place the enclosure with mounting rails into your rack system.
9. Attach the four-hole flanges to the inside of the rack's front post, using the attaching screws from your rack system.
10. Attach the two-hole flanges to the inside of the rack's rear post, using the attaching screws from your rack system.
11. Square the rails in the rack.
12. Tighten the adjustment screws and the attaching screws.

Install Disk Drives

You can populate the VTrak with 1.5 GB and 3.0 GB SATA drives.

- VTrak M310p supports up to 12 disk drives
- VTrak M210p supports up to 8 disk drives

All VTrak M310p or M210p models provide the RAID configurations listed below. See Chapter 7, page 179 for a complete explanation of RAID on VTrak.

RAID Configuration	Number of disk drives	
	Minimum	Maximum
RAID 0	1	12
RAID 1	2	2*
RAID 1E	3	12
RAID 5	3	12
RAID 6	4	12
RAID 10	4	12
RAID 50	6	12
* RAID 1 logical drives work in matched pairs. VTrak M310p supports up to six (6) RAID 1 logical drives. M210p supports up to four (4) RAID 1 logical drives.		

If you use different size disk drives in the same logical drive, the total size of the logical drive will equal the size of the smallest disk drive times the number of drives.



Caution

Be sure to install the counter-sink screws supplied with the VTrak. Use of other types of screws can damage the adjacent drives.

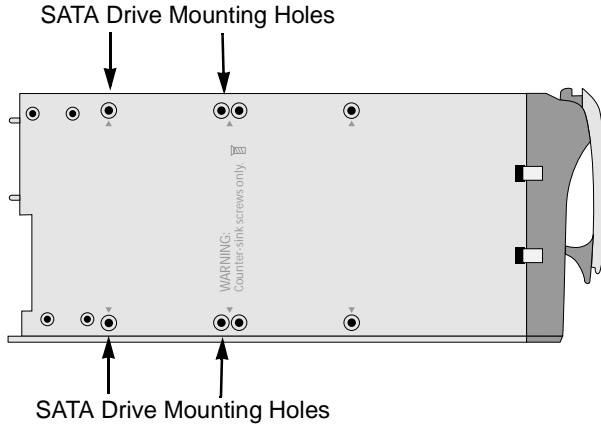


Figure 3. VTrak M310p/M210p drive carrier mounting holes



Figure 4. SATA Disk Drives mount at the front of the carrier

1. Carefully lay the drive into the drive carrier at the front, so that the screw holes on the bottom line up.
2. Insert the screws through the holes in the drive carrier and into the bottom of the disk drive (see Figure 3).
 - Install only the screws supplied with the VTrak.
 - Install four screws per drive.
 - Snug each screw. Be careful not to over tighten.
3. Reinstall the drive carrier into the VTrak chassis.

- Repeat these steps until all of your disk drives are installed.



Caution

If you plan to operate your VTrak with fewer than a full load of disk drives, install all of the drive carriers into the enclosure, to ensure proper airflow for cooling.



Important

Be sure each drive is securely fastened to its carrier. Proper installation ensures adequate grounding and minimizes vibration. Do not install drives with fewer than four screws.



Note

Unlike other VTrak models, the M310p and M210p do not support Parallel ATA disk drives. There is no PATA-to-SATA adapter available for these models.

Drive Numbering

Each disk drive in VTrak is identified by a number used for creating and managing logical drives. VTrak numbers disk drives from left to right. Numbers are stamped above each drive bay for easy identification.

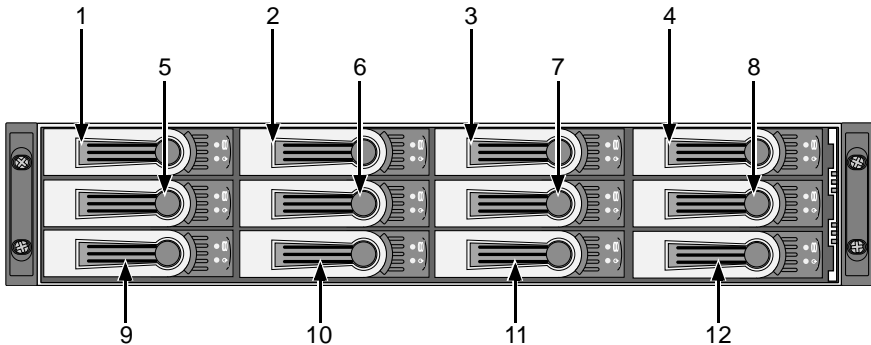


Figure 7. VTrak M310p disk drives are numbered as shown. The M210p is similar, with 8 disk drives

Connect Network and Data Cables

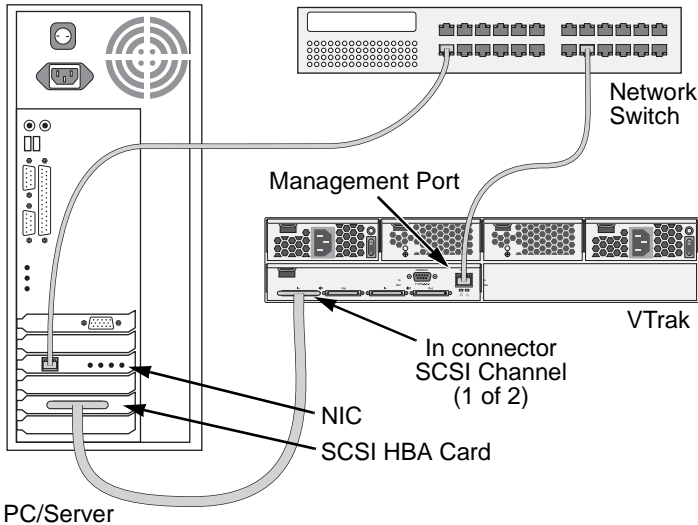


Figure 8. VTrak M310p/M210p DAS connections

This arrangement requires:

- A network switch
- A network interface card (NIC) in the PC
- A SCSI HBA card in the PC
- A SCSI cable that fits your HBA card and has a VHDCI connector to fit the VTrak SCSI channel

VTrak's SCSI connectors are bi-directional. However, the internal termination feature works only on the "Out" connector. Internal termination is set to "Automatic" by default.

Connect the PC's standard NIC and VTrak's Management Port to your network switch to establish the management path.

Connect a SCSI cable to the PC's SCSI HBA card and one of the VTrak's SCSI channels. To use the internal termination feature, attach the SCSI cable to the "In" connector. An external terminator is not required for this arrangement.

If you plan to connect multiple VTraks on a SCSI chain, connect the other side of the same SCSI channel on the first VTrak to a SCSI channel on the second VTrak.

See "Chapter 4: Management with WebPAM PROe" on page 37 and "Chapter 5: Management with the CLU" on page 119 for more information.

Set Up Serial Cable Connections

The RS-232 Serial connection enables the Command Line Utility (CLU) on your PC to monitor and control VTrak.

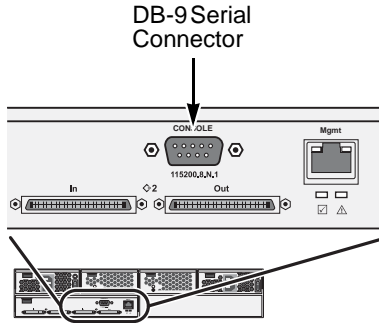


Figure 9. Serial connector for VTrak M310p/M210p

Connect the Power

Plug the power cords and switch on both power supplies on. When the power is switched on, the LEDs on the front of the VTrak will light up.

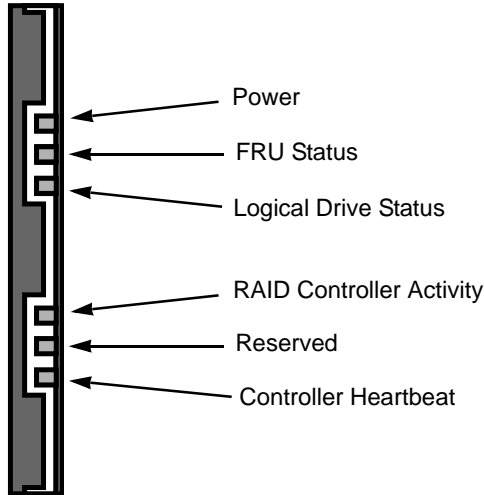


Figure 10. VTrak M310p/M210p front panel LED display

When boot-up is finished and the VTrak is functioning normally:

- Controller Heartbeat LED blinks green seven times in three seconds, goes dark for six seconds, then repeats the blink pattern.
- Power, FRU and Logical Drive LEDs display green continuously.
- The RAID Controller LED flashes green if there is activity on the controller.

There are two LEDs on each Drive Carrier. They report the presence of power and a disk drive, and the current condition of the drive.

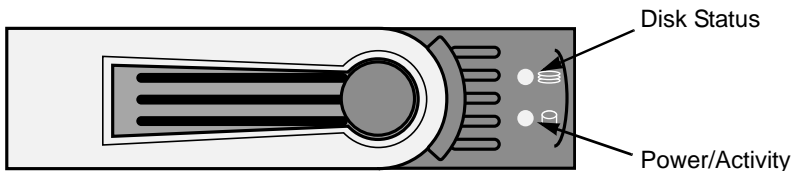


Figure 11. VTrak M310p/M210p disk carrier LEDs

After a few moments the Power/Activity should display Green.

If there is no disk drive in the carrier, the Disk Status LED and the Power/Activity LED will remain dark.

When you first power-up the VTrak, the audible alarm beeps twice to show normal operation.

Go to “Chapter 3: Setup” on page 17.

Chapter 3: Setup

- VTrak Setup with CLI or CLU (below)
 - VTrak Setup with WebPAM PROe (page 22)
-

VTrak Setup with CLI or CLU

After installation, the next step is to configure VTrak.

To set date, time and IP addresses, you must use the Command Line Interface (CLI) or the Command Line Utility (CLU).

For disk array creation, you can use the CLI, CLU or WebPAM PROe.

This Chapter only deals with basic functions needed to setup a new VTrak. For a full discussion of VTrak functions, refer to WebPAM PROe on page 37 and the CLU on page 119.

VTrak has a Command Line Interface (CLI) to manage all of its functions, including customization. A subset of the CLI is the Command Line Utility (CLU), a user-level interface that manages your VTrak via your PC's terminal emulation program, such as Microsoft HyperTerminal.

1. Change your terminal emulation program to match the following settings:
 - Bits per second: 115200
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: none
2. Start your PC's terminal VT100 or ANSI emulation program.
3. Press Enter once to launch the CLI.
4. At the Login prompt, type **administrator** and press Enter.
5. At the Password prompt, type **password** and press Enter.

At this point, you are in the CLI. You can continue using the CLI to make network settings or you can switch to the CLU.

- CLI (page 18)
- CLU (page 19)

CLI

1. Type the following string to set the Date and Time, then press Enter
 administrator@cli> **date -a mod -d 2006/06/15 -t 16:45:00**

Type the date in yyyy/mm/dd format and the time in hh/mm/ss format with a 24-hour clock. In the above example, the date was June 15, 2006. The time was 4:45 pm. Your values will be different.

2. Type the following string to set the Management Port IP address and other settings, then press Enter.

```
administrator@cli> net -a mod -t mgmt -s "primaryip=192.168.10.87,
primaryipmask=255.255.255.0, gateway=192.168.10.3"
```

In the above example, the IP addresses and subnet mask are included as examples only. Your values will be different. The default IP address is 10.0.0.1.

If you prefer to let your DHCP server assign the IP address, type the following string, then press Enter.

```
administrator@cli> net -a mod -t mgmt -s "dhcp=enable"
```

3. To verify the settings, type **net** and press Enter.

```
administrator@cli> net
```

```
=====
CId Port Type   IP           Mask           Gateway       Link
=====
1  1   Mgmt  192.168.10.87 255.255.255.0 192.168.10.3  Up
```

This completes the Management port setup. Go to “VTrak Setup with WebPAM PROe” on page 22.

To see the full set of CLI commands, at the admin@cli> prompt, type **help** and press Enter.

CLU

1. At the `admin@cli` prompt, type **menu** and press Enter.
The CLU main menu appears.

```

Promise M-Series | Main Menu

Quick Setup
Subsystem Management
Physical Drive Management
Disk Array Management
Logical Drive Management
Network Management
Fibre Channel Management
Background Activity
Event Viewer
Additional Info and Management
Buzzer

Return to CLI

ARROWS, TAB: Navigate; ENTER: Select; CTRL-X: Return; CTRL-E: Help; CTRL-E: Help

```

2. With Quick Setup highlighted, press Enter.
The first Quick Setup screen enables you to make Date and Time settings.

System Date and Time

```

Promise M-Series | Quick Setup [Step 1 of 4]: System Date & Time

System Date (yyyy/mm/dd): 2005/03/31
System Time (hh:mm:ss) : 16:27:41

Save Settings and Continue [CTRL-A]
Restore Settings [CTRL-R]
Skip to Next Step
Return to Main Menu

```

1. Press the arrow keys to highlight System Date.
2. Press the backspace key to erase the current date.
3. Type the new date.
4. Follow the same procedure to set the System Time.

5. Press Ctrl-A to save these settings and move to the Management Port configuration screen.

Management Port

```

Promise M-Series | Quick Setup [Step 2 of 4]: Management Port
Port ID       : 1                IP Type       : IPv4
Port Status   : Enabled          MAC Address    : 00:00:00:00:00:00
Link Status   : Up              Max Supported Speed : 1000Mbps

DHCP          : Enabled

Save Settings and Continue [CTRL-A]
Restore Settings [CTRL-R]
Skip to Next Step
Return to Previous Step
    
```

By default, DHCP is enabled on VTrak (above). To set Management Port settings manually, or to view the current settings, you must disable DHCP.

To view the current Management Port settings:

1. Press the arrow keys to highlight *DHCP*.
2. Press the spacebar to toggle to *Disabled*.

```

Promise M-Series | Quick Setup [Step 2 of 4]: Management Port
Port ID       : 1                IP Type       : IPv4
Port Status   : Enabled          MAC Address    : 00:00:00:00:00:00
Link Status   : Up              Max Supported Speed : 1000Mbps

DHCP          : Disabled
IP Address    : 192.168.10.112
Subnet Mask   : 255.255.255.0
Gateway IP Address : 192.168.10.1

DNS Server IP Address : 192.168.1.3

Save Settings and Continue [CTRL-A]
Restore Settings [CTRL-R]
Skip to Next Step
Return to Previous Step
    
```

The current Management Port IP are displayed (above).

3. Record the information on this screen.
4. Press the spacebar to toggle DHCP back to *Enable*.

5. Press Ctrl-A to save these settings and move to the RAID configuration screen.

To make Management Port settings manually:

1. Press the arrow keys to highlight *DHCP*.
2. Press the spacebar to toggle to *Disabled*.
3. Press the arrow keys to highlight *IP Address*.
4. Press the backspace key to erase the current IP Address.
5. Type the new IP Address.
6. Follow the same procedure to specify the Subnet Mask, Gateway IP Address and DNS Server IP Address.
If you do not have a DNS server, skip the DNS Server IP address.
7. Press Ctrl-A to save these settings.

Exit the CLU

1. Highlight *Skip the Step and Finish* and press Enter.
2. Highlight *Return to CLI* and press Enter.

This completes the Management port setup. Go to “VTrak Setup with WebPAM PROe” on page 22.

VTrak Setup with WebPAM PROe



Notes

- You can also use the CLU to create disk arrays and logical drives. See “Chapter 5: Management with the CLU” on page 119 for more information.
 - The WebPAM PROe software is embedded on the VTrak M310p or M210p subsystem. No installation is required.
-

Set up with WebPAM PROe consists of:

- Log-in to WebPAM PROe (below)
- Language Selection (page 25)
- Create a Disk Array (page 26)
- Additional Logical Drives (page 35)
- Log-out of WebPAM PROe (page 35)
- Internet Connection using WebPAM PROe (page 35)

Log-in to WebPAM PROe

1. Launch your Browser.
2. In the Browser address field, type in the IP address of the VTrak Management port.

Use the IP address you obtained in Step 7. Note that the IP address shown below is only an example. The IP address you type into your browser will be different.

Regular Connection

- WebPAM PROe uses an HTTP connection.http://
- Enter the VTrak’s Management Port IP address 192.168.10.87

Together, your entry looks like this:

http://192.168.10.87

Secure Connection

- WebPAM PROe uses a secure HTTP connection.https://
- Enter the VTrak’s Management Port IP address 192.168.10.87

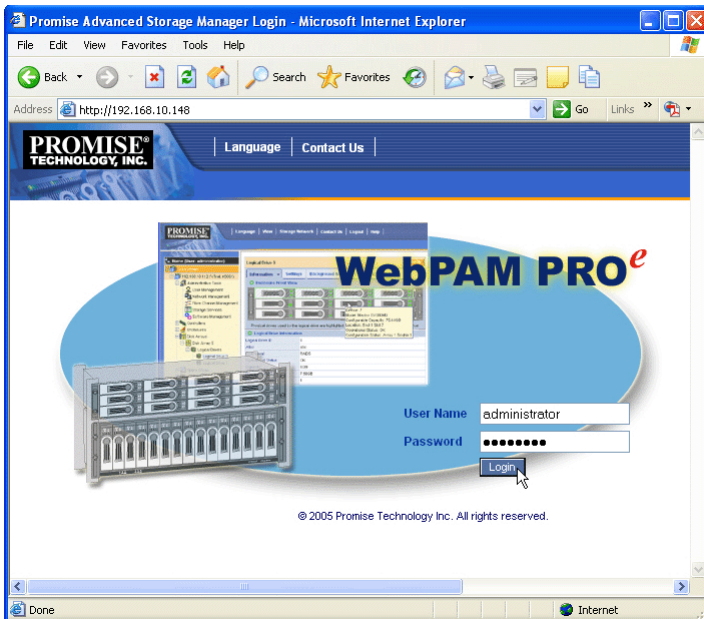
Together, your entry looks like this:

https://192.168.10.87



Note

Whether you select a regular or a secure connection, your login to WebPAM PROe and your user password are always secure.



3. When the opening screen appears, type **administrator** in the User Name field and type **password** in the Password field.
The User Name and Password are case sensitive.
4. Click the **Login** button.

After sign-in, the WebPAM PROe opening screen appears (next page). If there are any unconfigured physical drives in the enclosure, the Array Configuration menu will also appear (see page 26).



Important

As soon as possible, assign the Administrator's password. Make the change under User Management. Each user you create will have his/her own login ID and password.

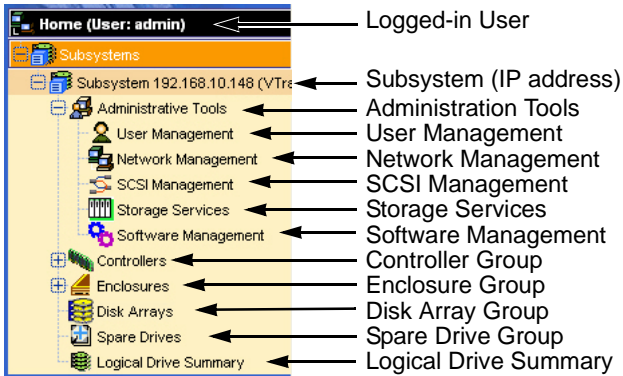


Note

Make a Bookmark (Netscape Navigator) or set a Favorite (Internet Explorer) of the Login Screen so you can access it easily next time.



The first time you log in to WebPAM, there will be no Users except for “administrator”. There will be no disk arrays or logical drives.



Use the Tree to navigate to the various functions of WebPAM PROe. Click on an item in the Tree to display it in the window.

Language Selection

WebPAM PROe displays in English, German, French, Italian, Japanese, Chinese Traditional, Chinese Simple and Korean. To set the display language:

1. Click on **Language** in the WebPAM PROe Header.


The language list appears in the Header.

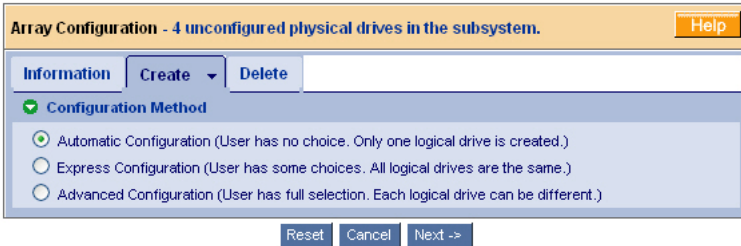
2. Click on the language you prefer.

The WebPAM PROe user interface will display in the selected language.

Note that online help is English only.

Create a Disk Array

Click on the Disk Arrays  icon. The Array Configuration menu appears. Since this VTrak is newly activated, there are no disk arrays or logical drives yet.

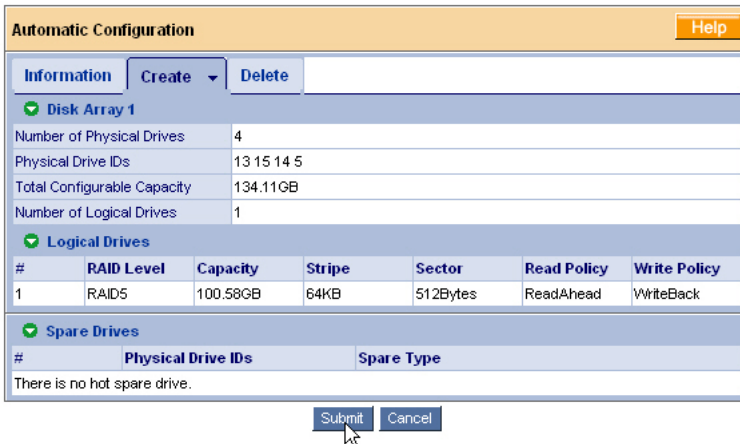


There are three options: *Automatic*, *Express* and *Advanced*. Select one and click the **Next** button. Or select one from the dropdown menu on the Create tab.

Automatic

The Disk Array Automatic Creation option enables you to create a new disk array following a default set of parameters. One logical drive will be made automatically when you create the disk array.

The number of unconfigured physical drives available will determine the RAID level of the disk array and whether a spare drive is created.



When you choose the Automatic option, the following parameters display:

- Disk Arrays – The number of physical drives in the disk array, their ID numbers, configurable capacity and the number of logical drives to be created
- Logical Drives – The ID number of the logical drive(s), their RAID level, capacity and stripe size
- Spare Drives – The physical drive ID number of the dedicated hot spare assigned to this disk array

If you accept these parameters, click the **Submit** button. The new disk array appears in the Disk Array List on the Information tab.

If you do NOT accept these parameters, use the Express (below) or Advanced (page 29) option to create your disk array.

Express

The Disk Array Express Creation option enables you to choose the parameters for a new disk array by specifying the characteristics you want. With this method, you can create multiple logical drives at the same time you create your disk array. However, all of the logical drives will be the same size and RAID level.

If you prefer to specify the parameters directly, use the Advanced option to create your disk array.

If you are uncertain about choosing parameters for your disk array, use the Automatic option.

Express Configuration
Help

Information
Create ▾
Delete

Express Configuration

Redundancy	<input type="checkbox"/>
Capacity	<input checked="" type="checkbox"/>
Performance	<input checked="" type="checkbox"/>
Spare Drive	<input type="checkbox"/>
Number of Logical Drives	<input style="width: 80px;" type="text" value="1"/> Max: 32
Application Type	<div style="border: 1px solid #ccc; padding: 2px; display: flex; align-items: center;"> File Server ▾ </div>
Automatic Update	<input checked="" type="checkbox"/> Update

Disk Array 1

Number of Physical Drives	4
Physical Drive IDs	13 15 14 5
Total Configurable Capacity	134.11GB
Number of Logical Drives	1

Logical Drives

#	RAID Level	Capacity	Stripe	Sector	Read Policy	Write Policy
1	RAID0	134.11GB	64KB	512Bytes	ReadAhead	WriteBack

Spare Drives

#	Physical Drive IDs	Spare Type
There is no hot spare drive.		

Submit
Cancel

Follow these steps to create a new disk array.

1. Check the boxes to select any one or a combination of:
 - Redundancy – The array will remain available if a physical drive fails
 - Capacity – The greatest possible amount of data capacity
 - Performance – The highest possible read/write speed
 - Spare Drive – A hot spare drive

2. In the Number of Logical Drives field, enter the number of logical drives you want to make from this disk array.
 The maximum possible number of logical drives appears to the right of this field.

3. From the Application Type menu, select an application that best describes your intended use for this disk array:
 - File Server
 - Video Stream
 - Transaction Data

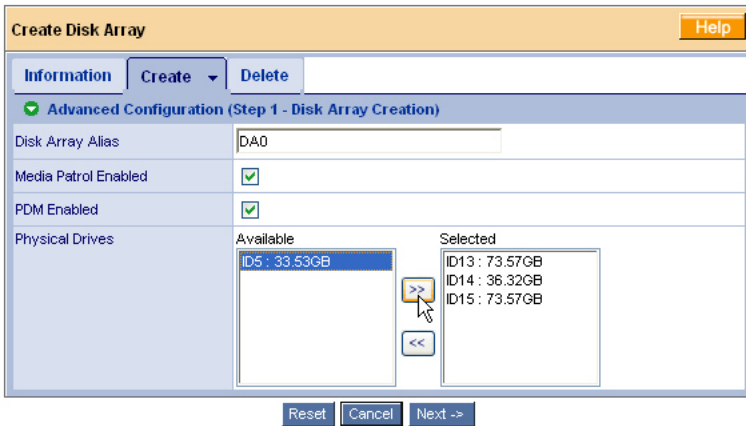
- Transaction Log
 - Other
4. Click the **Update** button.
Or check the Automatic Update box and updates will occur automatically.
The following parameters display:
- Disk Arrays – The number of physical drives in the disk array, their ID numbers, configurable capacity and the number of logical drives to be created
 - Logical Drives – The ID number of the logical drive(s), their RAID level, capacity and stripe size
 - Spare Drives – The physical drive ID number of the dedicated hot spare assigned to this disk array
- If you accept these parameters, proceed to the next step.
If you do NOT accept these parameters, review and modify your selections in the previous steps.
5. When you are done, click the **Submit** button.
The new disk array appears in the Disk Array List on the Information tab.

Advanced

The Disk Array Advanced Creation option enables you to directly specify all parameters for a new disk array. If you select less than the total available capacity for the first logical drive, you can use the remaining space to create additional logical drives.

For an explanation of the choices you will make while using the Advanced option to create your disk array, see “Chapter 7: Technology Background” on page 179.

If you are uncertain about choosing parameters for your disk array, use the Express or Automatic option to create your disk array.



To create a new disk array:

1. Enter a name for the disk array in the field provided.
2. Check the box to enable the following features.
 - Media Patrol – A routine maintenance procedure that checks the magnetic media on each disk drive. Media Patrol is concerned with the condition of the media itself, not the data recorded on the media.
 - PDM – Predictive Data Migration (PDM) scans the bad sector remapping table of the disk drives assigned to a logical drive. When the table fills to a specified percentage of its capacity, PDM triggers a migration of data from the suspect drive (the disk drive with the bad sectors) to a spare disk drive.
3. Highlight physical drives you want in the disk array from the Available list and press the >> button to move them to the Selected list.
You can also double-click them to move them.
4. When you are done, click the **Next** button.

Create Disk Array
Help

Information
Create ▾
Delete

✓ **Advanced Configuration (Step 2 - Logical Drive Creation)**

Alias	<input type="text" value="LD0"/>		
RAID Level	RAID0 ▾		
Capacity	<input type="text" value="50"/>	GB ▾	Maximum: 108.96GB
Stripe	64KB ▾		
Sector	512Bytes ▾		
Read Policy	ReadAhead ▾		
Write Policy	WriteBack ▾		

Update
Delete

✓ **Capacity Usage**

Logical Drive Entered
 Free Capacity

✓ **New Logical Drives**

#	Alias	RAID Level	Capacity	Stripe	Sector	Read Policy	Write Policy
There is no new logical drive.							

<- Back
Cancel

On this screen you will specify your logical drives. Specify one logical drive at a time until the full capacity of the disk array is allocated.

5. Enter an Alias (name) for the first logical drive.
6. Choose a RAID level from the dropdown menu.
The choice of RAID levels depends on the number of physical drives you selected.
7. Specify a Capacity and the unit of measure (MB, GB, TB).
This value will be the data capacity of the logical drive. If you specify less than disk array's maximum capacity, the remainder is available for additional logical drives.
8. Specify a Stripe size from the dropdown menu.
8, 16, 32, 64, 128, 256, 512 KB, and 1 MB are available. 64 KB is the default.
9. Specify a Sector size from the dropdown menu.
512 Bytes, 1, 2, and 4 KB are available. 512 Bytes is the default.

10. Choose a Read Cache policy:
 - ReadCache
 - ReadAhead
 - No Cache
11. Choose a Write Cache policy:
 - WriteThru
 - WriteBack
12. Click the **Update** button.

The screenshot shows the 'Create Disk Array' window with the 'Advanced Configuration (Step 2 - Logical Drive Creation)' section active. The configuration is as follows:

Alias	LD1
RAID Level	RAID0
Capacity	50 GB (Maximum: 58.96GB)
Stripe	64KB
Sector	512Bytes
Read Policy	ReadAhead
Write Policy	WriteBack

Below the configuration fields are 'Update' and 'Delete' buttons. The 'Update' button is highlighted with a mouse cursor.

The 'Capacity Usage' section shows a progress bar for logical drive 1, with 'Logical Drive Entered' checked and 'Free Capacity' unchecked.

The 'New Logical Drives' table is updated with the following entry:

#	Alias	RAID Level	Capacity	Stripe	Sector	Read Policy	Write Policy
1	LD0	RAID0	50GB	64KB	512Bytes	ReadAhead	WriteBack

At the bottom of the window are navigation buttons: '<- Back', 'Cancel', and 'Next ->'.

When you click the **Update** button, WebPAM PROe sets up one logical drive and adds it to the New Logical Drive lists at the bottom of the window. To create another logical drive, repeat steps 5 through 12, above.

Create Disk Array
Help

Information
Create ▾
Delete

✔ **Advanced Configuration (Step 2 - Logical Drive Creation)**

Alias	<input type="text" value="LD1"/>		
RAID Level	<input type="text" value="RAID0"/>		
Capacity	<input type="text" value="50"/>	<input type="text" value="GB"/>	Maximum: 58.96GB
Stripe	<input type="text" value="64KB"/>		
Sector	<input type="text" value="512Bytes"/>		
Read Policy	<input type="text" value="ReadAhead"/>		
Write Policy	<input type="text" value="WriteBack"/>		

Update
Delete

✔ **Capacity Usage**

1
2

Logical Drive Entered
 Free Capacity

✔ **New Logical Drives**

#	Alias	RAID Level	Capacity	Stripe	Sector	Read Policy	Write Policy
1	LD0	RAID0	50GB	64KB	512Bytes	ReadAhead	WriteBack
2	LD1	RAID0	50GB	64KB	512Bytes	ReadAhead	WriteBack

← Back
Cancel
Next →

If you want to change a logical drive setting, click on the logical drive at the bottom of the window. The entry and the capacity usage are highlighted. Make your changes to the parameters and click the **Update** button.

Create Disk Array Help

Information **Create** Delete

Advanced Configuration (Step 2 - Logical Drive Creation)

Alias: LD3

RAID Level: RAID0

Capacity: 8.96 GB Maximum: 8.96GB

Stripe: 64KB

Sector: 512Bytes

Read Policy: ReadAhead

Write Policy: WriteBack

Update Delete

Capacity Usage

1 2 3

Logical Drive Entered Free Capacity

New Logical Drives

#	Alias	RAID Level	Capacity	Stripe	Sector	Read Policy	Write Policy
1	LD0	RAID0	50GB	64KB	512Bytes	ReadAhead	WriteBack
2	LD1	RAID0	25GB	64KB	512Bytes	ReadAhead	WriteBack
3	LD2	RAID0	25GB	64KB	512Bytes	ReadAhead	WriteBack

<- Back Cancel **Next ->**

13. When you have finished specifying logical drives, click the **Next** button.

Create Disk Array Help

Information **Create** Delete

Advanced Configuration (Step 3 - Summary)

Disk Array Alias: DA0

Number of Physical Drives: 3

Physical Drive IDs: 13 14 15

Configurable Capacity: 108.96GB

Free Capacity: 8.96GB

Media Patrol: Enabled

PDM: Enabled

New Logical Drives

#	Alias	RAID Level	Capacity	Stripe	Sector	Read Policy	Write Policy
1	LD0	RAID0	50GB	64KB	512Bytes	ReadAhead	WriteBack
2	LD1	RAID0	25GB	64KB	512Bytes	ReadAhead	WriteBack
3	LD2	RAID0	25GB	64KB	512Bytes	ReadAhead	WriteBack


<- Back **Submit** Cancel


The proposed disk array appears with the logical drive(s) you specified.

14. If you agree with the proposed disk array and logical drive(s), click the **Submit** button.

If you disagree, click the **Back** button and make changes as needed.

Additional Logical Drives

If you want to create additional logical drives and there is unused space on the current disk array, click on the Disk Array  icon and click on the Create LD tab. You will go to Disk Array Advanced Creation (see page 29).

If the current disk array is fully allocated, use additional physical drives to create a new disk array. Click on the Disk Arrays  icon, then select Automatic, Express or Advanced from the Create tab dropdown menu (see page 26).

Log-out of WebPAM PROe

There are two ways to log out of WebPAM PROe:

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



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

Internet Connection using WebPAM PROe

The above instructions cover connections between VTrak and your company network. It is also possible to connect to a VTrak from the Internet.

Your MIS Administrator can tell you how to access your network from outside the firewall. Once you are logged onto the network, you can access the VTrak using its IP address.

While only a SCSI-capable PC can read and write data to the logical drives on the VTrak, other PCs can monitor the VTrak from virtually any location.

Chapter 4: Management with WebPAM PROe

- VTrak Status Indicators (below)
- Drive Status Indicators (page 39)
- Audible Alarm (page 39)
- Log-in/Log-out (page 40)
- Graphic User Interface (page 43)
- Subsystems (page 47)
- Administrative Tools (page 54)
- Controllers (page 77)
- Enclosures (page 81)
- Physical Drives (page 86)
- Disk Arrays (page 91)
- Logical Drives (page 104)
- Spare Drives (page 112)

This chapter describes using embedded WebPAM PROe to monitor and manage your RAID system. This chapter is divided into sections for major WebPAM PROe components as shown above.

VTrak Status Indicators

Even though WebPAM PROe offers comprehensive monitoring of VTrak, the LED indicators on the VTrak unit provide important status information.

When the power is switched on, the LEDs on the front of the VTrak will light up.

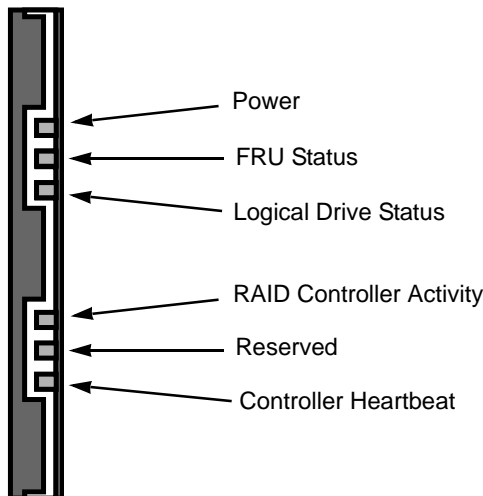


Figure 1. VTrak M310p/M210p front panel LED display

When boot-up is finished and the VTrak is functioning normally:

- Controller Heartbeat LED blinks green seven times in three seconds, goes dark for six seconds, then repeats the blink pattern.
- Power, FRU and Logical Drive LEDs display green continuously.
- The RAID Controller LED flashes green if there is activity on the controller.

See the table below.

LEDs	State				
	Dark	Steady Green	Flashing Green	Amber	Red
Power	System Off	Normal			
FRU*	System Off	Normal		Fan, battery or PSU Problem	Fan, battery or PSU Failed
Logical Drive	System Off	Normal		Logical Drive Critical	Logical Drive Offline
Controller Activity	No Activity		Activity		
Controller Heartbeat	System Off		Normal**		
* Field Replacement Unit: includes fan, battery and power supply unit (PSU). ** Blinks green seven times in three seconds, goes dark for six seconds, then repeats the blink pattern.					

See page 167 for more information about field-replaceable components.

See page 228 for a discussion of critical and offline logical drives.

Drive Status Indicators

There are two LEDs on each Drive Carrier. They report the presence of power and a disk drive, and the current condition of the drive.

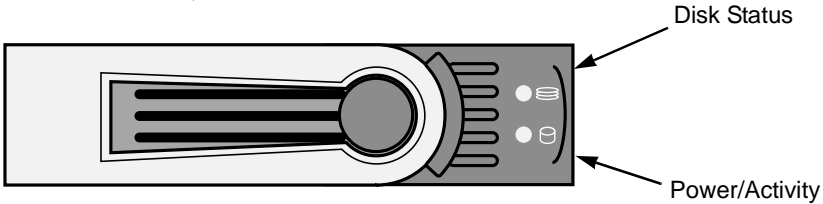


Figure 2. VTrak M310p/M210p disk carrier LEDs

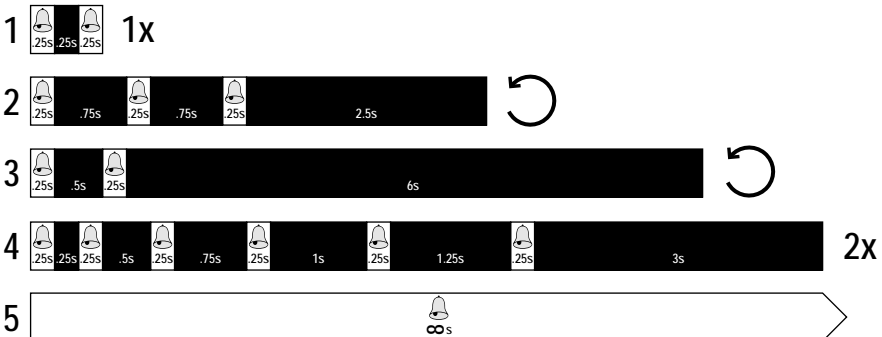
The VTrak spins up the disk drives sequentially in order to equalize power draw during start-up. After a few moments the Power/Activity and Disk Status LEDs should display green.

LEDs	State				
	Dark	Steady Green	Flashing Green	Amber	Red
Power/Activity	No Drive	Drive Present	Activity		
Status	No Power/No Drive	Drive OK		Drive Rebuilding	Drive Error

See “Critical & Offline Disk Arrays” on page 228 for a discussion of rebuilding and failed disk drives.

Audible Alarm

VTrak’s alarm has five different patterns, as shown below.



When you first power-up the VTrak, it beeps twice to show normal operation. The audible alarm sounds at other times to inform you that the VTrak needs attention. But the alarm does not specify the condition. When the alarm sounds:

- Check the front and back of VTrak for red or amber LEDs, as described above.
- If email notification is enabled, check for new messages.
- Check for yellow !s 🟡 red Xs 🔴 in Tree View (see page 46).
- Check the event log (see page 49).

When a continuous tone sounds, there are multiple alarm patterns sounding at the same time.

See “Chapter 8: Troubleshooting” on page 203 for diagnostic help.

To make alarm settings, see “Buzzer” on page 85.

Log-in/Log-out

Log-in to WebPAM PROe

1. Launch your Browser.
2. In the Browser address field, type in the IP address of the VTrak Management port. See “Chapter 3: Setup” on page 17.

Note that the IP address shown below is only an example. The IP address you type into your browser will be different.

Regular Connection

- WebPAM PROe uses an HTTP connection.http://
- Enter the VTrak’s Management Port IP address . . . 192.168.10.148

Together, your entry looks like this:

http://192.168.10.148

Secure Connection

- WebPAM PROe uses a secure HTTP connection.https://
- Enter the VTrak’s Management Port IP address . . . 192.168.10.148

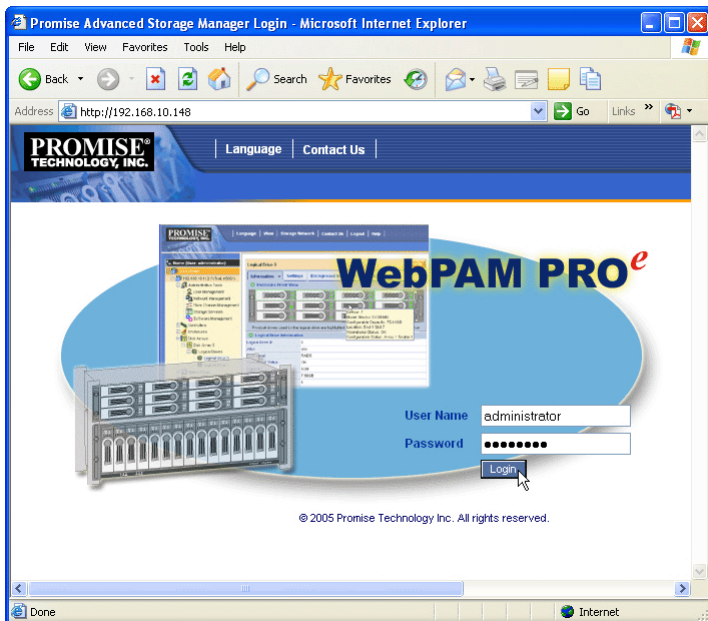
Together, your entry looks like this:

https://192.168.10.148



Note

Whether you select a regular or a secure connection, your login to WebPAM PROe and your user password are always secure.



.When the opening screen appears, type **administrator** in the User Name field and type **password** in the Password field.

The User Name and Password are case sensitive.

3. Click the **Login** button.

After sign-in, the WebPAM PROe opening screen appears.

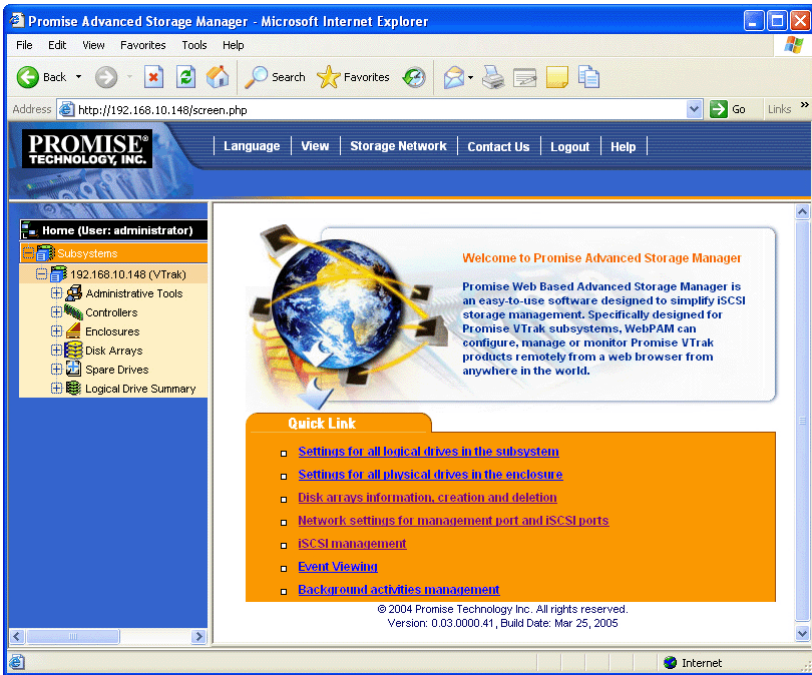


Figure 4. WebPAM PROe Opening Screen

The first time you log in to WebPAM PROe, there will be no Users except for “administrator”. There will be no disk arrays or logical drives.

If you setup your VTrak using WebPAM PROe (see “Chapter 3: Setup” on page 17) you will have one User, “administrator” and one disk array and logical drive.

Log-out of WebPAM PROe

There are two ways to log out of WebPAM PROe:

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



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

Graphic User Interface

- Header (page 44)
- Tree View (page 46)
- Management Window (page 47)
- Event Frame (page 47)

VTrak features a browser-based, graphic user interface. Your Internet browser is the basic component to access VTrak from your PC.

The screenshot shows the Promise WebPAM PROe interface in Microsoft Internet Explorer. The browser address bar shows the URL `http://192.168.1.201/screen.php`. The interface includes a navigation menu with links for Language, View, Storage Network, Contact Us, Logout, and Help. A left-hand navigation pane (Tree View) shows a directory structure under 'Subsystems' including Administrative Tools, Controllers, Enclosures, Disk Arrays (with 'Disk Array 0' selected), Logical Drives, Spare Drives, and Logical Drive Summary. The main content area (Management Window) displays 'Disk Array 0' with tabs for Information, Settings, Create LD, Delete LD, Background Activity, and Transport. It features an 'Enclosure Front View' diagram and a 'Disk Array Information' table:

Disk Array Information	
Disk Array ID	0
Alias	Sammy
Operational Status	OK
Total Physical Capacity	372.65GB
Configurable Capacity	
Free Capacity	
Max Contiguous Free Capacity	351.21GB
Media Patrol	Enabled

Below the table is an 'Event Frame' showing a log of events:

#	Device	Event ID	Severity	Time	Description
19	LD 0	0x00120000	Info	May 19, 2006 16:17:08	Synchronization is started
18	LD 0	0x00090000	Info	May 19, 2006 16:17:08	A new Logical drive has been created
17	DA 0	0x00130000	Info	May 19, 2006 16:17:08	New disk array has been created
16	PD 8	0x000D0000	Info	May 19, 2006 16:17:07	Physical Disk is marked online
15	PD 7	0x000D0000	Info	May 19, 2006 16:17:07	Physical Disk is marked online

There are four major parts to the graphic user interface:

Item	Function
Header	Enables you to make a language selection, show or hide the event frame, show or hide network storage subsystems, display contact information, log out, and display the Help directory.
Tree View	Navigates around all components of the Subsystem, including SCSI management, network and service management, RAID controller, enclosure, physical drives, disk arrays, logical drives, and spare drives.
Management Window	Provides status and user selections, enables creation, maintenance, deletion, and monitoring of disk arrays and logical drives. Function Tabs control specific actions and processes.
Event Frame	Displays recent events. Click on View in the Header to hide or display this feature.

Header

Language Selection

The VTrak graphic user interface displays in English, German, French, Italian, Japanese, Chinese Traditional, Chinese Simple, and Korean.

To change languages:

1. Click on **Language** in the Header.
The list of available languages appears.
2. Click on the language you prefer.
The VTrak user interface will display in the selected language.

View

The VTrak graphic user interface can currently display in Event Frame along with the Tree View and Management View.

The Event Frame displays the current Runtime Events for this subsystem. To view the Event Frame:

1. Click on **View** in the Header.
2. Click on the Show Event Frame popup option.
The VTrak user interface will display the Event Frame below the Management Window.

3. Click **View** again to hide the Event Frame.

Storage Network

The VTrak graphic user interface can currently display in Storage Network in the Tree View. The Storage Network consists of all the VTrak subsystem enclosures currently accessible on the network.

When you log into a VTrak, that VTrak subsystem is the only one to display in the Subsystems list. To view the Storage Network:

1. Click on **Storage Network** in the Header.
2. Click on the *Show Network Subsystems* popup option.
The VTrak user interface will display the Network Subsystems at the top of the Tree.
3. Click **Storage Network** again to hide the Network Subsystems.

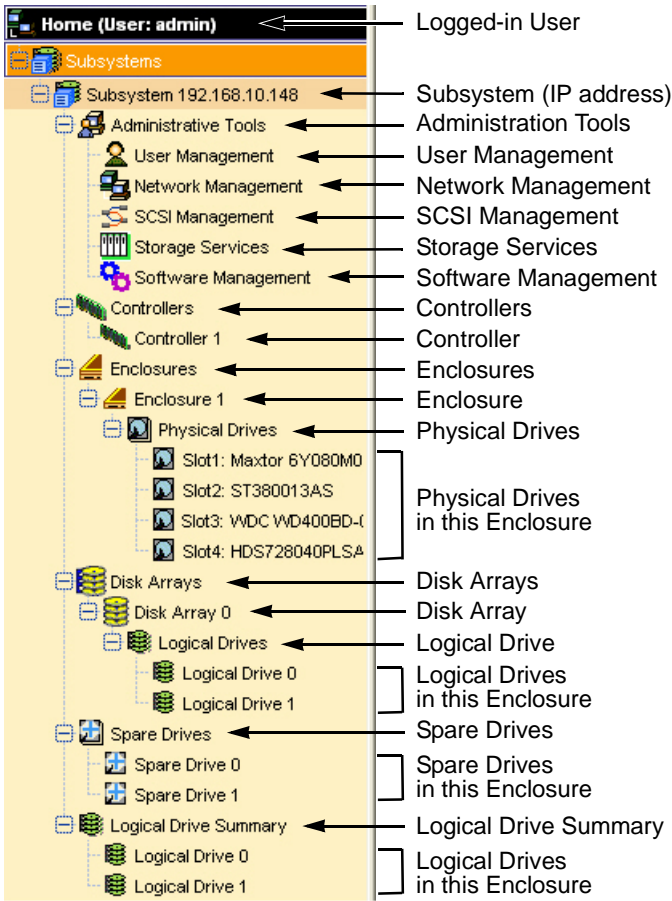
Contact Us

Click on **Contact Us** in the Header for a list of contact information for Promise Technology, including Technical Support.

Contact information is also included in this manual. See “Contact Technical Support” on page 239.

Tree View

Below are the components of Tree View.



The Administrative Tools section is different for the Super User than for other users. The remainder of the Tree is the same for all users.

The Management Window displays information according to the item you select in Tree View.


Management Window

The Management Window provides the actual user interface with the VTrak. This window changes depending on which item you select in Tree View and which tab you select in the Management Window itself.


Event Frame

To display the Event Frame, click on View in the Header, then click on Show Event Frame. Events are listed and sorted by:

- Number – A consecutive decimal number assigned to a specific event
- Device – Battery, controller, logical drive, physical drive, port, etc.
- Event ID – The hexadecimal number that identifies the specific type of event
- Severity – Information, Warning, Minor, Major, Critical, and Fatal. The severity level is user-specified. See “User Event Subscription” on page 56.
- Time – Time and date of the occurrence
- Description – A brief description of the event

Click on the Subsystems  icon and Events tab for event settings.

Subsystems

The Subsystems–Information tab lists all related subsystems. There are no user settings on this tab. To access the Subsystems–Information tab, click on the Subsystems  icon in Tree View.

Each individual subsystem is identified in the Tree by its Management Port IP address.


To see all of the VTrak subsystems on your network:

1. Move your cursor over Storage Network in the Header.
A “Show Network Subsystems” message will appear.
2. Click on the “Show Network Subsystems” message to display the subsystems.
The list will show all subsystems on the network at the time the GUI was launched.
3. To update the list, click the Discover button at the bottom of the list.

To log into any of the displayed VTrak subsystems:

1. In Tree View, click on the Subsystem icon of the subsystem you want to see.
If your user name and password do not match the subsystem you are logging into, the log in screen will appear.
2. Log in to the new subsystem, as needed.

Subsystem

VTrak subsystems are identified in the Tree by their Management Port IP address. Click on the Subsystem  icon in Tree View, then on the individual tabs in Management View to access the functions.

Subsystem Information

The Subsystem–Information tab provides information about a specific subsystem.

To set an alias for this subsystem, click the Settings tab.

To review the event log, click the Event tab.


To review settings for Rebuild, Auto Rebuild, Synchronization, Initialization, Redundancy Check, Migration, PDM, Transition, and Media Patrol, click the Background Activities tab.

To review the schedules for Media Patrol, Redundancy Check, Battery Recondition, and Spare Check, click the Scheduler tab.

Subsystem Settings

The Subsystem–Settings tab enables you to assign an alias (name) to a specific subsystem.


To set an alias for this subsystem:

1. Click on the Subsystem  icon in Tree View.
2. Click on the Settings tab in Management View.
3. Enter a name into the Alias field.

Maximum of 48 characters. Use letters, numbers, space between words, and underscore. An alias is optional.

4. Click the **Submit** button.

To set a Date and Time for this subsystem:

1. Click on the Subsystem  icon in Tree View.
2. In Management View, click on the Settings tab dropdown menu and select *Date and Time* Settings.
3. Under Subsystem Date, select the Month and Day from the dropdown menus.
4. Type the current year into the Year field.
5. Under Subsystem Time, select the Hour, Minutes, and Seconds from the dropdown menus.
6. Click the **Submit** button.

Subsystem Events


The Subsystem–Event tab provides information from the event (log) file of a specific subsystem.

Events are listed and sorted by:

- Number – A consecutive decimal number assigned to a specific event
- Device – Battery, controller, logical drive, physical drive, port, etc.
- Event ID – The hexadecimal number that identifies the specific type of event
- Severity – Information, Warning, Minor, Major, Critical, and Fatal. The severity level is user-specified. See “User Event Subscription” on page 56.
- Time – Time and date of the occurrence
- Description – A brief description of the event

View Events

To view the event log for this subsystem:

1. Click on the Subsystem  icon Tree View.
2. Click on the Event tab in Management View.
3. From the Event tab dropdown menu, select *Runtime Events* or *Subsystem Events in NVRAM*.


Runtime Events displays a list of and information about the 1023 most recent runtime events recorded since the system was started.

Subsystem Events in NVRAM displays a list of and information about 63 most recent important events. NVRAM events are stored in non-volatile memory.

4. Click on the headings to sort the events.


Clear Events

To clear the event file for this subsystem:

1. Click on the Subsystem  icon Tree View.
2. Click on the Event tab in Management View.
3. Click on the **Clear Event Log** button.
4. In the Confirmation dialog box, type the word **confirm** then click the **OK** button.

Save Events

To save the event file for this subsystem in a tab-delineated text file:

1. Click on the Subsystem  icon in Tree View.
2. Click on the Event tab in Management View.
3. Click on the Save Event Log button.

4. In the File Download Security Warning box, click the **Save** button.
5. In the Save As dialog box, navigate to the directory where you want to save the event file.
6. Enter a name for the event file (“eventlog” is the default file name).
7. Click the **Save** button.


Background Activities

The Subsystem–Background Activities tab provides information about functions that runs in the background on your subsystem:

- Disk Array Rebuilding. See “Disk Array Rebuild” on page 101
- Disk Array Synchronization. See “Logical Drive Synchronization” on page 109
- Logical Drive Initialization. See “Logical Drive Initialization” on page 108
- Disk Array Migration. See “Disk Array Migration” on page 100
- Disk Array Transition. See “Transition” on page 103
- Logical Drive Redundancy Check. See “Logical Drive Redundancy Check” on page 109
- Predictive Data Migration (PDM). See “Logical Drive PDM” on page 110
- Error and Reassigned Block Thresholds (to trigger PDM. See Change Background Settings, below)
- Media Patrol. See “Physical Drive Media Patrol” on page 91


Start Background Function

To start a background function:

1. Click on the Subsystem  icon in Tree View.
2. Click the Background Activities tab in Management View.
3. From the dropdown menu on the Background Activities tab, choose the function you want to start.

Change Background Settings

To change the current settings:

1. Click on the Subsystem  icon in Tree View.
2. Click the Background Activities tab in Management View.
3. From the dropdown menu on the Background Activities tab, choose *Settings*.
4. Click on the dropdown menu for the function you want to set and select a rate: Low, Medium or High.
 - Low allocates fewer system resources to the function and more to data read/write operations.

- Medium allocates a balance of system resources to the function and data read/write operations.
 - High allocates more system resources to the function and fewer to data read/write operations.
5. Set the Reassigned Block threshold.
When an error occurs in a physical drive, the directions to the block containing error are reassigned. When the number of reassigned blocks exceeds the threshold, PDM is triggered.
 6. Set the Error Block threshold.
When an error occurs in the data or the physical media in a disk drive, the block is marked and added to the block error count. When the number of error blocks exceeds the threshold, PDM is triggered.
 7. Check the boxes to enable Media Patrol.
For more information, see “Media Patrol” on page 198.
 8. Check the boxes to enable Auto Rebuild.
Auto Rebuild enables rebuilding of a disk array when a suitable hot spare drive is available. For more information, see “Hot Spare Drive(s)” on page 194.
 9. When you are done, click the **Submit** button.

Scheduler


The Subsystem–Scheduler tab enables you to view and assign scheduled background activities on a specific subsystem.

Scheduled activities include:

- Media Patrol. See “Physical Drive Media Patrol” on page 91
- Redundancy Check. See “Logical Drive Redundancy Check” on page 109
- Battery Reconditioning. See “Battery Recondition” on page 84
- Spare Drive Check. See “Spare Check – All Spare Drives” on page 114


View Scheduled Activities

To view scheduled activities for this subsystem:

1. Click on the Subsystem  icon Tree View.
2. Click on the Scheduler tab in Management View.

Schedule an Activity

To set a scheduled activity for this subsystem:

1. Click on the Subsystem  icon Tree View.
2. Click on the Scheduler tab in Management View.

3. Click on the Scheduler tab dropdown menu and select an item (see the list above).
4. In the Scheduler dialog box, check the Enable This Schedule box.
5. Select a start time (24-hour clock).
6. Select a Recurrence Pattern.
 - Daily – Enter the number of days between events.
 - Weekly – Enter the number of weeks between events and select which days of the week.
 - Monthly – Select a calendar day of the month (1 – 31).

If you select a higher number than there are days in the current month, the actual start date will occur at the beginning of the following month.

Or, select a day of the week and select the first, second, third, fourth, or last occurrence of that day in the month.

Then, select the months in which you want the activity to occur.

7. Select a Range of Occurrence.
 - Start-from date. The default is today's date.
 - End-on date.

Select No End Date (perpetual).

Or, select a number of occurrences for this activity.

Or, select a specific end date. The default is today's date.

8. For Redundancy Check only, select either or both of the Auto Fix and Pause on Error options.
9. For Redundant Logical Drives (all except RAID 0), check the boxes of the logical drives to which this activity will apply.




Note

You can schedule only ONE Redundancy Check for each logical drive.

10. Click the **Submit** button.

Delete an Activity

To delete a scheduled activity for this subsystem:

1. Click on the Subsystem  icon Tree View.
2. Click on the Scheduler tab in Management View.
3. Click on the Scheduler tab dropdown menu and select Delete Schedules.
4. Check the box to the left of the schedule you want to delete.

5. Click the **Submit** button.


Lock

The Subsystem–Lock tab displays lock status and enables you to lock or unlock a subsystem controller. The lock prevents other sessions (including by the same user) from making a configuration change to the controller until the lock expires or a forced unlock is done. When the user who locked the controller logs out, the lock is automatically released.

You can set the lock to last from one minute to one day. You can also release the lock before the scheduled time.

View Lock Status

To view the lock status for this subsystem:


1. Click on the Subsystem  icon Tree View.
2. Click on the Lock tab in Management View.

The following information is displayed:

- Lock Status – The User who set (owns) the current lock.
- Expiration Time – Amount of time left until the lock automatically releases.
- Expire At Time – The date and time when the lock will automatically release.


Set Lock

To set the lock for this subsystem:

1. Click on the Subsystem  icon Tree View.
2. Click on the Lock tab in Management View.
3. Click on the **Lock** option.
4. Enter a time interval between 1 and 1440 minutes (one day) that you want the lock to stay active.
5. Click the **Submit** button.

Renew Lock

To renew an existing lock for this subsystem:


1. Click on the Subsystem  icon Tree View.
2. Click on the Lock tab in Management View.
3. Click on the **Renew** option.
4. Enter a time interval between 1 and 1440 minutes (one day) that you want the lock to stay active.

The renew time replaces the previous Expiration Time.

5. Click the **Submit** button.

Release Lock

To release the lock for this subsystem:



1. Click on the Subsystem  icon Tree View.
2. Click on the Lock tab in Management View.

If you are the User who set the lock, click on the **Unlock** option.

If another User set the lock and you are a Super User, click on the **Unlock** option and check the **Force Unlock** box.

3. Click the **Submit** button.

Administrative Tools

The Administrative Tools screen is a set of links to individual functions. To access, click on the Subsystem  icon, then the Administrative Tools  icon in Tree View.




- User Management. See page 55
- Network Management. See page 61
- SCSI Management. See page 62
- Storage Services. See page 63
- SNMP Management. See page 69
- Web Server Setting. See page 66
- Email Setting. See page 64
- Telnet Setting. See page 67
- CIM Setting. See page 70
- Netsend. See page 71
- Export File. See page 73
- Import File. See page 73
- Firmware Update. See page 74
- Restore Factory Defaults. See page 75
- Clear Statistics. See page 75
- Shutdown. See page 76

User Management

User Management includes all functions dealing with user accounts.

User Information

The User Management–Information tab lists the user, his/her status, access privileges, display name, and email address. To access this tab:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the User Management  icon.

To add a user, log in as a Super User, then click the Create tab in Management View.




To delete a user, log in as a Super User, then click the Delete tab in Management View.

To access user settings, log in as a Super User, then click on a name link in the User list.

Each user can access his/her own settings.

User Settings – Administrator

The Administrator or a Super User can view and change the settings of other users. To change settings of other users:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the User Management  icon.
4. Click on the Information tab in Management View.
5. In the list of users, click on the link of the user whose settings you want to change.




The Settings screen for the selected user displays.

6. Enter or change the settings for this user.
 - Enable/disable this user
 - Display name
 - Email address
 - Privilege. See “List of User Privileges” on page 59
7. Click the **Submit** button.

The Administrator or Super User can change another user’s password. See “User Password – Administrator” on page 58 for more information.




User Settings – User

The User Management–Settings tab enables a user to view and change his/her display name and email address. To change user settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the User Management  icon.
4. Click on the Settings tab in Management View.
5. Enter or change the display name or mail address.
6. Click the **Submit** button.

User Event Subscription

The User Management–Event Subscription tab enables a user to enable event notification, specify events of interest, and assign the levels of severity to be reported. To make these changes:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the User Management  icon.
4. Click on the Event Subscription tab in Management View.
5. Check the box to enable event notification.
6. Under the subheadings, select the lowest level of Severity to be reported for each event. The selected level plus all higher levels of Severity will be reported.
 - Information – Information only, no action is required
 - Warning – User can decide whether or not action is required
 - Minor – Action is needed but the condition is not a serious at this time
 - Major – Action is needed now
 - Critical – Action is needed now and the implications of the condition are serious
 - Fatal – Non-Recoverable error or failure has occurred
 - None – Deactivates this event for notification purposes
7. Click the Submit button.

To change the email address for this user, click the Settings tab.

To make email settings, click on the Administrative Tools icon, then click the Email Setting link in the Management Window.

To send a test message to the email address in the listed under General Info, click the **Test Email** button.




For VTrak's Email settings, see "Email" on page 64.

List of User Notification Events

- Shortcuts
 - Enclosure – All items under Enclosure have the same Severity level
 - RAID Core – All items under RAID Core have the same Severity level
 - Host Interface – All items under Host Interface have the same Severity level
 - Drive Interface – All items under Drive Interface have the same Severity level
- Enclosure
 - Battery
 - Battery Backup Unit (BBU)
 - Blower (cooling unit fan)
 - Cooling Unit
 - Power Supply Unit (PSU)
- RAID Core
 - Controller
 - Disk Array
 - Initialization
 - Disk Data Format (DDF) Record of array information on the disk drives
 - Media Patrol
 - Online Capacity Expansion
 - Physical Disk
 - RAID Level Migration
 - Rebuild
 - Redundancy Check
 - SMART
 - Synchronization
 - Subsystem
 - Predictive Data Migration (PDM)
 - Spare Check
- Host Interface
 - Host Interface Controller
- Drive Interface
 - Drive Interface Controller

User Password – Administrator

The Administrator or a Super User can change another user's password. To make these changes:




1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the User Management  icon.
4. In the list of users, click on the link of the user whose settings you want to change.

The Settings screen for the selected user displays.

5. Click on the Password tab in Management View.
6. Enter the new password in the New Password field.
7. Enter the new password in the Retype Password field.
8. Click the **Submit** button.




User Password – Users

The User Management–Password tab enables a user to change his/her password or to add a password if none was previously assigned. To change your own password:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the User Management  icon.
4. Click on the Password tab in Management View.
5. Enter the current password in the Old Password field.
If you do not have a password, leave this field blank.
6. Enter the new password in the New Password field.
7. Enter the new password in the Retype Password field.
8. Click the **Submit** button.

Create a User

The User Management–Create tab enables a Super User to create other users. To create a user:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the User Management  icon.
4. Click on the Create tab in Management View.
5. Enter a user name in the User Name field.

6. Enter a password for this user in the New Password and Retype Password fields.
A password is optional. If you do not assign password, tell this user to leave the password field blank when he/she logs into to WebPAM PROe. The user can create his/her own password, see “User Password – Users” on page 58.
7. Check the Enabled box to enable this user on this subsystem.
8. Enter a display name in the Display Name field.
A display name is optional but recommended.
9. Enter the user's email address in the Email Address field.
An email address is optional but recommended.
10. Select a privilege level from the Privilege dropdown menu.
For definitions of each privilege level, see the List of User Privileges below.
11. Click the **Submit** button.

List of User Privileges

- View – Allows the user to see all status and settings but not to make any changes
- Maintenance – Allows the user to perform maintenance tasks including Rebuilding, PDM, Media Patrol, and Redundancy Check
- Power – Allows the user to create (but not delete) disk arrays and logical drives, change RAID levels, change stripe size; change settings of components such as disk arrays, logical drives, physical drives, and the controller.
- Super – Allows the user full access to all functions including create and delete users and changing the settings of other users, and delete disk arrays and logical drives. The default “administrator” account is a Super User.






Note

Each user can select his/her password under the User Management–Password tab. The use of passwords for other users is optional

Delete a User

The User Management–Delete tab enables a Super User to delete other users. To delete a user:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the User Management  icon.

4. Click on the Delete tab in Management View.
5. Check the box to the left of the user you want to delete.
6. Click the **Submit** button.
7. Click **OK** in the confirmation box.



Note




There will always be at least one Super User account.
A Super User cannot delete his/her own account.

User Sessions




The User Management–Session tab enables you to see all of the current sessions on this subsystem, including Telnet sessions:

- User name
- Privilege level
- Application Interface (WWW, RS-232 or Telnet)
- Log-in date and time
- API Inactivity (time in seconds since the last activity)

To view the current sessions:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the User Management  icon.
4. Click on the Sessions tab in Management View.

A Super User can logout other users:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the User Management  icon.
4. Click on the Sessions tab in Management View.
5. Check the box to the left of the user you want to log out.
6. Click the **Logout** button.
7. Click **OK** in the confirmation box.

Network Management




Network Management deals with network connections to the VTrak's Management Port.

Management Port

The Network Management–Ethernet tab enables you to see the current Management Port settings on the Controller, including:

- Controller ID
- Maximum number of ports supported
- Number of ports present
- Number of failed ports
- Port ID
- Port status (enabled or disabled)
- Link status (up or down)
- IP type
- DHCP status (enabled or disabled)
- Primary IP address
- Primary subnet mask
- Default gateway IP address
- Automatic Domain Name Service (DNS) through DHCP (yes or no)
- Primary DNS server IP address
- Primary MAC address
- Maximum speed supported by this connection

To make changes to the Management Port settings:




1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Network Management  icon.
4. Click the Port 1 link in Management View.
5. To enable DHCP, check the DHCP box.

When DHCP is NOT enabled, enter:

- Primary IP address
 - Primary subnet mask
 - Default gateway IP address
 - Enter a primary DNS server IP address.
6. Click the Submit button.

SCSI Management

SCSI Channel Information




1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the SCSI Management  icon.

The Channel tab displays SCSI Channel Information:

- Maximum Data Transfer Rate
- Termination Status
- List of currently enabled targets

To see Target information, click the Target tab.

SCSI Channel Settings

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the SCSI Management  icon.

The Channel tab displays SCSI Channel Information:

4. Click on the Channel 1 or the Channel 2 link.

The settings screen displays a list of the 16 Targets and Termination for the selected SCSI channel.

To enable a SCSI target:

1. Check (click on) the TID box beside the target you want to enable.
Checked means enabled, unchecked means disabled.
2. Click the **Submit** button.



Note

You must restart the VTrak for new settings to become effective. See "Shutdown and Restart" on page 76.

To set Termination for the VTrak SCSI controller "Out" connectors:




1. From the Termination dropdown menu, select Automatic, ON or OFF.
Automatic means the termination function will set itself automatically.
2. Click the **Submit** button.



Cautions

- Turn off termination only when the VTrak is NOT the last device in the SCSI chain.
 - Internal termination only works on the “Out” SCSI connectors.
-

SCSI Target Information

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the SCSI Management  icon.

The Channel tab displays SCSI Channel Information:

4. Click on the Target tab.

The Target tab displays information about the 16 SCSI targets on each of the two SCSI channels:

- Status – Enabled or Disabled
- Negotiated Transfer Rate – Data Transfer Rate in MB/s
- Bus Width – Narrow or Wide

A value of N/A under Transfer Rate or Bus Width appears when the Target is disabled. To enable a SCSI Target, see “SCSI Channel Settings” on page 62.




Storage Services

The Storage Services–LUN Map tab displays the Target IDs and LUNs assigned to each logical drive.

For SCSI, LUN Mapping is the process of applying a LUN Map so that each channel can access the logical drive (target).

View LUN Map

To view the current LUN Map:




1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Storage Services  icon.
4. Click the LUN Map tab in Management View.

Edit a LUN Map



Important

You must enable a Target before you assign a LUN to it. See “SCSI Channel Settings” on page 62.

1. Click on the Subsystem  icon in Tree view.
2. Click on the Administrative Tools  icon.
3. Click on the Storage Services  icon.
4. Click the LUN Map tab in Management View.
5. From the LUN Map tab dropdown menu, select *Edit LUN Map*.
6. Select Port 1 or Port 2 from the Port ID dropdown menu.
7. In the LUN Mapping and Masking table, select a Logical Drive ID with empty Target ID and LUN fields.
8. Type a Target ID into the Target ID field.
Target IDs range from 0 to 15.
9. Type a LUN into the LUN field.
LUNs range from 0 to 63. The number of available LUNs may be less, depending on the capability of your SCSI HBA card.
10. Click the **Submit** button.

LUN Mapping Parameters

- Logical Drive ID – The disk array ID number.
- RAID Level – RAID Level of the logical drive.
- Capacity – Capacity of the logical drive.
- WWN – World Wide Number of the logical drive.
- Target ID – Active Target ID on this logical drive for the selected port.
- LUN – Logical Unit Number on this logical drive for the selected port.



You must enter different LUN numbers for each logical drive.

Software Management

Email

VTrak's Email service sends notifications to the specified Users according to settings under their Event Subscription. See “User Event Subscription” on page 56.

To change the Email settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **Email Setting** link.
4. Enter the IP address for your SMTP server.
5. Enter server port number for your SMTP server.
25 is the default.
6. Select Yes to enable SMTP authentication or No to disable.
7. If you selected Yes for SMTP authentication, enter a Username and Password in the fields provided.
8. Enter an Email sender address (example: RAIDmaster@promise.com).
9. Enter an Email subject (example: VTrak Status).
10. When you are done, click on the **Submit** button.



Send a Test Message

To send one test message to the User currently logged into the VTrak GUI:

1. Make the Email settings as described above.
2. Under Test Email, check the "Send A Test Email" box.
3. Click on the **Submit** button.



Change Email Setting

To change the Email Automatic/Manual start setting:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **Email Setting** link.
4. Under Startup Type:
 - Click on the Automatic option to start the service automatically during system startup.
 - Click on the Manual option to start the service manually (the service does not start during system startup).
5. Click on the **Submit** button.

Manual Start, Restart, Stop

To manually start, restart or stop the Email service:



1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **Email Setting** link.
4. Under Running Status:

- If the service is stopped, click the **Start** button to start the service.
- If the service is started, click the **Stop** button to stop the service.
Or click on the **Restart** button to restart the service.

SLP



VTrak's SLP service discovers services available over the Internet.

To change the SLP startup settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **SLP Setting** link.
4. Under Startup Type:
 - Click on the Automatic option to start the service automatically during system startup.
 - Click on the Manual option to start the service manually (the service does not start during system startup).
5. Click on the **Submit** button.

Manual Start, Restart, Stop



To manually start, restart or stop the SLP service:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **SLP Setting** link.
4. Under Running Status:
 - If the service is stopped, click the **Start** button to start the service.
 - If the service is started, click the **Stop** button to stop the service.
Or click on the **Restart** button to restart the service.

Web Server

VTrak's Web Server service connects the VTrak GUI to the VTrak subsystem through your browser.



To change the Web Server settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **Web Server Setting** link.
4. Enter the HTTP Port number.
80 is the default.

5. Enter Session Time Out interval.
24 minutes is the default.
6. If you want to use a secure connection, check the Enable SSL box.
7. If you checked the Enable SSL box, enter a HTTPS Port number.
443 is the default.
8. If you want to download a SSL Certificate, check the Download Certificate box.
9. If you checked the Download Certificate box, enter the Certificate filename or click on the Browse... button to locate it.
10. When you are done, click on the **Submit** button.
11. Click **OK** in the confirmation box to restart the Web Server service with your changes.



Change Start Setting

To change the Web Server Automatic/Manual start setting:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **Web Server Setting** link.
4. Under Startup Type:
 - Click on the Automatic option to start the service automatically during system startup.
 - Click on the Manual option to start the service manually (the service does not start during system startup).
5. Click on the **Submit** button.

Manual Start, Restart, Stop



To manually start, restart or stop the Web Server service:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **Web Server Setting** link.
4. Under Running Status:
 - If the service is stopped, click the **Start** button to start the service.
 - If the service is started, click the **Stop** button to stop the service.
Or click on the **Restart** button to restart the service.

Telnet



VTrak's Telnet service enables you to access VTrak's Command Line Interface (CLI) through a network connection.

To change the Telnet settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **Telnet Setting** link.
4. Enter the Telnet Port number.
2300 is the default.
5. Enter the Maximum Number of Connections.
4 is the default.
6. Enter the Session Time Out interval.
24 minutes is the default.
7. When you are done, click on the **Submit** button.
8. Click **OK** in the confirmation box to restart the Telnet service with your changes.



Change Start Setting

To change the Telnet Automatic/Manual start setting:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **Telnet Setting** link.
4. Under Startup Type:
 - Click on the Automatic option to start the service automatically during system startup.
 - Click on the Manual option to start the service manually (the service does not start during system startup).
5. Click on the **Submit** button.

Manual Start, Restart, Stop



To manually start, restart or stop the Telnet service:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **Telnet Setting** link.
4. Under Running Status:
 - If the service is stopped, click the **Start** button to start the service.
 - If the service is started, click the **Stop** button to stop the service.
Or click on the **Restart** button to restart the service.

SNMP



VTrak's SNMP service enables the SNMP browser to obtain information from the VTrak. The Trap Sink is where SNMP events are sent and can be viewed.

To change the SNMP settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **SNMP Management** link.
4. Enter the SNMP Port number.
161 is the default.
5. Enter a System Name.
There is no default name.
6. Enter a System Location.
USA is the default.
7. Enter a System Contact (the email address of the administrator or other individual).
8. Enter the Read Community
Public is the default.
9. Enter the Write Community
Private is the default.
10. Enter a Trap Sink IP address.
11. Select a Trap Filter and click on its option.
12. Tap sinks of the selected Severity level and above will be sent.
13. Click on the **Update** button and review your Trap Sinks.
14. When you are done, click on the **Submit** button.
15. Click **OK** in the confirmation box to restart the SNMP service with your changes.

Change Start Setting



To change the SNMP Automatic/Manual start setting:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **SNMP Management** link.
4. Under Startup Type:
 - Click on the Automatic option to start the service automatically during system startup.

- Click on the **Manual** option to start the service manually (the service does not start during system startup).
5. Click on the **Submit** button.

Manual Start, Restart, Stop

To manually start, restart or stop the SNMP service:



1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **SNMP Management** link.
4. Under Running Status:
 - If the service is stopped, click the **Start** button to start the service.
 - If the service is started, click the **Stop** button to stop the service.Or click on the **Restart** button to restart the service.

CIM

VTrak's CIM service provides a database for information about computer systems and network devices. This service is normally Stopped and set to Manual start.



Change Start Setting

To change the CIM startup settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **CIM Setting** link.
4. Under Startup Type:
 - Click on the Automatic option to start the service automatically during system startup.
 - Click on the Manual option to start the service manually (the service does not start during system startup).
5. Click on the **Submit** button.

Manual Start, Restart, Stop



To manually start, restart or stop the CIM service:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **CIM Setting** link.
4. Under Running Status:
 - If the service is stopped, click the **Start** button to start the service.

- If the service is started, click the **Stop** button to stop the service.
Or click on the **Restart** button to restart the service.

CIM Service Settings

To change the CIM service settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **CIM Setting** link.
4. To enable CIM using a HTTP connection:
 - Choose the Yes option
 - Enter a port number in the field provided (5988 is the default)
5. To enable CIM using a HTTPS connection:
 - Choose the Yes option
 - Enter a port number in the field provided (5989 is the default)
6. To enable authentication for your CIM connection(s):
 - Choose the Yes option
 - Enter the old password in the field provided (password is the default)
 - Enter a new password in the field provided

To change your password, the CIM service must be running. See “Manual Start, Restart, Stop” on page 70.

There is only one user. The default name is cim. No changes are possible.
7. Click on the **Submit** button.

Netsend

VTrak's Netsend service sends VTrak subsystem events in the form of text messages to your Host PC and other networked PCs. In order to use Netsend:

- Netsend must be running on the VTrak
- You must provide the IP address for each recipient PC
- The Messenger service must be running on each recipient PC





Note

If your Netsend and Messenger service settings are correct but the recipient PC does not receive event messages, check the recipient PC's Firewall settings. Refer to your OS documentation for more information.



Manual Start, Restart, Stop

To manually start, restart or stop the Netsend service:

1. Click on the Subsystem  icon in Tree view.
2. Click on the Administration Tools  icon.
3. Click on the Netsend link.
4. Under Running Status:
 - If the service is stopped, click the **Start** button to start the service.
 - If the service is started, click the **Stop** button to stop the service. Or click on the **Restart** button to restart the service.



Change Start Setting

To change the Netsend Automatic/Manual start setting:

1. Click on the Subsystem  icon in Tree view.
2. Click on the Administration Tools  icon.
3. Click on the Netsend link.
4. Under Startup Type:
 - Click on the Automatic option to start the service automatically during system startup.
 - Click on the Manual option to start the service manually (the service does not start during system startup).
5. Click on the **Submit** button.

Add Recipients

To add recipients of Netsend messages:

1. Click on the Subsystem  icon in Tree view.
2. Click on the Administration Tools  icon.
3. Click on the Netsend link.
4. Enter the recipient PC's IP address in the Recipient IP Address field.
5. Under Recipient filter, select the lowest level of Severity to be reported for each event.



The selected level plus all higher levels of Severity will be reported:

- Information – Information only, no action is required
 - Warning – User can decide whether or not action is required
 - Minor – Action is needed but the condition is not a serious at this time
 - Major – Action is needed now
 - Critical – Action is needed now and the implications of the condition are serious
 - Fatal – Non-Recoverable error or failure has occurred
6. Click the **Update** button to add the new recipient to the list

7. When you are done, click on the **Submit** button.




Delete Recipients

To delete recipients of Netsend messages:

1. Click on the Subsystem  icon in Tree view.
2. Click on the Administration Tools  icon.
3. Click on the Netsend link.
4. Highlight the recipient you want to delete in the recipient list.
5. Click the **Delete** button to remove the recipient from the list.
6. When you are done, click on the **Submit** button.

Export

The Software Management–Export tab enables you to export the User Database file from the VTrak subsystem to the Host PC. From there, you can import the User Database file to other VTrak subsystems so that all have the same User information and settings. To export the User Database file from this subsystem:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Software Management  icon.
4. Click on the Export tab in Management View.
5. Under the Type dropdown list, select *User Database*.
6. Click on the **Export** button.
7. In the File Download Security Warning box, click the **Save** button.
8. In the Save As dialog box, navigate to the directory where you want to save the User Database.
9. Enter a name for the User Database (“export” is the default file name).
10. Click the **Save** button.



Note

The Encryption box is grayed out. Encryption is always enabled.

Import

The Software Management–Import tab enables you to import the User Database file from the Host PC’s file system to the VTrak subsystem. When you make user settings to one VTrak, you can export the User Database file to the Host PC.




From there, you can import the User Database file to other VTraks so that all have the same User information and settings.



Caution

Do NOT use this function to update the VTrak firmware.

To import the User Database file to this subsystem:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Software Management  icon.
4. Click on the Import tab.
5. Under the Type dropdown list, select *User Database*.
6. Enter the name of the file to be imported.
Or, click the **Browse...** button to search for the file.
7. Click on the **Submit** button.
8. Click on the **Next** button.

If the imported file is a valid user database, an warning will appear to inform you that it will overwrite the previous settings.

9. Click on the **OK** button.

This user settings are applied to this VTrak subsystem.



Note

The Decryption box is grayed out. Decryption is always enabled.

Firmware Update

The Software Management–Firmware Update tab enables you update the firmware on the VTrak subsystem. See “Firmware Update – WebPAM PROe” on page 168 for this procedure.

Restore Factory Defaults



VTrak includes a function to restore the default settings to its Firmware and Software settings.



Caution

The action of restoring default settings can disrupt your VTrak functions. Use this feature only when necessary and only on the settings that must reset to default in order to set them correctly.



To access the Restore Defaults feature:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
The Administrative Tools list appears.
3. Click the **Restore Factory Defaults** link at the bottom of the list in Management View.
The Restore Factory Defaults screen appears.
4. Check the Firmware and Software functions you want to restore to default settings.
5. Click on the **Submit** button.
6. In the confirmation box, type the word **confirm** in the field provided.
7. Click the **OK** button.

The functions you selected will be automatically restored to their default settings.

Clear Statistics

The Clear Statistics function clears statistical data on controllers, physical drives, and logical drives. To clear statistical data:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the **Clear Statistics** link.
The Clear Statistics tab appears in Management View.
4. Click on the **Submit** button.
5. In the confirmation box, type the word **confirm** in the field provided.
6. Click the **OK** button.

Shutdown and Restart



The Shutdown and Restart function enables you to:

- Shut down the subsystem
- Shut down and restart the subsystem

You can only do part of this function in WebPAM PROe. Additional action is required, as described below. If you want to monitor the shutdown or restart process, see the notes below.

Shutdown

To shutdown the subsystem:

1. Click on the Subsystem  icon in Tree View.
2. Click on the Administrative Tools  icon.
3. Click on the Shutdown link in Management View.
A Shutdown or Restart tab will appear.
4. On the Shutdown or Restart tab, select *Shutdown* from the dropdown menu.
5. Click the **Submit** button.
6. In the confirmation box, type the word **confirm** in the field provided.
7. Click the **OK** button.
When the controller shuts down, your WebPAM PROe connection will be lost.
8. Wait for no less than two minutes.
9. Manually turn off the power supply switches on the back of the subsystem.



Monitor the Shutdown

To monitor a shutdown, you must use the Command Line Interface (CLI) though a serial connection to the VTrak.

At the “administrator@CLI>” prompt, type **shutdown -a shutdown**.

When the “Shutdown complete. It is now safe to power off the subsystem.” message appears, turn off the power supply switches.

Restart the Subsystem

1. Click on the Subsystem  icon in Tree View.
2. Click on the Administrative Tools  icon.
3. Click on the Shutdown link in Management View.
A Shutdown or Restart tab will appear.
4. On the Shutdown or Restart tab, select *Restart* from the dropdown menu.

5. Click the **Submit** button.
6. In the warning box, click the **OK** button.
7. In the confirmation box, type the word **confirm** in the field provided.
8. Click the **OK** button.
When the controller shuts down, your WebPAM PROe connection will be lost.
9. Wait for two to three minutes.
10. In your browser, log into WebPAM PROe once again.
If you cannot log in, wait for 30 seconds, and try again. Repeat until login is successful.

Monitor the Restart

To monitor a restart, you must use the Command Line Interface (CLI) through a serial connection to the VTrak.

At the “administrator@CLI>” prompt, type **shutdown -a restart**.



When the “Login:” prompt appears, the restart is finished.

Controllers

The Controllers–Information tab provides information about the controllers in a VTrak subsystem. Controller information includes:

- Controller ID (1 or 2)
- Alias, if assigned
- Status – OK means normal
- Vendor
- Model
- Revision Number
- WWN – World Wide Name of the controller

To identify the VTrak subsystem housing this controller:

1. Click the Subsystem  icon in Tree View.
2. Click the Controllers  icon.
3. Click on the **Locate Controller** button.

The Controller Status LED and Dirty Cache LED on the back of the Controller, will flash for one minute. See the illustration below.

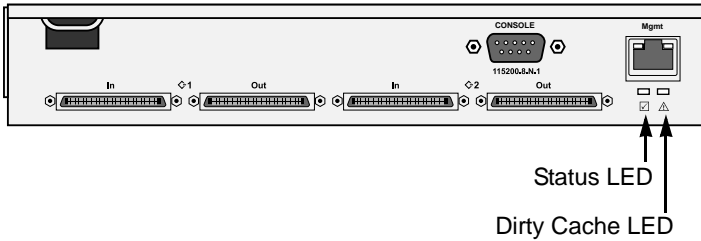





Figure 4. The Controller LEDs flash for one minute so you can identify the Controller

Controller

Controller Information

The Controller–Information tab provides information about a specific VTrak subsystem controller. This information is useful for maintenance and troubleshooting. To access Controller information:

1. Click the Subsystem  icon in Tree View.
2. Click the Controllers  icon.
3. Click on the Controller  icon.
4. Click on the Information tab in Management View.

The Controller information includes:

- Controller ID (1 or 2)
- Alias, if assigned*
- Vendor
- Model
- Status
- Power On Time
- Cache Usage (percent)
- Dirty Cache Usage (percent)
- Part number
- Serial number
- Hardware revision number
- WWN (World Wide Name)
- Date of manufacture
- SCSI protocols supported

- Boot loader Version
- Boot loader Build Date
- Firmware Version number
- Firmware Build Date
- Software Version number
- Software Build Date






Note

You can make setting adjustments to the items marked with an asterisk (*). Click the Settings tab for access.

Advanced Controller Information includes:

- Memory Type – Controller’s data cache
- Memory Size
- Flash Type – Stores firmware, software, and user configurations
- Flash Size
- NVRAM Type – Stores parameters, settings, and tables
- NVRAM Size
- Preferred Cache Line Size – See “Cache Policy” on page 192.
- Cache Line Size – See “Cache Policy” on page 192
- Coercion – See “Capacity Coercion” on page 193
- Coercion Method – See “Capacity Coercion” on page 193
- SMART – Self-Monitoring, Analysis, and Reporting System for physical drives.
- SMART Polling Interval
- Write Back Cache Flush Interval

Controller Statistics

1. Click the Subsystem  icon in Tree View.
2. Click the Controllers  icon.
3. Click on the Controller  icon.
4. Click on the Information tab in Management View and select Statistics from dropdown menu.

The Controller statistics include:

- Data transferred (read and write)
- Read Data transferred




- Write Data transferred
- Errors (total)
- Non-read/write errors
- Read errors
- Write errors
- I/O requests (total)
- Non-read/write I/O requests
- Read I/O requests
- Write I/O requests
- Statistics start time
- Statistics collection time

Clear Statistics

To clear statistics, see “Clear Statistics” on page 75.

Controller Settings

The Controller–Settings tab enables you to make Controller settings. To make Controller settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Controllers  icon.
3. Click on the Controller  icon.
4. Click on the Settings tab in Management View.
5. Enter a name into the Alias field.
Maximum of 48 characters. Use letters, numbers, space between words, and underscore. An alias is optional.
6. Check the SMART Log box to enable the Self-Monitoring, Analysis, and Reporting System (SMART).
7. Enter a polling interval (1 to 1440 minutes) in SMART Polling Interval field.
8. Check the Coercion Enabled box to enable disk drive capacity coercion.
When disk drives of different capacities are used in the same array, coercion reduces the usable capacity of the larger disk drive(s) in order to match the smallest capacity drive.
For more information, see “Capacity Coercion” on page 193.
9. Select a coercion method from the Coercion Method dropdown menu. The choices are:
 - GB Truncate – (Default) Reduces the useful capacity to the nearest 1,000,000,000 byte boundary.

- 10GB Truncate – Reduces the useful capacity to the nearest 10,000,000,000 byte boundary.
 - Group Rounding – Uses an algorithm to determine how much to truncate. Results in the maximum amount of usable drive capacity.
 - Table Rounding – Applies a predefined table to determine how much to truncate.
10. Enter a time interval (1 to 12 seconds) in the Write Back Cache Flush Interval field.
For more information, see “Cache Policy” on page 192.
 11. Select a Cache Line Size (8KB or 64KB) from the Preferred Cache Line Size dropdown menu.
For more information, see “Cache Line Size” on page 193.
 12. Click the **Submit** button.
The changes take effect immediately.



Enclosures

The Enclosures–Information tab provides component information about the VTrak subsystem enclosure, including:

- Enclosure ID number
- Number of power supply units
- Number of fans
- Number of blowers – Blowers are scroll fans, one in each cooling unit
- Number of physical drive slots – 12 or 8 depending on the VTrak model
- Number of temperature sensors – The number of sensors varies among VTrak models
- Number of voltage sensors – 3.3V, 5.0V, and 12.0V
- Number of batteries – One for each controller in the enclosure

Identify Enclosure

To identify the VTrak subsystem enclosure:

1. Click the Subsystem  icon in Tree View.
2. Click on the Enclosures  icon.
3. Click on the **Locate Enclosure** button.

The FRU LEDs on the back of the enclosure will flash for one minute. See the illustration below.

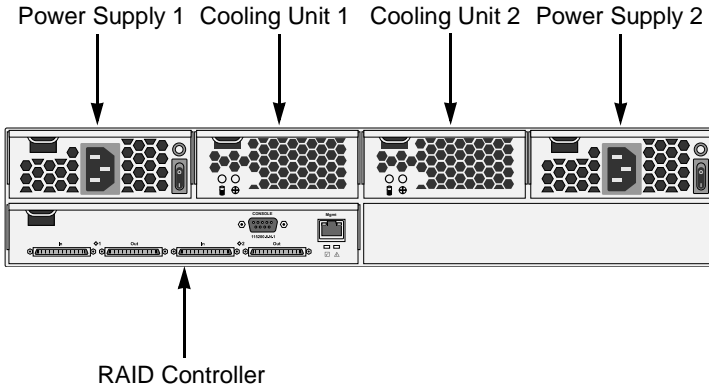


Figure 4. VTrak M310p/M210p Rear View




Enclosure

Enclosure Information

The Enclosure—Information tab provides a diagram showing the status and location of key components. Status information about the VTrak subsystem enclosure, including:

- SEP Firmware Version
- Polling Interval*
- Enclosure Warning and Critical temperature thresholds*
- Controller Warning and Critical temperature thresholds*
- Power Supply Units – Device ID, Status, Fan status, and Fan speed
- Blowers (scroll fans in the cooling unit(s) – Device ID, Status, and Speed
- Voltage Sensors – 3.3V, 5.0V, and 12.0V
- Temperature Sensors – The number of sensors varies among VTrak models




To access Controller information:

1. Click the Subsystem  icon in Tree View.
2. Click on the Enclosures  icon.
3. Click on the Enclosure  icon.

For information on Enclosure problems, see “Chapter 8: Troubleshooting” on page 203.

Enclosure Settings

The Enclosure—Settings tab enables you to make settings for certain components of the VTrak subsystem enclosure. To make Enclosure settings:

1. Click the Subsystem  icon in Tree View.
2. Click on the Enclosures  icon.
3. Click on the Enclosure  icon.
4. Click on the Settings tab in Management View.
5. Enter a polling interval (15 to 255 seconds) in the Polling Interval field.
6. Enter a value in the Enclosure Warning Temperature Threshold field.
7. Enter a value in the Enclosure Critical Temperature Threshold field.
8. Enter a value in the Controller Warning Temperature Threshold field.
9. Enter a value in the Controller Critical Temperature Threshold field.
10. Click the **Submit** button.

The changes take effect immediately.




FRU VPD

The Enclosure—FRU VPD tab displays Vital Product Data (VPD) information about Field Replaceable Units (FRU) in the VTrak subsystem enclosure, including:

- Controller Motherboard
- Battery Backup Unit (BBU)
- Cooling Units
- Power Supply Units
- Back Plane

Use this information when communicating with Technical Support and when ordering replacement units. For contact information, see “Contact Technical Support” on page 239.

To access Controller information:

1. Click the Subsystem  icon in Tree View.
2. Click on the Enclosures  icon.
3. Click on the Enclosure  icon.
4. Click on the FRU VPD tab in Management View.

Battery

The Enclosure–Battery tab displays information about the cache backup battery (or batteries) in the VTrak subsystem enclosure, including:

- Device ID
- Status – Fully Charged is normal
- Remaining Capacity in percent
- Temperature – 40°C or lower is normal
- Reconditioning cycle count
- Voltage – 4000 mV or higher is normal
- Current – A flow of a few mA is normal






Note

If a battery does not reflect normal conditions and it is not currently under reconditioning, run the Recondition function before you replace the battery. During Reconditioning, the battery is fully discharged then fully recharged. During that time, the controller cache is reset to Write Thru. If the battery does not maintain normal values after a Recondition, replace the battery. See page 175 for more information.

Battery Recondition

VTrak automatically reconditions the battery every two months. To set the recondition schedule, see “Scheduler” on page 51.

To recondition the battery:

1. Click the Subsystem  icon in Tree View.
2. Click on the Enclosures  icon.
3. Click on the Enclosure  icon.
4. Click on the Battery tab in Management View.
5. From the Battery tab dropdown menu, select *Recondition*.
6. Click the **Submit** button.




During reconditioning, Battery status can show “discharging” and “recharging”, and a value will display next to Current. Reconditioning runs in the background and stops automatically upon completion.

Buzzer

The Enclosure–Buzzer tab enables you to change audible settings for the VTrak subsystem enclosure. The buzzer sounds to inform you that the VTrak needs attention.

Silence Buzzer




To silence the Buzzer for the current event only:

1. Click the Subsystem  icon in Tree View.
2. Click on the Enclosures  icon.
3. Click on the Enclosure  icon.
4. Click on the Buzzer tab in Management View.
5. From the Buzzer tab dropdown menu, select *Settings*.
6. Uncheck the Buzzer Sounding box.
7. Click the **Submit** button.

The Buzzer goes silent for the current event. If the Buzzer is enabled, it will sound again when the next event happens.

Change Buzzer Settings

To change Buzzer settings:

1. Click the Subsystem  icon in Tree View.
2. Click on the Enclosures  icon.
3. Click on the Enclosure  icon.
4. Click on the Buzzer tab in Management View.
5. From the Buzzer tab dropdown menu, select *Settings*.
6. Check the Buzzer Enabled box to enable the buzzer for all events.
7. Check the Buzzer Sounding box to enable the buzzer the current event only.
8. Click the **Submit** button.

The setting is changed immediately.

Physical Drives





The Physical Drives–Information tab provides information about the physical disk drives installed in the VTrak subsystem enclosure, including:

- Device ID – PD plus the slot number where the drive is installed.
- Model – Drive Manufacturer's model name and/or number.
- Configurable Capacity – Configurable Capacity of this physical drive in GB.
- Location – Enclosure number and Slot number.
- Operational Status – OK is normal. Can also show Rebuilding or Dead.
- Configuration Status – The array to which the drive is assigned or its spare designation.

To view more information about a specific physical drive, click the **Device ID** link.

Identify a Physical Drive

To identify physical drive in the VTrak subsystem enclosure:

1. Click the Subsystem  icon in Tree View.
2. Click on the Enclosures  icon.
3. Click on the Enclosure  icon.
4. Click on the Physical Drives  icon.
5. In Management View, click on the physical drives in the graphic.
The Disk Status LED will flash to identify the carrier holding the drive.

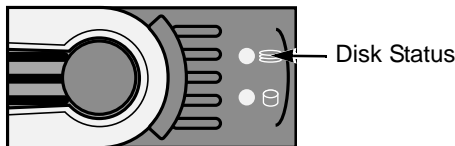






Figure 6. VTrak M310p/M210p disk carrier LEDs

Physical Drives Settings

The Physical Drives–Settings tab provides enables you to make settings that apply to all of the physical disk drives installed in the VTrak subsystem enclosure. To make physical drive settings:

1. Click the Subsystem  icon in Tree View.
2. Click on the Enclosures  icon.
3. Click on the Enclosure  icon.
4. Click on the Physical Drives  icon.
5. Click on the Settings tab in Management View.

6. To enable the disk drives' Write Caches, check the Write Cached Enabled box.
7. To enable the disk drives' Read Ahead Caches, check the Read Look Ahead Enabled box.
8. Select a DMA Mode from the dropdown menu.
SATA drive use UDMA 5.
9. To enable Command Queuing, check the Command Queuing Enabled box.
This feature only affects disk drives that support Command Queuing.
10. Click the **Submit** button.

Physical Drive

The Physical Drive—Information tab provides information about the selected physical disk drive:

Physical Drive Information

- Device ID – PD plus the slot number where the drive is installed.
- Location – By enclosure and slot numbers.
- Alias – If an alias has been assigned.
- Physical Capacity – Theoretical capacity of the drive in GB.
- Configurable Capacity – Capacity of the drive in GB actually available for use.
- Used Capacity – Capacity in GB lost to coercion or the difference between physical and configurable capacity.
- Block Size – The size of the stripe blocks on this physical drive.
- Operational Status – OK is normal. Can also show Rebuilding, Forced Online, Forced Offline, Transition Running, PDM Running, Media Patrol Running, Stale, PFA, Offline or Dead.
- Configuration Status – The array to which the drive is assigned or its spare designation, including Unconfigured, Stale, PFA, Global Spare, Dedicated Spare, Reversible Global Spare, Reversible Dedicated Spare.
- Model – Drive Manufacturer's model name and/or number.
- Drive Type – 3 Gb/s SATAII or 1.5 Gb/s SATA 1.0.
- Serial Number – From the drive manufacturer.
- Firmware Version – From the drive manufacturer.
- Protocol Version – From the drive manufacturer.

Advanced Physical Drive Information

- Write Cache – Enabled or disabled as selected on the Physical Drives Settings tab.

- Read Look Ahead (Cache) – Enabled or disabled as selected on the Physical Drives Settings tab.
- SMART Feature Set – Enabled or disabled as selected on the Controller Settings tab.
- SMART Self Test – Supported or not supported by this drive.
- SMART Error Logging – Supported or not supported by this drive.
- Command Queuing Support – NCQ or TCQ supported by this drive.
- Command Queuing – Enabled or disabled.
- Queue Depth – Number of commands the buffer can hold. Command Queuing must be enabled.
- Maximum Ultra DMA Mode Supported – UDMA5 for SATA drives.
- Ultra DMA Mode – Mode as selected on the Physical Drives Settings tab.

Physical Drive Statistics

From the Information Tab, click on the dropdown menu, and select Statistics to view statistical information about this physical drive. This information can help you understand the amount of work a physical drive has done and whether it is functioning properly.

- Data Transferred – Total amount of data transferred
- Read Data Transferred – Amount of Read data transferred
- Write Data Transferred – Amount of Write data transferred
- Errors – Total number of all errors
- Non Read/Write Errors – Number of errors that were not for a Read or Write operation
- Read Errors – Number of read errors
- Write Errors – Number of write errors
- IO Request – Total number of all IO requests
- Non Read/Write IO Request – Number of IO requests that were not for a Read or Write operation
- Read IO Request – Total number of Read IO requests
- Write IO Request – Total number of Write IO requests
- Statistics Start Time – Time and date when this data began to be collected
- Statistics Collection Time – Time and date you clicked the Statistics link to display this data

Identify a Physical Drive

To identify physical drive in the VTrak subsystem enclosure:

1. Click the Subsystem  icon in Tree View.

2. Click on the Enclosures 📦 icon.
3. Click on the Enclosure 📦 icon.
4. Click on the Physical Drives 🗄 icon.
5. Click on a Physical Drive 🗄 icon.
6. In Management View, click on the physical drives in the graphic.
The Disk Status LED will flash to identify the carrier holding the drive.

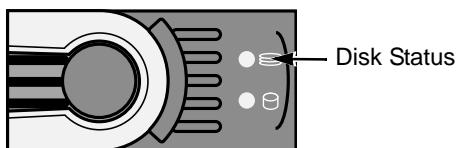


Figure 7. VTrak M310p/M210p disk carrier LEDs

Physical Drive Settings

The Physical Drive–Settings tab enables you to specify an alias for a physical disk drive. To make physical drive settings:

1. Click the Subsystem 🗄 icon in Tree View.
2. Click on the Enclosures 📦 icon.
3. Click on the Enclosure 📦 icon.
4. Click on the Physical Drives 🗄 icon.
5. Click on a Physical Drive 🗄 icon.
6. Click on the Settings tab in Management View.
7. Type an alias into the Physical Drive Alias field.
Maximum of 32 characters. Use letters, numbers, space between words, and underscore. An alias is optional.
8. Click the **Submit** button.

Clear Physical Drive Conditions

The Physical Drive–Clear tab enables you to clear certain conditions from a physical drive. The Clear tab only appears when those conditions are present.






- Stale – The physical drive contains obsolete disk array information.
- PFA – The physical drive has errors resulting in a prediction of failure.



Note

Be sure you have corrected the condition by a physical drive replacement, rebuild operation, etc., first. Then clear the condition in the GUI.

To clear a Stale or PFA status from a physical drive:

1. Click the Subsystem  icon in Tree View.
2. Click on the Enclosures  icon.
3. Click on the Enclosure  icon.
4. Click on the Physical Drives  icon.
5. Click on a Physical Drive  icon.
6. In Management View, click on the Clear tab.
7. In the Confirmation box, click **OK** to confirm.



Note

If a physical drive has both a Stale and a PFA condition, click the Clear tab once to clear the Stale condition, then click again to clear the PFA condition.

Force a Physical Drive Offline/Online

The Physical Drive–Force Offline/Online tab enables you to force an:

- Online physical drive to go Offline
- Offline physical drive to go Online




The Force Offline/Online tab appears only for physical drives that are assigned to disk arrays.





Caution

Forcing a physical drive offline or online is likely to cause data loss. Back up your data before you proceed. Use these functions only when required.

To force a physical drive offline:

1. Click the Subsystem  icon in Tree View.
2. Click on the Enclosures  icon.
3. Click on the Enclosure  icon.

4. Click on the Physical Drives  icon.
5. Click on a Physical Drive  icon.
6. Click on the Force Offline/Online tab in Management View.
7. Click the **Submit** button.
8. In the confirmation box, type the word **confirm** in the field provided.
9. Click the **OK** button.


Physical Drive Media Patrol

Media Patrol is a routine maintenance procedure that checks the magnetic media on each disk drive. Media Patrol checks all physical drives assigned to disk arrays. Media Patrol does not check unconfigured drives.

Media Patrol will also check spare drives, if those drives have Media Patrol enabled. Media Patrol for spare drives is enabled by default. You can disable it in VTrak's Command Line Interface (CLI).

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 critical error, it triggers PDM if PDM is enabled.

To run Media Patrol:

1. Click the Subsystem  icon in Tree View.
2. Click on the Background Activities tab in Management View.
3. From the Background Activities dropdown menu, select *Start Media Patrol*.
4. Click the **Start** button.

To set Media Patrol priority, see "Change Background Settings" on page 50.



Disk Arrays

A disk array is a collection of physical drives in a RAID. Logical drives are made from disk arrays. The Disk Arrays—Information tab displays a list of disk arrays along with their status and capacity:

- Device ID – This is the unique ID number assigned to an individual disk array
- Alias – A user-specified name for the disk array
- Status – This refers to functional status of this disk array. OK is normal
- Configurable Capacity – This is the data storage capacity available for new and existing logical drives
- Free Capacity – This is the data storage capacity available for new logical drives



To see more information about a specific disk array, click on its **Device ID** link.

To access the Disk Arrays–Information tab:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.

Create a Disk Array – Automatic

The Disk Array Automatic Creation option enables you to create a new disk array following a default set of parameters. One logical drive will be made automatically when you create the disk array. To create a Disk Array using the Automatic function:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Create tab in Management View.
4. From the Create tab dropdown menu, select *Automatic*.

The following parameters display:

- Disk Arrays – The number of physical drives in the disk array, their slot numbers, configurable capacity, and the number of logical drives to be created
 - Logical Drives – The ID number of the logical drive(s), their RAID level, capacity, and stripe size
 - Spare Drives – The physical drive slot number of the dedicated hot spare assigned to this disk array. A hot spare drive is created for all RAID levels except RAID 0, when five or more unconfigured physical drives are available
5. If you accept these parameters, click the Submit button.

The new disk array appears in the Disk Array List on the Information tab.

If you do NOT accept these parameters, use the Advanced option to create your disk array.

The new disk array appears in the Disk Array List on the Information tab.



Create a Disk Array – Express

The Disk Array Express Creation option enables you to choose the parameters for a new disk array by specifying the characteristics you want. With this method, you can create multiple logical drives at the same time you create your disk array. However, all of the logical drives will be the same.

If you prefer to specific the parameters directly, use the Advanced option to create your disk array.

If you are uncertain about choosing parameters for your disk array, use the Automatic option.

To create a new disk array:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Create tab in Management View.
4. From the Create tab dropdown menu, select *Express*.
5. Check the boxes to select any one or combination of:
 - Redundancy – The array will remain available if a physical drive fails
 - Capacity – The greatest possible amount of data capacity
 - Performance – The highest possible read/write speed
 - Spare Drive – A hot spare drive is created when you select Redundancy, Spare Drive, and five or more unconfigured physical drives are available
6. In the Number of Logical Drives field, enter the number of logical drives you want to make from this disk array.
7. From the Application Type menu, select an application that best describes your intended use for this disk array:
 - File Server
 - Video Stream
 - Transaction Data
 - Transaction Log
 - Other
8. Click the **Update** button.

Or check the Automatic Update box and updates will occur automatically.

The following parameters display:

- Disk Arrays – The number of physical drives in the disk array, their slot numbers, configurable capacity, and the number of logical drives to be created
- Logical Drives – The slot number of the logical drive(s), their RAID level, capacity, and stripe size
- Spare Drives – The physical drive slot number of the dedicated hot spare assigned to this disk array (all RAID levels except RAID 0)

If you accept these parameters, proceed to the next step.

If you do NOT accept these parameters, review and modify your selections in the previous steps.

9. When you are done, click the **Submit** button.



The new disk array appears in the Disk Array List on the Information tab.

Create a Disk Array – Advanced

The Disk Array Advanced Creation option enables you to directly specify all parameters for a new disk array. One logical drive will be made automatically when you create the disk array. If you select less than the total available capacity, you can use the remaining space to create additional logical drives at a later time.

If you are uncertain about choosing parameters for your disk array, use the Express or Automatic option to create your disk array.

To create a new disk array:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Create tab in Management View.
4. From the Create tab dropdown menu, select *Advanced*.

Step 1 – Disk Array Creation

5. Enter a name for the disk array in the field provided.
6. Check the box if you want to enable Media Patrol.
For more information, see “Media Patrol” on page 198.
7. Check the box if you want to enable PDM.
For more information, see “Predictive Data Migration (PDM)” on page 199.
8. Highlight physical drives you want in the disk array from the Available list and press the >> button to move them to the Selected list.
You can also double-click them to move them.
9. When you are done, click the **Next** button.

Step 2 – Logical Drive Creation

Logical Drive Creation enables you to specify logical drives under the new disk array. Enter the information for a logical drive, then click the Update button. If there is free capacity remaining, you can specify another logical drive now or wait until later.

10. Choose a RAID level for the logical drive from the dropdown menu.
The choice of RAID levels depends on the number of physical drives you selected.
11. RAID 50 only – Specify the number of axes for your array.
For more information on axes, see “RAID 50 – Striping of Distributed Parity” on page 186.
12. Specify a Capacity and the unit of measure (MB, GB, TB).

This value will be the data capacity of the first logical drive in your new disk array. If you specify less than disk array's maximum capacity, the remainder will be available for additional logical drives which you can create later.

13. Specify a Stripe size from the dropdown menu.
8, 16, 32, 64, 128, 256, 512 KB, and 1 MB are available. 64 KB is the default.
14. Specify a Sector size from the dropdown menu.
512 B, 1, 2, and 4 KB are available. 512 B is the default.
15. Specify a Read (cache) Policy from the dropdown menu.
Read Cache, Read Ahead Cache, and No Cache are available. Read Ahead is the default.
16. Specify a Write (cache) Policy from the dropdown menu.
Write Back and Write Through (Thru) are available. Write Back is the default.
17. Click the **Update** button.
A new logical drive is displayed under New Logical Drives.
Repeat the above steps to specify additional logical drives as desired.
18. When you are done specifying logical drives, click the **Next** button.

Step 3 – Summary

The Summary lists the disk array and logical drive information you specified.

19. To proceed with disk array and logical drive creation, click the **Submit** button.

The new disk array appears in the Disk Array List on the Information tab.



Note

This function does not automatically create a hot spare drive. After the disk array is created, you can create a hot spare drive for it. For more information, see “Create Spare Drive” on page 113.

Delete a Disk Array

The Disk Arrays–Delete tab enables you to delete existing disk arrays.




Caution

If you delete a disk array, you also delete any logical drives that belong to it, along with the data in those logical drives. Back up any important data before deleting a disk array.

To delete a disk array:

1. Click the Subsystem  icon in Tree View.




2. Click on the Disk Arrays  icon.
3. Click on the Delete tab in Management View.
4. Check the box to the left of the disk array you want to delete.
5. Click the **Submit** button.
6. In the confirmation box, type the word confirm in the field provided.
7. Click the **OK** button.

The selected disk array disappears from the Disk Array List on the Information tab.

Disk Array

The Disk Array–Information tab gives a description and reports the status of the physical drives and logical drives that belong to this disk array. A disk array is a collection of physical drives in a RAID. Logical drives are made from disk arrays.

To access the Disk Array–Information tab:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.

Disk Array Information

- Disk Array ID – This is the ID number assigned by the VTrak GUI for this disk array.
- Alias – Optional.
- Operational Status – OK, Synchronizing, Rebuilding, Degraded, Offline or Transport Ready (see definitions below).
- Total Physical Capacity – The theoretical data storage capacity without regard to capacity coercion.
- Configurable Capacity – The actual data storage capacity available for new and existing logical drives.
- Free Capacity – The data storage capacity available for new logical drives.
- Max Contiguous Free Capacity – The maximum contiguous data storage capacity available for new logical drives.
- Media Patrol – Enabled or disabled.
- PDM – Enabled or disabled.
- Number of Physical Drives – The number of physical drives that belong to this disk array.

- Number of Logical Drives – The number of logical drives that belong to this disk array.
- Supported RAID Level – The RAID levels this disk array can support.

Physical Drives in the Disk Array

- Slot No. – Physical drive ID number.
- Model – The physical drive's model name from the manufacturer.
- Type – SATA or PATA.
- Configurable Capacity – This is the available data storage capacity of this physical drive.
- Status – OK is normal. Can also show Rebuilding, Forced Online, Forced Offline, Transition Running, PDM Running, Media Patrol Running, Stale, PFA, Offline or Dead (see definitions below).

Logical Drives in the Disk Array

- Device ID – This is the ID number of a logical drive that belongs to this disk array.
- Alias – Optional.
- RAID Level – This is the RAID level of this logical drive.
- Capacity – This is the available data storage capacity of this physical drive.
- Status – Functional, Synchronizing, Rebuilding, Critical, or Offline (see below).




Disk Array Status

- Functional/OK – This is the normal state of a logical drive. When a logical drive is Functional, it is ready for immediate use. For RAID Levels other than RAID 0 (Striping), the logical drive has full redundancy.
- Synchronizing – This condition is temporary. Synchronizing is a maintenance function that verifies the integrity of data and redundancy in the logical drive. When a logical drive is Synchronizing, it will function and your data is available. However, access will be slower due to the synchronizing operation.
- Critical/Degraded – This condition arises as the result of a physical drive failure. A degraded logical drive will still function and your data is still available. However, the logical drive has lost redundancy (fault tolerance). You must determine the cause of the problem and correct it.
- Rebuilding – This condition is temporary. When a physical drive has been replaced, the logical drive automatically begins rebuilding in order to restore redundancy (fault tolerance). When a logical drive is rebuilding, it will function and your data is available. However, access will be slower due to the rebuilding operation.

- Transport Ready – After you perform a successful Prepare for Transport operation, this condition means you can remove the physical drives of this disk array and move them to another enclosure or different drive slots. After you relocate the physical drives, the disk array status will show OK.
- Forced Offline – This drive was forced offline by the user.
- Forced Online – This drive was forced online by the user.
- Transition Running – A Transition is running that involves this physical drive.
- PDM Running – PDM is running on this physical drive.
- Media Patrol Running – Media Patrol is running on this physical drive.
- Stale – The physical drive contains obsolete disk array information. Click on the Clear tab.
- PFA – The physical drive has errors resulting in a prediction of failure. Click on the Clear tab.
- Offline – This condition arises as the result of a second physical drive failure. An Offline logical drive is not accessible but some or all of your data may remain intact. You must determine the cause of the problem and correct it.
- Dead – The physical drive has failed.

Disk Array Settings




The Disk Array–Settings tab enables you to assign an alias to this disk array and also enable or disable Media Patrol and PDM. To make Disk Array settings:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.
4. Click on the Settings tab in Management View.
5. Enter an alias in the Disk Array Alias field.
Maximum of 32 characters. Use letters, numbers, space between words, and underscore. An alias is optional.
6. To enable Media Patrol support, check the Media Patrol box.
7. To enable PDM support, check the PDM box.
8. Click the **Submit** button.

Create a Logical Drive

The Disk Array–Create LD tab enables you to create additional logical drives under this disk array. When you create a disk array, you automatically create one logical drive also. If the initial logical drive used less than the full capacity of the disk array, you can create additional logical drives from the same disk array.

To create a logical drive:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.
4. Click on the Create LD tab in Management View.
5. Enter an alias (name) in the Alias field.
Maximum of 32 characters. Use letters, numbers, space between words, and underscore. An alias is optional.
6. From the RAID Level dropdown list, select a RAID level for this logical drive.
All RAID levels supported by the disk array appear in the list. See “Choosing a RAID Level” on page 188.
7. Enter a capacity and select unit of measure (MB, GB, TB).
The default value is the available capacity of the disk array. You can use this value or any lesser amount.
8. From the Stripe dropdown menu, select a Stripe size for this logical drive.
The choices are 8, 16, 32, 64, 128, 256, 512 KB, and 1 MB. 64 KB is the default. See “Stripe Size” on page 191.
9. From the Sector dropdown menu, select a Sector size for this logical drive.
The choices are 512 B, 1, 2, and 4 KB. 512 B is the default. See “Sector Size” on page 191.
10. From the Read Policy dropdown menu, select a Read Cache policy for this logical drive.
The choices are Read Cache, Read Ahead, and No (read) Cache. Read Ahead is the default. See “Cache Policy” on page 192.
11. From the Write Policy dropdown menu, select a Write Cache policy for this logical drive.
The choices are Write Through (thru) and Write Back. Write Back is the default. If you selected No Cache under Read Cache, this setting will be Write Through. See “Cache Policy” on page 192.
12. Click the **Update** button to enter the logical drive parameters.
13. Review the results. If there is remaining space on the disk array, you can create another logical drive, following the steps above. Each logical drive can have a different set of parameters.
14. Click the **Next** button when you are done.
A new window displays with the disk array information and the proposed logical drives with their parameters.
15. Click the **Submit** button create the logical drives.

The new logical drive appears in the Logical Drive List on the Information tab.

If you created a fault-tolerant logical drive (any RAID level except RAID 0), the Operational Status of new logical drive will display *Synchronizing* for several minutes after creation. You can use the logical drive during this period but read/write performance could be slower than normal. See “Logical Drive Synchronization” on page 109.

Delete a Logical Drive




The Disk Array–Delete LD tab enables you to delete a logical drive under this disk array.



Caution

All data on the logical drive will be lost. Back up any valuable data before deleting the logical drive.

To delete a logical drive:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.
4. Click on the Delete LD tab in Management View.
5. Check the box to the left of the logical drive you want to delete.
6. Click the **Submit** button.
In the confirmation box, type the word **confirm** in the field provided.
7. Click the **OK** button.

The selected logical disappears from the Logical Drive List on the Information tab.

Disk Array Migration

For VTrak, the term “Disk Array Migration” means either or both:

- Change the RAID Level
- Expand the storage capacity




For a list of Migration options and other important information, see “RAID Level Migration” on page 195.



Notes

- You can add physical drives to a RAID 50 array but you cannot change the number of axes.
- If you add an odd number of physical drives to a RAID 10 array, it will become a RAID 1E array by default.

To Migrate an existing disk array:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.
4. Click the Background Activities tab in Management view.
5. From the dropdown menu on the Background Activities tab, select *Start Migration*.
6. Under Capacity Usage, if there is more than one Disk Array, click on the one you want to Migrate.
7. Select a new RAID Level, if desired.
8. To expand the disk array's capacity, check the Expand Capacity box.
9. If you checked the Expand Capacity box, enter a number into the Capacity field and select the appropriate unit of measure (MB, GB, TB).
10. Click on the **Update** button.
The information under Capacity Usage changes to reflect your choices.
11. If you agree with the changes, click on the **Next** button.
12. Click on the **Submit** button to begin Migration.

To set Migration priority, see “Change Background Settings” on page 50.

Disk Array Rebuild

When you rebuild a disk array, you are actually rebuilding the data on one disk drive. Normally, a disk array would rebuild itself using a hot disk drive, after going Critical. However, if the Auto Rebuild function is disabled or no spare drives are available, you must initiate the procedure.




To enable Auto Rebuild, see “Background Activities” on page 50.

To create a spare drive, see “Create Spare Drive” on page 113.

For more information, see “Hot Spare Drive(s)” on page 194.

Manual Rebuild

If a physical drive has failed, identify and replace the drive, then rebuild the disk array as described below:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.

If there are multiple disk arrays, choose the icon with the yellow !.

4. Click on the Background Activities tab in Management View.
5. Click the dropdown menu on the Background Activity tab and select *Start Rebuild*.
6. Select the Source physical drive.
This is a remaining functional physical drive in the disk array.
7. Select the Target physical drive.
This is the replacement physical drive.
8. Click the **Submit** button.

The Disk Array Background Activity tab will show the rebuild on the replacement (target) physical drive. Depending on the size of the physical disk involved, this process will take some time.

To view more information, click on the **Rebuild on PDx** link.

To set Rebuild priority, see “Change Background Settings” on page 50.




Disk Array Background Activity

The Disk Array–Background Activity tab provides information about functions that run in the background on your subsystem:

- Disk array Migration
- Disk array Rebuild
- Predictive Data Migration (PDM)
- Spare drive Transition

Start Background Function

To start a background function:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.
4. Click the Background Activities tab in Management view.

5. From the dropdown menu on the Background Activities tab, choose the function you want to start.

View Progress of Background Function

To view the progress of the current background activity and a list of activities in the queue:

1. Click the Subsystem  icon in Tree View.
2. Click the Background Activities tab in Management view.

To view more information, click on the **activity** link.

To pause a background activity, click on the activity link, then click the **Pause** button. To resume again, click the **Resume** button.


To cancel a background activity, click on the activity link, then click the **Stop** button.

Transition

Transition is the process of replacing a revertible spare drive that is currently part of a disk array with an unconfigured physical drive or a non-revertible spare. The revertible spare drive returns to its original status. For more information, see “Transition” on page 200.

In order to run the Transition function, the spare drive must be Revertible. In addition, you must specify an unconfigured physical drive of the same or larger capacity to replace the revertible spare drive.

To run Transition:

1. Click the Subsystem  icon in Tree View.
2. Click on the Background Activities tab in Management View.
3. From the Background Activities dropdown menu, select *Start Transition*.
4. Select an unconfigured physical drive from the list of available drives.

After Transition is completed, refresh the screen. The revertible spare drive will be listed under the Spare Drives icon and the disk array’s operational status will show OK.

To set Transition priority, see “Change Background Settings” on page 50.

Transport

The Disk Array–Transport tab enables you to prepare a disk array for transport.






Important

Before you can use this feature:

- There must be a dedicated spare disk drive assigned to this disk array.
 - The disk array Operational Status must be OK.
-





To prepare a disk array for transport:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.
4. Click the Transport tab in Management View.
5. Click on the **Submit** button.
6. In the confirmation box, type the word **confirm** in the field provided.
7. Click the **OK** button.
8. After the Transition is complete, move the physical drives comprising the disk array to their new locations.
9. Click the **Refresh** button in your Browser.

The drives appear in their new locations and disk array status displays.

Logical Drives

The Logical Drives–Information tab displays a list of logical drives along with their status and capacity. Logical drives are made from disk arrays. To access the Logical Drives–Information tab:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.
4. Click on the Logical Drives  icon

The Information tab displays:

- Device ID – This is the unique ID number assigned to an individual logical drive.
- Alias – Optional.

- RAID Level – The RAID level of this logical drive (It may differ from the disk array).
- Capacity – This is the data storage capacity available.
- Disk Array ID – The ID number of the disk array from which this logical drive was created.
- Stripe – The stripe size of the logical drive.
- Sector –The sector size of the logical drive.
- Status –The operational status of the logical drive (see below).

Logical Drive Status

- Functional/OK – This is the normal state of a logical drive. When a logical drive is Functional, it is ready for immediate use. For RAID Levels other than RAID 0 (Striping), the logical drive has full redundancy.
- Synchronizing – This condition is temporary. Synchronizing is a maintenance function that verifies the integrity of data and redundancy in the logical drive. When a logical drive is Synchronizing, it will function and your data is available. However, access will be slower due to the synchronizing operation.
- Critical/Degraded – This condition arises as the result of a physical drive failure. A degraded logical drive will still function and your data is still available. However, the logical drive has lost redundancy (fault tolerance). You must determine the cause of the problem and correct it.
- Rebuilding – This condition is temporary. When a physical drive has been replaced, the logical drive automatically begins rebuilding in order to restore redundancy (fault tolerance). When a logical drive is rebuilding, it will function and your data is available. However, access will be slower due to the rebuilding operation.
- Transport Ready – After you perform a successful Prepare for Transport operation, this condition means you can remove the physical drives of this disk array and move them to another enclosure or different drive slots. After you relocate the physical drives, the disk array status will show OK.
- Forced Offline – This drive was forced offline by the user.
- Forced Online – This drive was forced online by the user.
- Transition Running – A Transition is running that involves this physical drive.
- PDM Running – PDM is running on this physical drive.
- Media Patrol Running – Media Patrol is running on this physical drive.
- Stale – The physical drive contains obsolete disk array information. Click on the Clear tab.
- PFA – The physical drive has errors resulting in a prediction of failure. Click on the Clear tab.

- Offline – This condition arises as the result of a second physical drive failure. An Offline logical drive is not accessible but some or all of your data may remain intact. You must determine the cause of the problem and correct it.
- Dead – The physical drive has failed.






To create a logical drive, see “Create a Logical Drive” on page 98.

To delete a logical drive, see “Delete a Logical Drive” on page 100.

For a Degraded or Offline logical drive, see “Critical & Offline Disk Arrays” on page 228.

Logical Drive

The Logical Drive–Information tab displays a list of logical drives along with their status and capacity. Logical drives are made from disk arrays. To access the Logical Drives–Information tab:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.
4. Click on the Logical Drives  icon
5. Click on the Logical Drive  icon.

To specify an Alias or set the Read and Write Policies, click on the Settings tab.

Logical Drive Information

- Logical Drive ID – A number assigned to the logical drive by the system.
- Alias – Optional.
- RAID Level – The RAID level of this logical drive.
- Operations Status – The operational status of the logical drive (see below).
- Capacity – This is the data storage capacity of the logical drive.
- Physical Capacity – This is the data storage capacity of the physical drives used in the logical drive.
- Number of Axles – Each axle represents a physical drive.
- Number of Used Physical Drives – The number of physical drives used in this logical drive.
- Stripe Size – The stripe size of this logical drive.
- Sector Size – The sector size of this logical drive.
- Disk Array ID – The ID number of the disk array from which this logical drive was created.






- Read Policy – The Read Cache policy of this logical drive.
- Write Policy – The Write Cache policy of this logical drive.
- Serial Number – The Serial Number of this logical drive.
- WWN – The World Wide Number of this logical drive.
- Synchronized – Has this logical drive been synchronized? Yes or No.

Logical Drive Statistics (in alphabetical order)

- Data Transferred
 - Data Bytes
 - Read Data Bytes
 - Write Data Bytes
- Error Counts
 - Errors
 - Non-Read/Write Errors
 - Read Errors
 - Write Errors
- I/O Request Counts
 - IO Request
 - Non-Read/Write IO Request
 - Read IO Request
 - Write IO Request
- Session Received Counts
- Statistics Collection Date/Time
- Statistics Start Date/Time

Logical Drive Settings

The Logical Drive–Settings tab enables you to assign an alias and make cache settings to this logical drive. To make Logical Drive settings:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.
4. Click on the Logical Drives  icon
5. Click on the Logical Drive  icon.
6. Click on the Settings tab in Management View.
7. Enter an alias in the Logical Drive Alias field.

Maximum of 32 characters. Use letters, numbers, space between words, and underscore. An alias is optional.

8. From the Read Policy dropdown menu, select a Read Cache policy.
The choices are Read Cache, Read Ahead, and No Cache.
9. From the Write Policy dropdown menu, select a Write Cache policy.
The choices are Write Back and Write Through (Thru). If you select No Read Cache, Write policy is automatically Write Through.
10. Click the **Submit** button.

Logical Drive Background Activity

The Logical Drive–Background Activity tab provides information about functions that run in the background on this logical drive:

- Logical Drive Initialization
- Logical Drive Redundancy Check

Logical Drive Initialization





Initialization is done to logical drives after they are created from a disk array. Initialization sets all data bits in the logical drive to zero. The action is useful because there may be residual data on the logical drives left behind from earlier configurations. For this reason, Initialization is recommended for all new logical drives.



Caution

When you initialize a logical drive, all the data on the logical drive will be lost. Backup any important data before you initialize a logical drive.

Initialize a Logical Drive:

1. Click the Subsystem  icon in Tree View.
2. Click on the Logical Drive Summary  icon.
3. Click on the  icon of the logical drive you want to Initialize.
You can also start Initialization from the Subsystem  icon Background Activities tab
4. Click on the Background Activities tab in Management View.
5. From the Background Activities dropdown menu, select *Initialization*.
6. To select Quick Initialization, check the box.
If you checked the box, enter a value in the Quick Initialization Size field. This value is the size of the initialization blocks in MB.

7. If you did not select Quick Initialization, enter a hexadecimal value in the Initialization Pattern in Hex field or use the default 00000000 value.
8. Click the **Submit** button.
9. In the confirmation box, type the word **confirm** in the field provided.
10. Click the **OK** button.





The Background Activity tab displays the progress of the Initialization.

To set Initialization priority, see “Change Background Settings” on page 50.

Logical Drive Redundancy Check

Redundancy Check is a routine maintenance procedure for fault-tolerant disk arrays (those with redundancy) that ensures all the data matches exactly. Redundancy Check can also correct inconsistencies.


Redundancy Check a Logical Drive

1. Click the Subsystem  icon in Tree View.
2. Click on the Logical Drive Summary  icon.
3. Click on the  icon of the logical drive you want to Initialize.
You can also start Redundancy check from the Subsystem  icon Background Activities tab
4. Click on the Background Activities tab in Management View.
5. From the Background Activities dropdown menu, select *Redundancy Check*.
6. To select Auto Fix, check the box.
This feature attempts to repair the problem when it finds an error.
7. To select Pause On Error, check the box.
This feature stops the process when it finds an error.
If Auto Fix is also checked, the process stops only when it finds a non-repairable error.
8. Click the **Submit** button.

The Background Activity tab displays the progress of the Redundancy Check.

To set Redundancy Check priority, see “Change Background Settings” on page 50.

Logical Drive Synchronization


Synchronization is an automatic procedure applied to logical drives when they are created. Click on the logical drive  icon and look under Logical Drive Information to see Synchronization. A Yes means the logical drive was synchronized.

To set Synchronization priority, see “Change Background Settings” on page 50.

Logical Drive PDM

Predictive Data Migration (PDM) is the migration of data from the suspect disk drive to a spare disk drive, similar to Rebuilding a Logical Drive. But unlike Rebuilding, PDM constantly monitors your disk drives, and automatically copies your data to a spare disk drive *before* the disk drive fails and your Logical Drive goes Critical. See “Predictive Data Migration (PDM)” on page 199.

To run PDM:






1. Click the Subsystem  icon in Tree View.
2. Click on the Background Activities tab in Management View.
3. From the Background Activities dropdown menu, select *Start PDM*.
4. From the Source Physical Drive dropdown menu, select a Source disk array.
5. From the Target Physical Drive dropdown menu, select a Target physical drive.
6. Click on the **Submit** button.

A PDM link appears on the Background Activities tab and the percent completed displays.

To set PDM priority, see “Change Background Settings” on page 50.

Logical Drive Check Table

The Logical Drive—Check Table tab enables you to view error tables. Use this information to evaluate the integrity of the logical drive and to determine whether corrective action is needed. To View the tables:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.
4. Click on the Logical Drives  icon
5. Click on the Logical Drive  icon.
6. Click the Check Table tab in Management view.
7. Click the option for the table you want to see.

The default is All tables.

If there are entries, they are listed as follows:

- Entry Number – A number assigned to each block of entry.
- Table Type – Read Check, Write Check or Inconsistent Block (see below).
- Start Logical Block Address – LBA of the first block for this entry.






- Count – Number of continuous blocks starting from this LBA.
- Read Check Table – Contains a list of read errors for this logical drive.
- Write Check Table – Contains a list of write errors for this logical drive.
- Inconsistent Block Table – Contains a list of inconsistent blocks for this logical drive. Mirror data for RAID Levels 1, 1E, and 10 or Parity data for RAID Levels 5, 6, and 50, identified by the Redundancy Check (a background function).

Logical Drive LUN Settings

For SCSI, LUN Mapping is the process of applying a LUN Map so that each port can access the logical drive (target).

You must enable a Target before you assign a LUN to it. See page 62.

To specify a SCSI LUN Map:

1. Click the Subsystem  icon in Tree View.
2. Click on the Disk Arrays  icon.
3. Click on the Disk Array  icon.
4. Click on the Logical Drives  icon
5. Click on the Logical Drive  icon.
6. Click the LUN Map tab in Management View.
7. From the Assigned Channel List, click on Channel 1 or 2.
The Channel ID number appears under LUN Assignment Worksheet.
8. From the Target ID dropdown menu, select a Target ID number.
Target IDs range from 0 to 15.
9. From the LUN dropdown menu, select a LUN.
LUNs range from 0 to 63. The number of available LUNs may be less, depending on the capability of your SCSI HBA card.
You must enter different LUN numbers for each logical drive.
10. Click the **Assign** button.
11. Click the **Submit** button.

LUN Mapping Parameters

- Channel ID – The VTrak controller SCSI ID number, 1 or 2
- Target ID – Active Target ID on this logical drive for the selected port.
- LUN – Logical Unit Number on this logical drive for the selected port.



Spare Drives

The Spare Drives–Information tab displays a list of Spare Drives along with their status, capacity, disk array assignment and Spare Check results. You must assign an unconfigured physical drive in order for it to function as a spare drive.

When a physical drive in a disk array fails and a spare drive of adequate capacity is available, the disk array will begin to rebuild automatically using the spare drive. See “Critical & Offline Disk Arrays” on page 228.

You must assign an unconfigured physical drive in order for it to function as a spare drive. See “Create Spare Drive” on page 113.


To access the Spare Drives–Information tab:

1. Click the Subsystem  icon in Tree View.
2. Click on the Spare Drives  icon.

The Spare Drives–Information tab displays a list of Spare Drives along with their status, capacity, disk array assignment and Spare Check results.

- ID – The unique ID number assigned to the spare drive.
- Operational Status – OK is normal. Can also show Rebuilding, Transition Running, PDM Running or Offline.
- Capacity – The data storage capacity of this spare drive.
- Revertible – Yes or No. A revertible spare drive automatically returns to its spare drive assignment after the failed physical drive in the disk array is replaced.
- Type – Global, can be used by any disk array. Dedicated, can only be used by the assigned disk array.
- Dedicated to Array – For dedicated spares, the disk array to which it is assigned. Global spares show N/A.
- Spare Check – The result of the Spare Check function. Healthy or Not Checked.

To see more information about a specific spare drive, click on its **Spare ID** link.

To identify unconfigured physical drives that you can assign to be spare drives, click the Physical Drives  icon and look under Configuration Status.



Create Spare Drive



Note

Be sure the spare drive you select has adequate capacity to replace the largest drive in each assigned disk array.

To create a spare drive:

1. Click the Subsystem  icon in Tree View.
2. Click on the Spare Drives  icon.
3. Click on the Create tab in Management View.
4. Select a spare type, Global or Dedicated.
Global can be used by any disk array. Dedicated can only be used by the assigned disk array
5. To make a revertible spare drive, check the Revertible box.
A revertible spare drive can be returned to spare drive status after it replaces a failed drive in a disk array. See “Transition” on page 200 for more information.
6. Highlight physical drives you want in as a spare drive the Available list and press the >> button to move them to the Selected list.
You can also double-click them to move them.
7. If you selected a Dedicated spare drive, highlight disk array to which you want assign the spare drive from the Available list and press the >> button to move them to the Selected list.
You can also double-click them to move them.
8. Click the **Update** button.
Your choices are displayed under New Hot Spare Drives.
9. If you agree with the proposed choices, click the **Submit** button.

The new spare drive is added to the Spare Drive List on the Information tab.

Delete Spare Drive



The Spare Drives–Delete tab enables you to delete an existing spare drive.



Note

If an existing spare drive has the wrong parameters for your needs, click on the Settings tab to change the parameters rather than delete the spare drive and create a new one.



To delete a spare drive:

1. Click the Subsystem  icon in Tree View.
2. Click on the Spare Drives  icon.
3. Click on the Delete tab in Management View.
4. Check the box to the left of the spare drive you want to delete.
5. Click the **Submit** button.
In the confirmation box, type the word **confirm** in the field provided.
6. Click the **OK** button.

The selected spare drive disappears from the Spare Drives List on the Information tab.

Spare Check – All Spare Drives

The Spare Drives–Spare Check tab enables you verify the status of your spare drives. To check a spare drive:

1. Click the Subsystem  icon in Tree View.
2. Click on the Spare Drives  icon.
3. Click on the Spare Check tab in Management View.
4. From the Physical Drive dropdown menu, select the spare drive you want to check.
Or select All to check all the spare drives at the same time.
5. Click the **Submit** button.

The results of the Spare Check appear under Spare Check Status in the Information tab. “Healthy” means normal condition.

Spare Drive

Spare Drive Information

When a physical drive in a disk array fails and a spare drive of adequate capacity is available, the disk array will begin to rebuild automatically using the spare drive. See “Critical & Offline Disk Arrays” on page 228.




The Spare Drive–Information tab provides information about the selected physical disk drive.

- Spare ID – Consecutive number assigned when the spare drive was created.
- Physical Drive ID – The ID number of this physical drive.
- Spare Type – Global, can be used by any disk array. Dedicated, can only be used by the assigned disk array.

- Revertible – Yes or No. A revertible spare drive automatically returns to its spare drive assignment after the failed physical drive in the disk array is replaced.
- Spare Check Status – The result of the Spare Check function. Healthy or Not Checked.
- Physical Capacity – Theoretical capacity of the drive in GB.
- Configurable Capacity – Capacity of the drive in GB actually available for use.
- Block Size – Sector size in bytes.
- Drive Type – SATA or PATA.
- Model – Drive Manufacturer's model name and/or number.
- Location – The enclosure and slot number where the spare drive is physically installed.
- Configuration Status – Type of spare drive: Global, Revertible Global, Dedicated, Revertible Dedicated.
- Operational Status – OK is normal. Can also show Rebuilding or Offline.
- Serial Number – From the drive manufacturer.
- Firmware Version – From the drive manufacturer.

Locate a Spare Drive

To locate a spare drive in the VTrak subsystem enclosure:

1. Click the Subsystem  icon in Tree View.
2. Click on the Spare Drives  icon.
3. Click on the Spare Drive  icon.
4. In Management View, click on the spare drive in the graphic.
The Disk Status LED will flash to identify the carrier holding the drive.

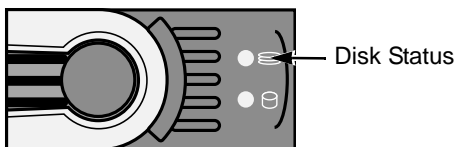




Figure 5. VTrak M310p/M210p disk carrier LEDs

Spare Drive Settings




The Spare Drive–Settings tab enables you to change the settings of an existing spare drive. To change spare drive settings:

1. Click the Subsystem  icon in Tree View.

2. Click on the Spare Drives  icon.
3. Click on the Spare Drive  icon.
4. Click on the Settings tab in Management View.
5. Select a spare type, Global or Dedicated.
Global can be used by any disk array. Dedicated can only be used by the assigned disk array
6. To make a revertible spare drive, check the Revertible box.
A revertible spare drive automatically returns to its spare drive assignment after the failed physical drive in the disk array is replaced.
7. Highlight physical drives you want in the Available list and press the >> button to move them to the Selected list.
You can also double-click them to move them.
8. If you selected a Dedicated spare drive, highlight the disk array to which you want assign the spare drive from the Available list and press the >> button to move them to the Selected list.
You can also double-click them to move them.
9. Click on the **Submit** button.
The new spare drive settings are shown in the Spare Drive List on the Information tab.

Spare Check – Individual Spare Drive

The Spare Drive–Spare Check tab enables you verify the status of the selected spare drive. To check the spare drive:



1. Click the Subsystem  icon in Tree View.
2. Click on the Spare Drives  icon.
3. Click on the Spare Drive  icon.
4. Click on the Spare Check tab in Management View.
5. Click the **Submit** button.

The results of the Spare Check appear under Spare Check Status in the Information tab. “Healthy” means normal condition.

Logical Drive Summary

The Logical Drive Summary–Information tab displays a list of all logical drives in this VTrak enclosure, along with their status and capacity. See “Logical Drive Information” on page 106.

To access the Logical Drive Summary–Information tab:

1. Click the Subsystem  icon in Tree View.
2. Click on the Drive Summary  icon.

Chapter 5: Management with the CLU

- VTrak Status Indicators (below)
 - Drive Status Indicators (page 121)
 - Audible Alarm (page 121)
 - CLU Connection (page 122)
 - CLU Function Map (page 125)
 - Subsystem Management (page 132)
 - Physical Drive Management (page 138)
 - Disk Array Management (page 141)
 - Logical Drive Management (page 148)
 - Network Management (page 150)
 - SCSI Management (page 151)
 - Background Activity (page 152)
 - Event Viewer (page 154)
 - Additional Info and Management (page 155)
 - Buzzer (page 166)
-

VTrak Status Indicators

Even though the Command Line Utility (CLU) offers comprehensive monitoring of VTrak, the LED indicators on the VTrak unit provide important status information.

When the power is switched on, the LEDs on the front of the VTrak will light up.

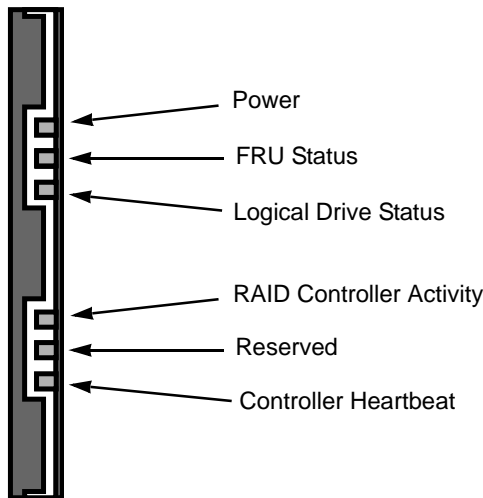


Figure 1. VTrak M310p/M210p front panel LED display

When boot-up is finished and the VTrak is functioning normally:

- Controller Heartbeat LED blinks green seven times in three seconds, goes dark for six seconds, then repeats the blink pattern.
- Power, FRU and Logical Drive LEDs display green continuously.
- The RAID Controller LED flashes green if there is activity on that channel.

See the table below.

LEDs	State				
	Dark	Steady Green	Flashing Green	Amber	Red
Power	System Off	Normal			
FRU*	System Off	Normal		Fan, battery or PSU Problem	Fan, battery or PSU Failed
Logical Drive	System Off	Normal		Logical Drive Critical	Logical Drive Offline
Controller Activity	No Activity		Activity		
Controller Heartbeat	System Off		Normal**		
* Field Replacement Unit: includes fan, battery and power supply unit (PSU). ** Blinks green seven times in three seconds, goes dark for six seconds, then repeats the blink pattern.					

See page 167 for more information about field-replaceable components.

See page 228 for a discussion of critical and offline logical drives.

Drive Status Indicators

There are two LEDs on each Drive Carrier. They report the presence of power and a disk drive, and the current condition of the drive.

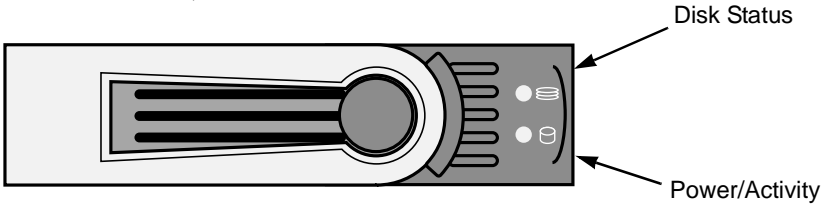


Figure 2. VTrak M310p/M210p disk carrier LEDs

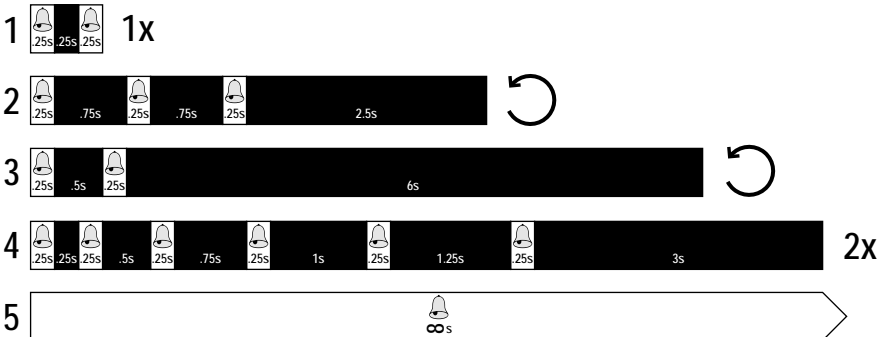
The VTrak spins up the disk drives sequentially in order to equalize power draw during start-up. After a few moments the Power/Activity and Disk Status LEDs should display green.

LEDs	State				
	Dark	Steady Green	Flashing Green	Amber	Red
Power/Activity	No Drive	Drive Present	Activity		
Status	No Power/No Drive	Drive OK		Drive Rebuilding	Drive Error

See “Critical & Offline Disk Arrays” on page 228 for a discussion of rebuilding and failed disk drives.

Audible Alarm

VTrak’s alarm has five different patterns, as shown below.



When you first power-up the VTrak, it beeps twice to show normal operation. The audible alarm sounds at other times to inform you that the VTrak needs attention. But the alarm does not specify the condition. When the alarm sounds:

- Check the front and back of VTrak for red or amber LEDs, as described above.
- If email notification is enabled, check for new messages.
- Check the different functions in the CLU for component problems.
- Check the event log (see page 154).

When a continuous tone sounds, there are multiple alarm patterns sounding at the same time.

See “Chapter 8: Troubleshooting” on page 203 for diagnostic help.

To make alarm settings, see “Buzzer” on page 166.

CLU Connection

There are two connections methods for the CLU:

- Serial – Requires a null modem cable (included with VTrak) to connect the serial ports on the Host PC and VTrak
- Telnet – Requires a network connection between the Host PC and VTrak’s Management Port.

Serial Connection

Before you begin, be sure the null modem cable is connected between the Host PC and VTrak, and that both machines are booted and running.

1. Start your PC’s terminal emulation program.
2. Press **Enter** once to launch the CLU.

Telnet Connection

If your Telnet connection has not been setup, refer to “Set Up Serial Cable Connections” on page 14.

To start the telnet program:

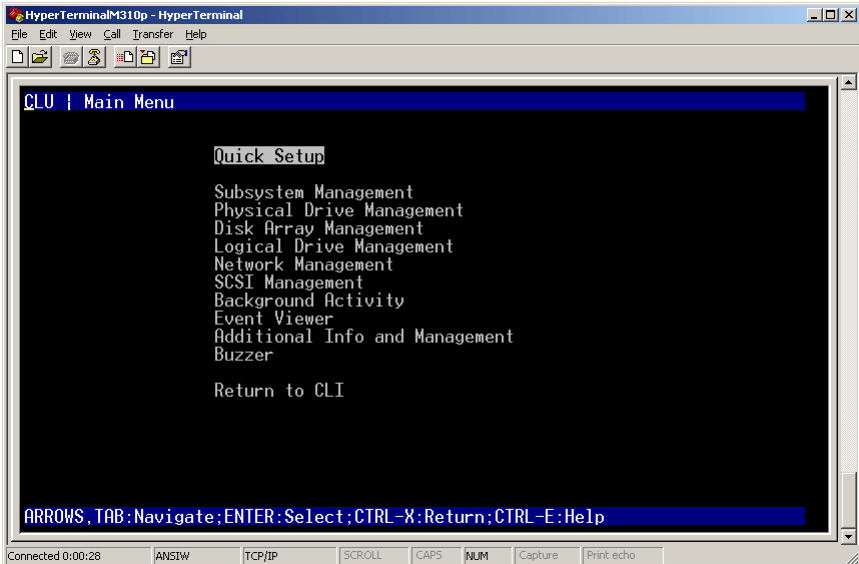
1. Go to the command line prompt (Windows) or click the terminal icon (Linux), then run:

telnet 192.168.1.56 2300

The IP address above is only an example. Use your VTrak’s Management port IP address. 2300 is the Telnet port for the VTrak.

The telnet login screen appears.

2. At the Login prompt, type the user name and press Enter.
The default user name is *administrator*.
3. At the Password prompt, type the password and press Enter.
The default password is *password*.
The CLI screen appears.
4. At the CLI prompt, type **menu** and press Enter
The CLU Main Menu appears.



Quick Setup – A sequence of four steps to setup System Date & Time, Management Port, and RAID Configuration

Subsystem Management – View controller information, lock/unlock the controller, set date and time, and monitor the enclosure.

Physical Drive Management – View disk drive assignments and parameters, change disk drive cache settings and command queuing, and locate a physical drive.

Disk Array Management – View disk array information, create and delete disk arrays, transport, rebuild, PDM, and transition functions, and locate a disk array, create and delete logical drives.

Logical Drive Management – View logical drive information, name logical drives, initialization and redundancy check, and locate a logical drive.

Network Management – Set IP addresses for Management Port, gateway and DNS server; subnet mask.

SCSI Management – Channel information, Enable/disable targets, Termination settings, Target information and statistics.

Background Activity – Settings for Media Patrol, Auto Rebuild, Rebuild, Migration, PDM, Transition, Synchronization, Initialization, Redundancy Check rate and thresholds.

Event Viewer – View the event logs.

Additional Info and Management – Spare Drives, LUN Mapping, User management, EMail, SLP, Webserver, Telnet, SNMP, CIM, and Netsend settings, firmware flash, clear statistics and restore factory default settings.

Buzzer – Enable, disable or silence the buzzer (audible alarm).

Exit the CLU

1. Highlight *Return to Previous Menu* and press Enter.
Repeat this action until you arrive at the Main Menu.
2. From the Main Menu, highlight *Return to CLI* and press **Enter** to exit
3. Close the terminal emulation, Telnet or terminal window.

CLU Function Map

The map below is designed to help you navigate to the submenu where each function is located. Begin at the Main Menu. Highlight the next item in the path and press Enter. The paths in this map do not activate the functions.

A

Alias, controller – Main Menu, Subsystem Management, Controller Management, Controller Settings

Alias, disk array – Main Menu, Disk Array Management, individual disk array

Alias, logical drive – Main Menu, Logical Drive Management, individual drive

Alias, physical drive – Main Menu, Physical Drive Management, individual drive

Alias, subsystem – Main Menu, Subsystem Management

Auto Rebuild, enable/disable – Main Menu, Background Activity, Background Activity Settings

B

Background Activity, in progress – Main Menu, Background Activity, Background Activities List

Battery, recondition – Main Menu, Subsystem Management, Enclosure Management, Batteries, individual Battery

Blowers – Main Menu, Subsystem Management, Enclosure Management

Buzzer, settings – Main Menu, Buzzer

C

Cache Settings, controller – Main Menu, Subsystem Management, Controller Management, Controller Settings

Cache Settings, logical drive – Main Menu, Logical Drive Management, individual logical drive

Cache Settings, physical drive – Main Menu, Physical Drive Management, Global Physical Drive Settings

Channel, SCSI – Main Menu, SCSI Management

Check Tables, logical drive – Main Menu, Logical Drive Management, individual logical drive

CIM, settings – Main Menu, Additional Info and Management, Software Management, CIM

C, continued

Clear Events, runtime – Main Menu, Event Viewer, Clear Runtime Event Log

Clear Events, non-volatile RAM – Main Menu, Event Viewer, NVRAM Events, Clear NVRAM Event Log

Clear Statistics – Main Menu, Additional Info and Management, Clear Statistics

Coercion Method, physical drives – Main Menu, Subsystem Management, Controller Management, individual Controller, Controller Settings

Command Queuing – Main Menu, Physical Drive Management, Global Physical Drive Settings

Controller Management – Main Menu, Subsystem Management

Controller Settings – Main Menu, Subsystem Management, Controller Management, individual Controller, Controller Settings

D

Date and Time, setting – Main Menu, Subsystem Management

DHCP, management port – Main Menu, Network Management, management port, NetMgmt Ethernet Port Settings

Disk Array, create/delete – Main Menu, Disk Array Management

Disk Array, locate – Main Menu, Disk Array Management, individual disk array

DMA Mode – Main Menu, Physical Drive Management, Global Physical Drive Settings

E

Email, settings – Main Menu, Additional Info and Management, Software Management, Email

Enclosure, date and time – Main Menu, Subsystem Management

Enclosure, locate – Main Menu, Subsystem Management, Enclosure Management

Enclosure, management – Main Menu, Subsystem Management

Enclosure, settings – Main Menu, Subsystem Management, Enclosure Management

Enclosure, temperature – Main Menu, Subsystem Management, Enclosure Management, Temperature Sensors

Enclosure, voltage – Main Menu, Subsystem Management, Enclosure Management, Voltage Sensors

E, continued

Error Block Threshold, RC – Main Menu, Background Activity, Background Activity Settings

Event Log, runtime – Main Menu, Event Viewer

Event Log, non-volatile RAM – Main Menu, Event Viewer, NVRAM Events

F

Fans – Main Menu, Subsystem Management, Enclosure Management

Flash through TFTP – Main Menu, Additional Info and Management, Flash through TFTP

Force Offline/Online – Main Menu, Physical Drive Management, individual drive

FRU VPD – Main Menu, Subsystem Management, Enclosure Management

G

Gateway IP Address, management port – Main Menu, Network Management, management port, NetMgmt Ethernet Port Settings

I

Inconsistent Block Table, logical drive – Main Menu, Logical Drive Management, individual logical drive, Check Table

Information, physical drive – Main Menu, Physical Drive Management, individual drive

Initialization, rate – Main Menu, Background Activity, Background Activity Settings

Initialization, start/stop – Main Menu, Logical Drive Management, individual logical drive, Background Activity

IP Address, management port – Main Menu, Network Management, management port, NetMgmt Ethernet Port Settings

L

Locate, disk array – Main Menu, Disk Array Management, individual disk array

Locate, enclosure – Main Menu, Subsystem Management, Enclosure Management

Locate, logical drive – Main Menu, Logical Drive Management, individual logical drive

Locate, physical drive – Main Menu, Physical Drive Management, individual drive

Lock Management – Main Menu, Subsystem Management

L, continued

Logical Drive, locate – Main Menu, Logical Drive Management, individual logical drive

Logical Drive, read cache – Main Menu, Logical Drive Management, individual logical drive

Logical Drive, write cache – Main Menu, Logical Drive Management, individual logical drive

Logical Drives, in disk array – Main Menu, Disk Array Management, individual disk array

LUN, assign to logical drive – Main Menu, Additional Info and Management, LUN Mapping, SCSI channel

LUNs – Main Menu, Additional Info and Management, LUN Mapping

LUN Mapping – Main Menu, Additional Info and Management, LUN Mapping

M

Management Port, settings – Main Menu, Network Management, management port, NetMgmt Ethernet Port Settings

Media Patrol, enable/disable – Main Menu, Background Activity, Background Activity Settings

Media Patrol, start/stop – Main Menu, Subsystem Management

Migration, disk array – Main Menu, Disk Array Management, individual Disk Array

Migration, rate – Main Menu, Background Activity, Background Activity Settings

N

Netsend, settings – Main Menu, Additional Info and Management, Software Management, Netsend

P

Password, user – Main Menu, Additional Info and Management, User Management, individual User, Change Password...

PDM, disk array – Main Menu, Disk Array Management, individual disk array

PDM, rate – Main Menu, Background Activity, Background Activity Settings

PFA Condition, clear – Main Menu, Physical Drive Management, individual Physical Drive

Physical Drives – Main Menu, Physical Drive Management

P, continued

Physical Drives, coercion method – Main Menu, Subsystem Management, Controller Management, individual Controller, Controller Settings

Physical Drives, in disk array – Main Menu, Disk Array Management, individual disk array

Physical Drives, SMART settings – Main Menu, Subsystem Management, Controller Management, Controller Settings

Power Supplies – Main Menu, Subsystem Management, Enclosure Management

R

Read Cache, logical drive – Main Menu, Logical Drive Management, individual logical drive

Read Cache, physical drive – Main Menu, Physical Drive Management, Global Physical Drive Settings

Read Check Table, logical drive – Main Menu, Logical Drive Management, individual logical drive, Check Table

Reassigned Block Threshold, RC – Main Menu, Background Activity, Background Activity Settings

Rebuild, disk array – Main Menu, Disk Array Management, individual disk array

Rebuild, rate – Main Menu, Background Activity, Background Activity Settings

Redundancy Check, rate and settings – Main Menu, Background Activity, Background Activity Settings

Redundancy Check, start/stop – Main Menu, Logical Drive Management, individual logical drive, Background Activity

Restart – Main Menu, Additional Info and Management, Shutdown

Restore Factory Defaults – Main Menu, Additional Info and Management, Restore Factory Defaults

S

Settings, restore defaults – Main Menu, Additional Info and Management, Restore Factory Defaults

Shutdown – Main Menu, Additional Info and Management, Shutdown

SLP, settings – Main Menu, Additional Info and Management, Software Management, SLP

SMART, enable/disable, settings – Main Menu, Subsystem Management, Controller Management, Controller Settings

S, continued

SNMP, settings – Main Menu, Additional Info and Management, Software Management, SNMP

Software Management – Main Menu, Additional Info and Management

Spare Drive, check – Main Menu, Additional Info and Management, Spare Drive Management, Spare drive

Spare Drive, create/delete – Main Menu, Additional Info and Management, Spare Drive Management

Spare Drive, settings – Main Menu, Additional Info and Management, Spare Drive Management, Spare drive

Spare Drives, in disk array – Main Menu, Disk Array Management, individual disk array

Spare Drives, list – Main Menu, Additional Info and Management, Spare Drive Management

Stale Condition, clear – Main Menu, Physical Drive Management, individual Physical Drive

Statistics, clear – Main Menu, Additional Info and Management, Clear Statistics

Statistics, Controller – Main Menu, Subsystem Management, Controller Management, individual Controller

Statistics, logical drive – Main Menu, Logical Drive Management, individual logical drive

Statistics, physical drive – Main Menu, Physical Drive Management, individual drive

Subnet Mask, management port – Main Menu, Network Management, management port, NetMgmt Ethernet Port Settings

Synchronization, rate – Main Menu, Background Activity, Background Activity Settings

System Date & Time – Main Menu, Subsystem Management

T

Target, assign to logical drive – Main Menu, Additional Info and Management, LUN Mapping, SCSI channel

Telnet, settings – Main Menu, Additional Info and Management, Software Management, Telnet

Temperature Sensors – Main Menu, Subsystem Management, Enclosure Management

T, continued

Temperature, enclosure – Main Menu, Subsystem Management, Enclosure Management, Temperature Sensors

TFTP, flash – Main Menu, Additional Info and Management, Flash through TFTP

Time and Date, setting – Main Menu, Subsystem Management

Transition, disk array – Main Menu, Disk Array Management, individual disk array

Transition, rate – Main Menu, Background Activity, Background Activity Settings

Transport, disk array – Main Menu, Disk Array Management, individual disk array

Transport, rate – Main Menu, Background Activity, Background Activity Settings

U

User, create/delete – Main Menu, Additional Info and Management, User Management

User, password – Main Menu, Additional Info and Management, User Management, user from list

User, privilege – Main Menu, Additional Info and Management, User Management, user from list

User, settings – Main Menu, Additional Info and Management, User Management, user from list

User, status – Main Menu, Additional Info and Management, User Management, user from list

User Management – Main Menu, Additional Info and Management

V

Voltage Sensors – Main Menu, Subsystem Management, Enclosure Management

Voltage, enclosure – Main Menu, Subsystem Management, Enclosure Management, Voltage Sensors

W

Webserver, settings – Main Menu, Additional Info and Management, Software Management, Webserver

Write Cache, logical drive – Main Menu, Logical Drive Management, individual logical drive

Write Cache, physical drive – Main Menu, Physical Drive Management, Global Physical Drive Settings

W, continued

Write Check Table, logical drive – Main Menu, Logical Drive Management, individual logical drive, Check Table

This is the end of the CLU Function Map

Quick Setup

Quick Setup is discussed under “VTrak Setup with CLI or CLU” on page 17.

Subsystem Management

Subsystem Management includes, Alias, Media Patrol, Lock Management, System Date and Time, Controller Management and Enclosure Management.

Alias

An alias is optional. To set an Alias for this subsystem:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Type and alias into the Alias field.
Maximum of 48 characters. Use letters, numbers, space between words and underscore.
3. Press Ctrl-A to save your settings.

Media Patrol

Media Patrol is a routine maintenance procedure that checks the magnetic media on each disk drive. Media Patrol checks all physical drives assigned to disk arrays and spare drives. It does not check unconfigured drives.

To start, stop, pause or resume Media Patrol:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Media Patrol* and press enter.
3. Highlight *Start, Stop, Pause, or Resume* and press Enter.
4. If you chose Stop, press Y to confirm.

Lock Management

This function displays lock status and enables you to lock or unlock a subsystem controller. The lock prevents other sessions (including by the same user) from making a configuration change to the controller until the lock expires or a forced unlock is done. When the user who locked the controller logs out, the lock is automatically released.

To access lock settings:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Lock Management* and press Enter.

To set the lock:

1. In the Lock Time field, type a lock time in minutes.
1440 minutes = 24 hours
2. Highlight *Lock* and press Enter.

To reset the lock with a new time:

1. In the Lock Time field, type a lock time in minutes.
1 to 1440 minutes (24 hours)
2. Highlight *Renew* and press Enter.

To release your own lock, highlight *Unlock* and press Enter.

To release somebody else's lock:

1. Highlight *Force Unlock* and press the Spacebar to change to *Yes*.
2. Highlight *Unlock* and press Enter.

System Date and Time

Use this screen to make Date and Time settings:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Modify System Date and Time* and press Enter.
3. Highlight the System Date or System Time setting.
4. Press the backspace key to erase the current value.
5. Type in a new value.
6. Press Ctrl-A to save your settings.

Controller Management

Controller Management includes information, settings and statistics. To access Controller Management:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Controller Management* and press Enter.
3. Highlight the controller you want and press Enter.
Basic Controller information displays.

To access additional controller information, highlight *Advanced Information* and press Enter.

To access controller statistics, highlight *Controller Statistics* and press Enter.

Controller Settings

Controller settings include controller alias, disk drive capacity coercion, cache line size and SMART settings. To access Controller settings:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Controller Management* and press Enter.
3. Highlight the controller you want and press Enter.
4. Highlight *Controller Settings* and press Enter.

From this point, you can make settings to the Alias, Coercion and SMART functions.

Alias

An alias is optional. To set an Alias for this controller:

1. Type and alias into the Alias field.
Maximum of 48 characters. Use letters, numbers, space between words and underscore.
2. Press Ctrl-A to save your settings.

Physical Drive Coercion

Physical Drive Coercion is a function of the RAID system to adjust for physical drives of different sizes by reducing or coercing the capacity of the larger drives to match the smaller ones.

To enable/disable coercion:

1. Highlight *Coercion* and press the spacebar to toggle between *Enable* and *Disable*.
2. Highlight *Coercion Method* and press the spacebar to toggle through:
 - GB Truncate – Reduces the capacity to the nearest 1 GB boundary
 - 10 GB Truncate – Reduces the capacity to the nearest 10 GB boundary
 - Grp (group) Rounding – Uses an algorithm to determine truncation. Results in the maximum amount of usable drive capacity
 - Table Rounding – Applies a predefined table to determine truncation
3. Press Ctrl-A to save your settings.

SMART

SMART is the Self-Monitoring, Analysis and Reporting function of physical drives. The Controller polls the physical drives for problems and reports the results.

To make SMART settings:

1. Highlight *SMART* and press the spacebar to toggle between *Enable* and *Disable*.
2. Highlight *SMART Poll Interval* and press the backspace key to erase the current value.
3. Type a new interval value in minutes.
1 to 1440 minutes (24 hours)
4. Press Ctrl-A to save your settings.

Enclosure Management

Enclosure Management includes information, status, settings and location. To access Enclosure Management:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.

To access FPU VPD information (vital product data on field replaceable units), highlight *FPU VPD Information* and press Enter.

To access the current status of the power supplies, blowers, temperature or voltage sensors, highlight the item you want and press Enter.

Enclosure Status

Enclosure Management

The current status of the power supplies, blowers, temperature or voltage sensors:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight power supplies, blowers, temperature or voltage sensors and press Enter.

Power Supply Units

This screen displays the operational and fan status of VTrak's two power supplies.

- PSU (power supply unit) status – Should show Power On and Functional
- Fan Status – Should show Functional
- Healthy Threshold – Minimum acceptable fan speed
- Current Fan Speed – Should be greater than the Healthy Threshold value

If any status differs from those listed above or the fan speed is below the Healthy Threshold value, there is a fan/power supply malfunction. See "Chapter 6: Maintenance" on page 167.

Blowers

This screen displays the status and speed of VTrak's blowers. There is one blower in each cooling unit.

- Blower status should be Functional
- Healthy Threshold – Minimum acceptable fan speed
- Current Speed – Should be greater than the Healthy Threshold value

If either blower speed is below the Healthy Threshold, there is a blower malfunction. See “Chapter 6: Maintenance” on page 167.

Voltage Sensors

There are three power supply circuits inside the VTrak.

- Voltage Sensor – Circuits: 3.3V, 5.0V, 12V
- Healthy Threshold – Normal voltage range for each circuit
- Current Voltage – Should be within the Healthy Threshold values

If any voltage is outside the Healthy Threshold values, there is a voltage malfunction in the enclosure. See “Chapter 8: Troubleshooting” on page 203.

Temperature Sensors

The number and type of sensors depends on the VTrak model. Controller sensors normally run warmer than backplane sensors.

- Sensor number
- Location – Backplane or Controller
- Healthy Threshold – Maximum acceptable temperatures.
- Current Temperature – Should be less than the Healthy Threshold value.

If any temperature exceeds the Healthy Threshold value, there is an overheat condition in the enclosure. See “Chapter 8: Troubleshooting” on page 203.

Enclosure Settings

Enclosure settings include internal sensor polling intervals and temperature thresholds. To access Enclosure settings:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight *Enclosure Settings* and press Enter.

From this point, you can make settings to the polling interval and temperature thresholds.

Polling Interval

Polling interval refers to the interval of time at which the Controller polls the Enclosure temperature sensors and reports their values.

To make polling interval settings:

1. Highlight *Polling Interval* and press the backspace key to erase the current value.
2. Type a new interval value in seconds.
15 to 255 seconds (4 minutes, 15 seconds)
3. Press Ctrl-A to save your settings.

Temperature Thresholds

Temperature thresholds are the temperature levels the Controller will report as a Warning or Critical. For most applications, the factory default settings are recommended.

To change temperature thresholds:

1. Highlight the Enclosure Temperature Warning threshold and press the backspace key to erase the current value.
2. Type a new interval value in degrees C.
Note the acceptable range of temperature values in the brackets.
3. Do the same action to set the other thresholds.
4. Press Ctrl-A to save your settings.

Batteries

This feature enables you monitor and recondition the subsystem battery or batteries.

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight *Batteries* and press Enter.
4. Highlight the battery you want to monitor and press Enter.
5. Battery condition is expressed in the following items:
 - Temperature Threshold Discharge – If battery exceeds this value while charging, replace the battery
 - Battery Temperature – Should stay below charge and discharge thresholds
 - Battery Voltage – Approximately 3900 mV is normal
 - Battery Status – “FullyCharged” is normal. If it says “Malfunction”, replace the battery

- Remaining Capacity – When status is “FullyCharged”, capacity should be at least 90%. If less, replace the battery
- Temperature Threshold Charge – If battery exceeds this value while charging, replace the battery
- Battery Current – Positive during charge, negative during discharge

To recondition the battery:

1. Highlight *Recondition Battery* and press Enter.
2. Press Y to confirm.

Reconditioning the battery is a full discharge and recharge.

Locate Enclosure

This feature helps you identify the physical VTrak enclosure you are working with through the CLU.

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight *Locate Enclosure* and press Enter.

The LEDs on the front of the VTrak will blink for one minute.

Physical Drive Management

Physical Drive Management includes global and individual settings for physical disk drives.

Global Physical Drive Settings

This screen enables you to make settings that apply to all physical drives in this VTrak enclosure.

1. From the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight *Global Physical Drives Settings* and press Enter.

Write Cache

This feature enables/disables the write cache on all physical drives.

1. Highlight *Write Cache* and press the spacebar to toggle between *Enabled* and *Disabled*.
2. Press Ctrl-A to save your settings.

Read Ahead Cache

This feature enables/disables the read ahead cache on all physical drives.

1. Highlight *Read Look Ahead Cache* and press the spacebar to toggle between *Enabled* and *Disabled*.

2. Press Ctrl-A to save your settings.

DMA Mode

This feature switches between UDMA and MDMA modes on all physical drives.

1. Highlight *DMA Mode* and press the spacebar to toggle through UDMA 0 – 5 and MDMA 0 – 2.
2. Press Ctrl-A to save your settings.

Command Queuing

This function enables/disables the command queuing on all physical drives that support this feature.

1. Highlight *CmdQueuing* and press the spacebar to toggle between *Enabled* and *Disabled*.
2. Press Ctrl-A to save your settings.

Individual Physical Drive Settings

This screen enables you to make settings that apply to individual physical drives in this VTrak enclosure.

1. From the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight the physical drive of your choice and press Enter.

Alias

An alias is optional. To set an Alias for this physical drive:

1. Type an alias into the Alias field.
Maximum of 32 characters. Use letters, numbers, space between words and underscore.
2. Press Ctrl-A to save your settings.

Advanced Information

To view advanced information about this physical drive, highlight *Advanced Information* and press Enter.

Physical Drive Statistics

To view the statistics for this physical drive, highlight *Physical Drive Statistics* and press Enter.

Clear Stale and PFA Conditions

The Clear Stale and Clear PFA functions only appear when those conditions exist on the physical drive.

Highlight *Clear Stale* or *Clear PFA* and press Enter.

If a physical drive is still online and shows a PFA error but “Clear PFA” does not appear, use PDM to copy the data to a new physical drive. Go to Disk Array Info and Settings.

If a physical drive is offline and shows a PFA error, rebuild the disk array. Go to Disk Array Info and Settings. After rebuilding, the drive will show Stale. Run Clear Stale then run Clear PFA.

If the physical drive with a PFA error is a spare, you must delete the drive as a spare, then Clear PFA will be available.

After you clear a PFA error, watch for another PFA error to appear. If it does, replace the physical drive.

Force Physical Drive Offline/Online

The Physical Drive—Force Offline/Online function enables you to force an:

- Online physical drive to go Offline
- Offline physical drive to go Online

The Force Offline/Online function appears only for physical drives that are assigned to disk arrays.



Caution

Forcing a physical drive offline or online is likely to cause data loss. Back up your data before you proceed. Use these functions only when required.

1. From the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight *Global Physical Drives Settings* and press Enter.
3. Highlight the physical drive of your choice and press Enter.
4. Highlight *Force Offline* or *Force Online* and press Enter.
5. Press Y to confirm.

Locate Physical Drive

This feature helps you identify a physical drive within the VTrak enclosure you are working with through the CLU.

1. From the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight *Global Physical Drives Settings* and press Enter.
3. Highlight the physical drive of your choice and press Enter.
4. Highlight *Locate Physical Drive* and press Enter.

The drive carrier LEDs on the front of the VTrak will blink for one minute.

Disk Array Management

Disk Array Management includes the creation and deletion of disk arrays, disk array settings and functions, and also logical drive creation and deletion.

Create a Disk Array

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight *Create New Array* and press Enter.
3. Highlight *Configuration Method* and press the spacebar to toggle through *Automatic*, *Express*, and *Advanced*.
 - Automatic – Creates a default disk array and logical drive based on unconfigured physical drives in the system. No user choices. Go to “Automatic” below.
 - Express – You select the RAID characteristics and type of application. Creates a disk array and logical drive(s) based on your input. Go to “Express” below.
 - Advanced – You specify all parameters for a new disk array. One logical drive will be made automatically when you create the disk array. If you select less than the total available capacity, you can use the remaining space to create additional logical drives at a later time. Go to “Advanced” below.

If you are uncertain about choosing parameters for your disk array, use the Express or Automatic option to create your disk array.

Automatic

Review the proposed configuration of disk array and logical drive(s).

To accept the proposed configuration and create the disk array and logical drive(s), highlight *Save Configuration* and press Enter.

To reject the proposed configuration, highlight *Cancel Array Configuration* and press Enter. You will return to the Disk Arrays Summary screen.

To create a disk array with different characteristics, repeat the steps above specifying different parameters but choose the Express or Advanced option.

Express

1. Highlight *Configuration Method* and press to spacebar to select each of the following characteristics for your disk array:
 - Redundancy
 - Capacity
 - Performance
 - Spare Drive

2. Highlight *Number of Logical Drives* and press the backspace key to erase the current value.
3. Enter the number of logical drives you want.
4. Highlight *Application Type* and press the spacebar to toggle through the applications and select the best one for your disk array.
 - File Server
 - Video Stream
 - Transaction Data
 - Transaction Log
 - Other
5. Press Ctrl-A to save your settings and move to the next screen.
6. Review the proposed configuration of disk array and logical drive(s).

To accept the proposed configuration and create the disk array and logical drive(s), highlight *Save Configuration* and press Enter.

To reject the proposed configuration, highlight *Cancel Array Configuration* and press Enter. You will return to the Disk Arrays Summary screen.

To create a disk array with different characteristics, highlight *Create New Array* and press Enter. Repeat the steps above specifying different parameters.

Advanced

For more information on the choices below, see "Chapter 7: Technology Background" on page 179.

1. Choose whether to enable Media Patrol and PDM.
2. If you want to specify an alias to the disk array, highlight *Alias* and type a name.

Maximum of 32 characters. Use letters, numbers, space between words and underscore.
3. Highlight *Save Settings* and Continue and press Enter.
4. Highlight a physical drive you want to add to your array and press the spacebar to select it.

Repeat this action until you have selected all the physical drives for your array.
5. Highlight *Save Settings and Continue* and press Enter.
6. If you want to specify an alias to the logical drive, highlight *Alias* and type a name.

Maximum of 32 characters. Use letters, numbers, space between words and underscore.

7. Highlight *RAID Level* and press the spacebar to toggle through a list of available RAID levels.
8. If you want to create multiple logical drives, highlight *Capacity*, press the backspace key to remove the current value, then type a new smaller value.
9. Highlight *Stripe* and press the spacebar to toggle through stripe sizes 8KB, 16KB, 32KB, 64KB, 128KB, 256KB, 512KB, or 1MB.
10. Highlight *Sector* and press the spacebar to toggle through sector sizes 512B, 1KB, 2KB, or 4KB.
11. Highlight *Write Policy* and press the spacebar to toggle write cache policy between *WriteBack* and *WriteThru* (write through).
12. Highlight *Read Policy* and press the spacebar to toggle read cache policy through *ReadCache*, *ReadAhead*, and *NoCache*.
13. Highlight *Save Logical Drive* and press Enter.
14. Review logical drive(s) you are about to create for your new array. Then do one of the following actions:
 - If you agree with the logical drive(s) as specified, highlight *Complete Disk Array Creation* and press Enter. A note will appear to remind you to set up LUN mapping for your new logical drive(s). Press any key to continue.
 - If you specified less than the full capacity for the logical drive in the previous screen, and you want to add another logical drive now, highlight *Create New Logical Drive* and press Enter.
 - If you do not agree with the logical drive(s), highlight *Return to Previous Screen* and press Enter to begin the process again.

Delete a Disk Array



Caution

When you delete a disk array, you delete all the logical drives and the data they contain. Back up all important data before deleting a disk array.

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want to delete and press the spacebar to mark it. The mark is an asterisk (*) to the left of the listing.
3. Highlight *Delete Marked Arrays* and press Enter.
4. Press Y to confirm the deletion.

Disk Array Information

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
The information and settings screen appears.
3. Highlight any of the following and press Enter to view a list of:
 - Spare drives in this array, dedicated and global
 - Physical drives in this array
 - Logical drives in this array

Disk Array Settings and Functions

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
The information and settings screen appears.

Alias

1. To set an alias for this disk array, highlight *Alias* and type an alias into the field.
Maximum of 32 characters. Use letters, numbers, space between words and underscore. An alias is optional.
2. Press Ctrl-A to save your settings.

Media Patrol

1. Highlight *Media Patrol* and press the spacebar to toggle between *Enable* and *Disable*.
2. Press Ctrl-A to save your settings.

PDM

1. Highlight *PDM* (Predictive Data Migration) and press the spacebar to toggle between *Enable* and *Disable*.
2. Press Ctrl-A to save your settings.

Transport

This function prepares the physical drives in the disk array for moving to new drive slots.

To run the Transport function, highlight *Transport* and press Enter.

Rebuild

This function rebuilds the disk array's data onto a replacement physical drive. Use this function after a disk array has gone critical.

1. Highlight *Rebuild* and press Enter.

2. Specify the source and target physical drives.
3. Highlight *Start* and press Enter.

Migration

This function includes RAID level migration (change existing array to a different RAID level or Online Capacity Expansion (add physical drives to an existing array). In order to migrate RAID level, you may have to add physical drives. For more information, see “RAID Level Migration” on page 195.

1. Highlight *Migration* and press Enter.
2. Highlight the physical drive you want to add and press the spacebar to select it.
Repeat this action to add more physical drives.



Notes

- You can add physical drives to a RAID 50 array but you cannot change the number of axes.
- If you add an odd number of physical drives to a RAID 10 array, it will become a RAID 1E array by default.

3. Highlight *Save Settings and Continue* and press Enter.
4. To change RAID level, Highlight the logical drive in the list and press Enter.
5. Highlight *RAID Level* and press the spacebar to toggle through the available RAID levels.
6. Highlight *Capacity*, press the backspace key to erase the current logical drive capacity and type in the new value.
The new value must be equal or larger than the current capacity.
7. Highlight *Save Logical Drive* and press Enter.
The screen returns to Disk Array Migration Logical Drives.
8. Highlight *Complete Disk Array Migration* and press Enter.
9. In the confirmation message, press Y to confirm.
The screen jumps to Disk Arrays Summary.

Predictive Data Migration

This function rebuilds the disk array’s data onto a replacement physical drive. Use this function after a disk array has gone critical. PDM must be enabled (see above).

1. Highlight *Predictive Data Migration* and press Enter.
2. Specify the source and target physical drives.
3. Highlight *Start* and press Enter.

Transition

Transition is the process of replacing a revertible spare drive that is currently part of a disk array with an unconfigured physical drive or a non-revertible spare drive. The revertible spare drive will return to its original status. For more information, see “Transition” on page 200.

In order to run Transition, the spare drive must be Revertible. In addition, you must specify an unconfigured physical drive of the same or larger capacity to replace the revertible spare drive.

1. Highlight *Transition* and press Enter.
2. Specify the source and target physical drives.
3. Highlight *Start* and press Enter.

Accept Incomplete Array

This function appears when a physical drive was missing at startup.

Highlight *Accept Incomplete Array* and press Enter to enable a Rebuild of the disk array.

Do not use this function if the physical drive was manually removed from the enclosure.

Locate Disk Array

This feature helps you identify the physical drives assigned to the disk array you are working with in the CLU.

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
3. Highlight *Locate Disk Array* and press Enter.

The drive carrier LEDs pertaining to this disk array will blink for one minute.

Create a Logical Drive

You can create logical drives on existing disk arrays if there is available space in the array. For more information on the choices below, see “Chapter 7: Technology Background” on page 179.

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array in which you want to create a logical drive and press Enter.
3. Highlight *Create New Logical Drive* and press Enter.

The Disk Array ID number and Maximum capacity available for the new logical drive are displayed.

4. Highlight the following parameters and press the backspace key to erase the current value:
 - Alias - Type an alias into the field, if desired. Maximum of 32 characters. Use letters, numbers, space between words and underscore.
 - Capacity - Maximum capacity shown. Enter a smaller capacity if desired.
5. Highlight the following parameters and press the spacebar to toggle through the available choices:
 - Stripe size – Press the spacebar to select: 8, 16, 32, 64, 128, 256, 512 KB, or 1 MB
 - Sector size – Press the spacebar to select: 512 B; 1, 2, or 4 KB
 - Write Policy – Press spacebar to select: Write Back or Write Through
 - Read Policy – Press spacebar to select: No Cache, Read Cache, or Read Ahead Cache
6. Press Ctrl-A to save your settings.



Note

If you did not use all of the available capacity of the disk array, you can create an additional logical drive at this point.

Delete a Logical Drive



Caution

When you delete a logical drive, you delete all the data it contains. Back up all important data before deleting a logical drive.

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array that contains the logical drive you want to delete and press Enter.
3. Highlight the logical drive you want to delete and press the spacebar to mark it.
The mark is an asterisk (*) to the left of the listing.
4. Highlight *Delete Marked Logical Drives* and press Enter.
5. Press Y to confirm the deletion.

Logical Drive Management

This function deals with settings and functions of existing logical drives. To create or delete a logical drive, see “Disk Array Management” on page 141.

Logical Drive Information

1. From the Main Menu, highlight *Logical Drive Management* and press Enter.
2. Highlight the logical drive you want and press Enter.
The information and settings screen appears.
3. Highlight any of the following and press Enter to view more information:
 - Check Table – Read Check, Write Check, and Inconsistency Check Tables
 - Logical Drive Statistics

Logical Drive Settings and Functions

1. From the Main Menu, highlight *Logical Drive Management* and press Enter.
2. Highlight the logical drive you want and press Enter.

Alias

1. To set an alias for this disk array, highlight *Alias* and type an alias into the field.
Maximum of 32 characters. Use letters, numbers, space between words and underscore. An alias is optional.
2. Press Ctrl-A to save your settings.

Write Cache Policy

1. To set write cache policy for this disk array, highlight *WritePolicy* and press the spacebar to toggle between *WriteBack* and *WriteThru* (write though).
2. Press Ctrl-A to save your settings.

Read Cache Policy

1. To set read cache policy for this disk array, highlight *ReadPolicy* and press the spacebar to toggle though *ReadCache*, *ReadAhead* and *None*.
2. Press Ctrl-A to save your settings.

Initialization

This function sets all data bits in the logical drive to zero.



Caution

When you initialize a logical drive, you delete all the data it contains. Back up all important data before initializing a logical drive.

1. Highlight *Background Activity* and press Enter.
2. Highlight *Start Initialization* and press Enter.

The initialization parameters appear.

- Initialization pattern. The default 00000000 is best for most applications
- Quick Initialization – Yes means only the disk data format of the logical drives are initialized.
- Quick Initialization Rate – Enter a value or use the default 64 bits.

To change a parameter, highlight it and press the backspace key to erase the current value, then type the new value.

3. Highlight *Start* and press Enter.

If necessary, you can pause and resume or stop and restart the Initialization. You cannot access the logical drive until Initialization has finished.

Redundancy Check

This function is a maintenance procedure for logical drives in fault-tolerant disk arrays that ensures all the data matches exactly.

1. Highlight *Background Activity* and press Enter.
2. Highlight *Start Redundancy Check* and press Enter.

The redundancy check parameters appear.

- Auto Fix – Corrects inconsistencies automatically
- Pause On Error – Pauses the Redundancy Check when an error is found

To change a parameter, highlight it and press the backspace toggle between *Yes* and *No*.

3. Highlight *Start* and press Enter.

If necessary, you can pause and resume or stop and restart the Redundancy Check. You can use the logical drive while Redundancy Check is running.

Locate Logical Drive

This feature helps you identify the physical drives assigned to the logical drive you are working with in the CLU.

1. From the Main Menu, highlight *Logical Drive Management* and press Enter.
2. Highlight the disk array you want and press Enter.
3. Highlight *Locate Logical Drive* and press Enter.

The drive carrier LEDs pertaining to this logical drive will blink for one minute.

Network Management

Network Management deals with network connections and settings for VTrak's Management Port.

Management Port Settings

1. From the Main Menu, highlight *Network Management* and press Enter.
2. Highlight the management port and press Enter.
3. Highlight *NetMgmt Ethernet Port Settings* and press Enter

The settings screen appears. You can enable DHCP or make settings manually.

DHCP

If you enable DHCP, IP Address, Subnet Mask and Gateway are set automatically.

1. Highlight *DHCP* and press the spacebar to toggle to *Enabled*.
2. Press Ctrl-A to save your settings.

Manual

1. Highlight *DHCP* and press the spacebar to toggle to *Disabled*.
2. Highlight each of the following and press the backspace key to erase the current value, then type the new value.
 - IP Address
 - Subnet Mask
 - Default Gateway IP Address
 - DNS Server IP Address
3. Press Ctrl-A to save your settings.

SCSI Management

SCSI Management deals with all SCSI settings and functions. This feature appears only with VTrak SCSI models.

Channel Information

1. From the Main Menu, highlight *SCSI Management* and press Enter.
2. Highlight one of the SCSI ports to select it and press Enter.
3. Highlight *Channel Info* and press Enter.

This screen displays SCSI Channel Information:

- Maximum Data Transfer Rate
- Maximum LUNs per Target
- Termination Status
- List of currently assigned targets
- Status of currently assigned targets

There are no user settings on this screen.

Channel Settings

1. From the Main Menu, highlight *SCSI Management* and press Enter.
2. Highlight one of the SCSI ports to select it and press Enter.
3. Highlight *Channel Settings* and press Enter.

This screen displays a list of the 16 Targets and Termination for the selected SCSI channel.

To enable a SCSI target:

1. Highlight the target you want.
2. Press the spacebar to toggle between *Enabled* and *Disabled*.
3. Type Ctrl-A save your settings.



Note

You must reboot the VTrak for new settings to become effective.

To set Termination for the VTrak SCSI controller “Out” connectors:

1. Highlight *Termination Control*.
2. Press the spacebar to toggle through *Automatic*, *On* and *Off*,

3. Type Ctrl-A save your settings.



Cautions

- Turn off termination only when the VTrak is NOT the last device in the SCSI chain.
 - Internal termination only works on the “Out” SCSI connectors.
-

Target Information

1. From the Main Menu, highlight *SCSI Management* and press Enter.
2. Highlight one of the SCSI ports to select it and press Enter.
3. Highlight *Target Info* and press Enter.

This screen displays a list of the 16 SCSI Targets for the selected SCSI channel.

To see information and statistics on an enabled SCSI Target, highlight the Target you want to see and press Enter.



Note

Enable Targets in the SCSI Channel Settings screen.

Background Activity

Background activity refers to any of several functions that take place in the background while normal operation of the VTrak continues.

From the Main Menu, highlight *Background Activity* and press Enter. A count of current background activities appears, including:

- Rebuild
- PDM
- Synchronization
- Redundancy Check
- Migration
- Transition
- Initialization
- Media Patrol

Background Activity Settings

Use this feature to make settings for Background Activities. The Activities themselves are started manually or automatically in conjunction with a specific disk array or logical drive.

1. From the Main Menu, highlight *Background Activity* and press Enter.
2. Highlight *Background Activity Settings* and press Enter.
3. Highlight following and press the spacebar to toggle between *Enabled* and *Disabled*.
 - Media Patrol – Checks the magnetic media on physical drives
 - Auto Rebuild – If there is no spare drive of adequate capacity, but this function is Enabled, the disk array will begin to rebuild automatically as soon as you remove the failed physical drive and install an unconfigured physical drive in the same slot.
4. Highlight following and press the spacebar to toggle through *Low*, *Medium*, and *High* rates:
 - Rebuild – Checks the data integrity on disk arrays
 - Migration – Change RAID level or add physical drives to disk arrays
 - PDM – Looks for bad blocks on the physical drives of disk arrays
 - Transition – Returns a revertible spare drive to spare status
 - Synchronization – Checks the data integrity on disk arrays
 - Initialization – Sets all data bits in the logical drive to zero
 - Redundancy Check – Checks, reports and can correct data inconsistencies in logical drives

The rates are defined as follows:

Low – Fewer resources to activity, more to data read/write.

Medium – Balance of resources to activity and data read/write.

High – More resources to activity, fewer to data read/write.

5. Highlight the following PDM trigger settings and press the backspace key to erase the current value:
 - Reassigned Block Threshold – 1 to 512 blocks
 - Error Block Threshold – 1 to 1024 blocks
6. Press Ctrl-A to save your settings.

Background Activities List

1. From the Main Menu, highlight *Background Activity* and press Enter.
2. Highlight *Background Activities List* and press Enter.
A list of the current background activities appears.

Event Viewer

The Event Viewer displays log of events. Events are classified as Runtime and NVRAM.

Runtime Events

This screen displays a list of and information about the 1023 most recent runtime events recorded since the system was started.

To display Runtime Events:

1. From the Main Menu, highlight *Event Viewer* and press Enter.

The log of Runtime Events appears. Events are added to the top of the list. Each item includes:

- Sequence number – Begins with 0 at system startup.
- Device – Disk Array, Logical Drive, Physical Drive by its ID number.
- Severity – (lowest to highest) Information, Warning, Minor, Major, Critical and Fatal
- Timestamp – Date and time the event happened.
- Description – A description of the event in plain language.

2. Press the up and down arrow keys to scroll through the log.

To clear the event log:

1. Highlight *Clear Runtime Event Log* and press Enter.
2. Press Y to confirm.

NVRAM Events

This screen displays a list of and information about 63 most recent important events. NVRAM events are stored in non-volatile memory.

To display NVRAM events:

1. From the Main Menu, highlight *Event Viewer* and press Enter.
2. Highlight *NVRAM Events* and press Enter.

The log of NVRAM Events appears. Events are added to the top of the list. Each item includes:

- Sequence number – Begins with 0 at system startup.
- Device – Disk Array, Logical Drive, Physical Drive by its ID number.
- Severity – (lowest to highest) Information, Warning, Minor, Major, Critical and Fatal
- Timestamp – Date and time the event happened.
- Description – A description of the event in plain language.

3. Press the up and down arrow keys to scroll through the log.

To clear the NVRAM event log:

1. Highlight *Clear NVRAM Event Log* and press Enter.
2. Press Y to confirm.

Additional Info and Management

Additional Info and Management includes these functions: Spare Drive Management, LUN Mapping, User Management, Software Management, Flash through TFTP, Clear Statistics, Restore Factory Defaults, and Shutdown/Restart.

Spare Drive Management

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Spare Drive Management* and press Enter.

A list of the current spare drives appears. The following parameters are included:

- ID number
- Operational Status
- Physical Drive ID number
- Configured Capacity
- Revertible – The drive can be returned to spare status after it is used to rebuild a disk array
- Type – Global (all disk arrays) or Dedicated (to a specific disk array)

Create New Spare Drive

Only unconfigured physical drives can be used to make spares. Check your available drives under Physical Drive Management.

1. Highlight *Create New Spare Drive* and press Enter.
2. Highlight *Physical Drive Number* and press the backspace key to erase the current value, then type the new value.

Specify the number of the physical drive you want for your spare. The available drive numbers are in parentheses.

3. Highlight *Revertible* and press the spacebar to toggle between *Yes* and *No*.
A revertible spare drive can be returned to spare drive status after it replaces a failed drive in a disk array. See “Transition” on page 200 for more information.
4. Highlight *Spare Type* and press the spacebar to toggle between *Dedicated* and *Global*.

Dedicated means this spare drive can only be used with the specified disk array(s). Global means this spare drive can be used by any disk array.

5. If you chose Dedicated, highlight *Dedicated to Arrays* and press the backspace key to erase the current value, then type the new value.
Specify the number(s) of the disk array(s) you want to assign your spare. The current disk arrays are listed in parentheses.
6. Press Ctrl-A to save the spare drive.

Spare Drive Settings

This screen displays information about a spare drive. It enables you to change the settings for this spare drive:

- Reversible – Yes means the drive automatically returns to its spare drive assignment after the failed physical drive is replaced.
- Type – Global or Dedicated (to a specific disk array)

To change these settings:

1. Highlight the setting you want to change.
2. Press the spacebar to toggle between the choices.
3. For dedicated spares, type the array number it is assigned to.
4. Press Ctrl-A to save your settings.

To run spare check, highlight *Start Spare Check* and press Enter. The results appear next to Spare Check Status.

Delete Spare Drive



Caution

If the spare drive you delete is the only spare, the controller will not rebuild a critical array until you provide a new spare drive.

1. Highlight the spare drive you want to delete and press the spacebar to mark it.
The mark is an asterisk (*) to the left of the listing.
2. Highlight *Delete Marked Spare Drives* and press Enter.
3. Press Y to confirm the deletion.

LUN Mapping

This function enables you to assign a Target and LUN to each logical drive, so the SCSI initiator can recognize it.

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *LUN Mapping* and press Enter.
3. Highlight a SCSI Channel and press Enter.
A list of the current logical drives appears.

You must enable a Target under SCSI Management before you can assign a LUN to it. See “Channel Settings” on page 151.

To assign a Target and LUN to a logical drive:

1. Highlight the logical drive you want from the list.
2. Under Target ID, type the Target number you want to use.
Target IDs range from 0 to 15.
3. Press the right arrow key to move to the LUN column.
4. Under LUN, type the LUN number you want to use.
LUNs range from 0 to 63. The number of available LUNs may be less, depending on the capability of your SCSI HBA card.
5. Press Ctrl-A to save the LUN Map.

If the logical drive displays in red, the Target you selected is not enabled.

If you select an invalid LUN, this message displays: “WARNING: Target X has no LUN 0 defined!”

User Management

Each user types their user name and password to log into the CLI.

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *User Management* and press Enter.
A list of the current users appears.

Create New User

1. Highlight *Create New User* and press Enter.
2. Highlight each field and type in the appropriate information:
 - User name (no spaces)
 - Password (Optional. Maximum 32 characters. Use letters, numbers, space between words and underscore)
 - Display name (Optional)
3. Highlight *Privilege* and press the space bar to toggle through the options:
 - Super – Allows the user full access to all functions including create and delete users and changing the settings of other users, and delete disk

arrays and logical drives. The default “administrator” account is a Super User.

- Power – Allows the user to create (but not delete) disk arrays and logical drives, change RAID levels, change stripe size; change settings of such components as disk arrays, logical drives, physical drives and the controller.
 - Maintenance – Allows the user to perform maintenance tasks including Rebuilding, PDM, Media Patrol and Redundancy Check.
 - View – Allows the user to see all status and settings but not to make any changes.
4. Highlight *Status* and press the space bar to toggle between the options:
 - Enabled – Allows the user to log in to the system
 - Disabled – Prevents the user from logging in to the system
 5. Press Ctrl-A to save the user.

Password

Each user can change their own password. A Super user can change other user's passwords.

1. Highlight a User in the list and press Enter.
2. Highlight *Change Password...* and press Enter.
3. Highlight *New Password* and type the password.
4. Highlight *Retype Password* and type the password again to verify.
5. Press Ctrl-A to save the password.

User Settings: Display Name and Email Address

Each user can change their display name and email address.

1. Highlight a User in the list and press Enter.
2. Highlight *Display Name* and press Enter.
3. Highlight the items you want and press the backspace key to erase the current value, then type the new value:
 - User name
 - Email address
4. Press Ctrl-A to save the settings.

User Settings: Privilege and Status

No user can change their own privilege or status. To change another user's privilege or status, log in as a Super user.

1. Highlight a User in the list and press Enter.
2. Highlight *Display Name* and press Enter.

3. Highlight *Privilege* and press the space bar to toggle through the options:
 - Super – Allows the user full access to all functions including create and delete users and changing the settings of other users. The default “administrator” account is a Super User
 - Power – Allows the user to create and delete disk arrays and logical drives, change RAID levels, change stripe size
 - Maintenance – Allows the user to perform maintenance tasks including Rebuilding, PDM, Media Patrol and Redundancy Check
 - View – Allows the user to see all status and settings but not to make any changes
4. Highlight *Status* and press the space bar to toggle between the options:
 - Enabled – Allows the user to log in to the system
 - Disabled – Prevents the user from logging in to the system
5. Press Ctrl-A to save the settings.

Delete User

1. Highlight the user you want to delete and press the spacebar to mark it. The mark is an asterisk (*) to the left of the listing.
2. Highlight *Delete Marked Users* and press Enter.
3. Press Y to confirm the deletion.



Note

You cannot delete a user while you are logged in as that user.

Software Management

VTrak's software services include:

- Email
- SLP (Service Location Protocol)
- Webserver
- Telnet
- SNMP (Simple Network Management Protocol)
- CIM (Common Information Model [a protocol])
- Netsend

To start any of these services:

1. Highlight the service and press Enter.
2. In the Service Setting screen, highlight *Start* and press Enter.

To stop any of these services:

1. Highlight the service and press Enter.
2. In the Service Setting screen, highlight *Stop* and press Enter.

To restart any of these services:

1. Highlight the service and press Enter.
2. In the Service Setting screen, highlight *Restart* and press Enter.

Email

1. Highlight *Email* and press Enter.
2. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
3. Highlight the following and press the backspace key to erase the current value, then type the new value:
 - Server IP address
 - Server Port number
4. Highlight *Authentication* and press the spacebar to toggle between *Yes* and *No*.

If you selected *Yes*, type in a User name and Password in the fields provided.

5. The following items are optional but recommended. Highlight and press the backspace key to erase the current value, then type the new value:
 - Sender's email address
 - Subject Line for the email message
6. Press Ctrl-A to save your settings.

To start, stop or restart the Email service, highlight *Start*, *Stop* or *Restart* and press Enter.

SLP

1. Highlight *SLP* and press Enter.
2. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
3. Press Ctrl-A to save your settings.

To start, stop or restart the Email service, highlight *Start*, *Stop*, or *Restart* and press Enter.

Webserver

1. Highlight *Webserver* and press Enter.

2. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
3. Highlight the following and press the backspace key to erase the current value, then type the new value:
 - HTTP Port – 80 is the default
 - Session Time Out – 24 minutes is the default. 1440 minutes = 24 hours
4. Highlight *SSL* and press the spacebar to toggle between *Enabled* and *Disabled*.
5. Highlight *HTTPS Port* and press the backspace key to erase the current value, then type the new value. 443 is the default.
6. Press Ctrl-A to save your settings.

To start, stop or restart the Webserver service, highlight *Start*, *Stop*, or *Restart* and press Enter.

Telnet

1. Highlight *Telnet* and press Enter.
2. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
3. Highlight the following and press the backspace key to erase the current value, then type the new value:
 - Port number – 2300 is the default
 - Session Time Out – 24 minutes is the default. 1440 minutes = 24 hours
 - Maximum number of connections – 4 is the default
4. Press Ctrl-A to save your settings.

To start, stop or restart the Telnet service, highlight *Start*, *Stop*, or *Restart* and press Enter.

SNMP

1. Highlight *SNMP* and press Enter.
2. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
3. Highlight the following and press the backspace key to erase the current value, then type the new value:
 - Port Number – 161 is the default
 - System Name – (optional) Type a system name in this field
 - System Location – Type a country name in this field
 - System Contact – Type the email address of your system administrator in this field

- Read Community – Type a community name in this field
 - Write Community – private (no change possible)
4. Press Ctrl-A to save your settings.

To start, stop or restart the SNMP service, highlight *Start*, *Stop*, or *Restart* and press Enter.

SNMP Trap Sinks

1. Highlight *SNMP* and press Enter.
2. Highlight *Trap Sinks* and press Enter.
A list of the current trap sinks appears.

To add a trap sink:

1. Highlight *Create New Trap Sink* and press Enter
2. Highlight *Trap Sink IP address* and press the backspace key to erase the current value, then type the new IP address in this field.
3. Highlight *Trap Filter* and press the spacebar to toggle through the severity levels.

The Severity Levels are (lowest to highest) Information, Warning, Minor, Major, Critical and Fatal.

4. Press Ctrl-A to save the Trap Sink.

To delete a trap sink:

1. Highlight the trap sink you want to delete and press the spacebar to mark it.
The mark is an asterisk (*) to the left of the listing.
2. Highlight *Delete Marked Entries* and press Enter.

CIM

1. Highlight *CIM* and press Enter.
2. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
3. Highlight *HTTP* and press the spacebar to toggle between *Enabled* and *Disabled*.
4. Highlight *HTTP Port*, press the backspace key to erase, type new value.
5988 is the default port number.
5. Highlight *HTTPS* and press the spacebar to toggle between *Enabled* and *Disabled*.
6. Highlight *HTTPS Port*, press the backspace key to erase, type new value.
5989 is the default port number.
7. Highlight *Authentication* and press the spacebar to toggle between *Enabled* and *Disabled*.

Note: There is only one user. The default name is cim. No changes are possible.

Note: CIM service must be running to change the password.

The default password is password.

8. Highlight *Change Password...* and press Enter to change the password.
9. Highlight *Old Password* and type the current password.
10. Highlight *New Password* and type a new password.
11. Highlight *Retype Password* and type the new password again.
12. Press Ctrl-A to save your settings.

To start, stop or restart the CIM service, highlight *Start*, *Stop*, or *Restart* and press Enter.

Netsend

1. Highlight *Netsend* and press Enter.
2. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
3. Press Ctrl-A to save your settings.

To start, stop or restart the Netsend service, highlight *Start*, *Stop*, or *Restart* and press Enter.

Netsend Recipients

Note that the Messenger service must be running on the recipient PC in order to receive reports.

To add a recipient:

1. Highlight *Netsend* and press Enter.
2. Highlight *Message Recipient* and press Enter.
3. Highlight *Create New Message Recipient* and press Enter.
4. Type the recipient's IP address into the field provided.
5. Highlight *Message Event Severity Filter* and press the spacebar to change severity levels.

The selected level and all higher severity levels of severity will be reported. Severity levels (from lowest to highest) are: Info, Warning, Minor, Major, Critical, and Fatal.

6. Press Ctrl-A to save your settings.

To change recipient settings:

1. Highlight the recipient whose settings you want to change and press Enter.
2. Type the recipient's IP address into the field provided.

3. Highlight *Message Event Severity Filter* and press the spacebar to change severity levels.
4. Press Ctrl-A to save your settings.

To delete a recipient:

1. Highlight the recipient you want to delete and press the spacebar to mark it. The mark is an asterisk (*) to the left of the listing
2. Highlight *Delete Marked Entries* and press Enter.

Flash through TFTP

Use this function to flash the VTrak's firmware. See "Firmware Update – CLU" on page 170 for this procedure.

Clear Statistics

This function clears the statistical counts for the RAID controller, physical drives, and logical drives.

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Clear Statistics* and press Enter.
3. Press Y to confirm the deletion.

Restore Factory Defaults

This function restores the factory default settings to the firmware and software items you select.



Caution

Use this function with care. Do not restore to default settings for any item unless you are sure this action is needed.

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Restore Factory Defaults* and press Enter.
3. Highlight the setting group you want and press the spacebar to toggle between *Yes* and *No*.
Yes means this setting will be restored to the default value.
4. Highlight *Restore Factory Defaults* and press Enter.
5. Press Y to confirm the reset.

Shutdown and Restart

This function enables you to shutdown or restart the VTrak subsystem. You can only do part of this procedure in the CLU. Additional action is required, as described below. What you see on the screen differs whether you have a Telnet or serial connection.

Shutdown over Telnet

To shutdown the VTrak subsystem on a Telnet connection:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Shutdown or Restart* and press Enter.
3. Press the spacebar to display *Shutdown* then press Enter.
A warning message appears.
4. Press Y to continue.
The screen will go blank.
5. Wait for no less than two minutes.
6. Manually turn off the power supply switches on the back of the subsystem.

Shutdown over Serial

To shutdown the VTrak subsystem on a serial connection:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Shutdown or Restart* and press Enter.
3. Press the spacebar to display *Shutdown* then press Enter.
A warning message appears.
4. Press Y to continue"
5. When this message appears:

Shutdown complete. It is now safe to power off
the subsystem.

turn off the power supply switches.

Restart over Telnet

To restart the VTrak subsystem on a Telnet connection:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Shutdown or Restart* and press Enter.
3. Press the spacebar to display *Restart* then press Enter.
A warning message appears.

4. Press Y to continue.
The screen will go blank.
5. Wait for two to three minutes.
6. Re-establish your Telnet connection to the VTrak CLU.
If you cannot re-establish a connection, wait 30 seconds, then try again.

Restart over Serial

To restart the VTrak subsystem on a serial connection:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Shutdown or Restart* and press Enter
3. Press the spacebar to display *Restart* then press Enter.
A warning message appears.
4. Press Y to continue.
The screen will display shutdown and startup functions.
5. When the `Log in:` prompt appears, log into the CLU again.

Buzzer

This function enables the buzzer on the controller. VTrak's audible alarm sounds a 10-second continuous beep to indicate that one or more logical drives is offline.

To change buzzer settings:

1. From the Main Menu, highlight *Buzzer* and press Enter.
A list of Controllers appears with the current buzzer setting and status.
2. Highlight the Controller whose buzzer you want to set and press Enter.
3. Highlight *Enabled* and press the spacebar to toggle between *Yes* and *No*.
4. Press Ctrl-A to save your settings.

Chapter 6: Maintenance

- Firmware Update – WebPAM PROe (page 168)
- Firmware Update – CLU (page 170)
- Replace Power Supply (page 171)
- Replace Cooling Unit Blower (page 172)
- Replace Cache Battery (page 175)
- Replace RAID Controller (page 178)

This Chapter covers the maintenance procedures for VTrak.

The power supplies, cooling unit fans, and the cache battery are hot-swappable field-replaceable components.

The RAID Controller is field-replaceable but you must power-down the VTrak before you remove the RAID Controller.

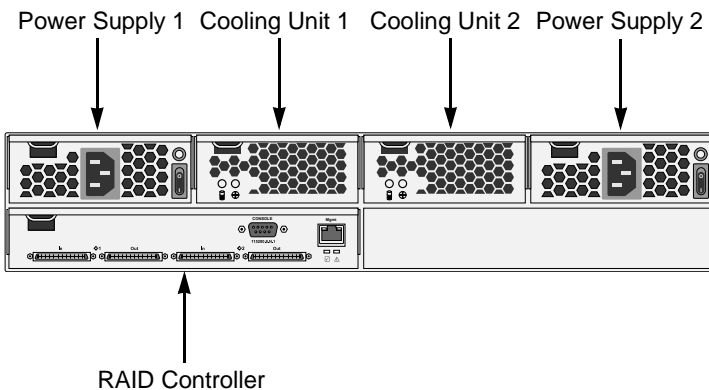


Figure 1. Field Replaceable Units (FRUs) on VTrak M310p/M210p

The primary means to identify and diagnose problems on VTrak is to observe and interpret LED colors. A discussion of this process is found on the next two pages.




All hot-swappable components can be fully diagnosed with LEDs, although the Command Line Utility (CLU) and WebPAM PROe each offer you additional help to make and confirm your diagnosis. See page 203 additional information.

Firmware Update – WebPAM PROe

Before you begin, go to the Promise website www.promise.com and download the latest firmware update file to your TFTP server or your PC.

TFTP Server

To update the firmware from a TFTP server:




1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Software Management  icon.
4. Click on the Firmware Update tab.
5. Do one of the following actions:
 - Click on the Download from TFTP Server option, then click on the **Next** button.
 - From the Firmware Update tab dropdown menu, select *Download from TFTP Server*.
6. Enter the hostname or IP address of your TFTP server in the field provided.
7. Enter the port number of your TFTP server in the field provided (69 is the default).
8. Enter the filename of the Firmware Update file in the field provided.
9. Click the **Submit** button.
10. When the download is completed, click the **Next** button.

A popup message appears warning you not to reboot the VTrak during the firmware update procedure.
11. In the popup message, click the **OK** button.

The update progress displays. Then a popup message appears to tell you to reboot the VTrak
12. In the popup message, click the **OK** button.
13. Restart the VTrak as described below.

Your PC



To update the firmware from your PC:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click on the Software Management  icon.
4. Click on the Firmware Update tab.

5. Do one of the following actions:
 - Click on the Download Flash File from Local File through HTTP option, then click on the Next button.
 - From the Firmware Update tab dropdown menu, select *Download from Local File*.
6. Enter the filename of the Firmware Update file in the field provided.
Or, click the **Browse...** button and select the Firmware Update file in the Open dialog box.
7. Click the **Submit** button.
8. When the download is completed, click the **Next** button.
A popup message appears to warn you not to reboot the VTrak during the firmware update procedure.
9. In the popup message, click the **OK** button.
The update progress displays. Then a popup message appears to tell you to reboot the VTrak.
10. In the popup message, click the **OK** button.
11. Restart the VTrak as described below.

Restart VTrak

To restart the VTrak subsystem:

1. Click on the Subsystem  icon in Tree View.
2. Click on the Administrative Tools  icon.
3. Click on the Shutdown link in Management View.
A Shutdown or Restart tab will appear.
4. On the Shutdown or Restart tab, select *Restart* from the dropdown menu.
5. Click the **Submit** button.
6. In the warning box, click the **OK** button.
7. In the confirmation box, type the word **confirm** in the field provided.
8. Click the **OK** button.
When the controller shuts down, your WebPAM PROe connection will be lost.
9. Wait for two to three minutes.
10. In your browser, log into WebPAM PROe once again.
If you cannot log in, wait for 30 seconds, and try again. Repeat until login is successful.

Firmware Update – CLU

Use this function to flash the VTrak's firmware. Before you begin, go to the Promise website **www.promise.com** and download the latest firmware update file to your TFTP server.

1. From the Main Menu, highlight *Additional Info and Management*, and press Enter.
2. Highlight *Flash through TFTP* and press Enter.
3. Highlight *TFTP Server* and type the IP address of your TFTP server in the field provided.
4. Highlight *Port Number* and press the backspace key to erase the current value, then type the new value. 69 is the default.
A list of the current users appears.
5. Highlight *File Name* and type the file name of the firmware image file in the field provided.
6. Highlight *Start* and press Enter.
A message appears to tell you to reboot the VTrak.
7. Restart the VTrak as described below.

Restart VTrak

Restart over Telnet

To restart the VTrak subsystem on a Telnet connection:

1. From the Main Menu, highlight *Additional Info and Management*, and press Enter.
2. Highlight *Shutdown or Restart* and press Enter.
3. Press the spacebar to display *Restart* then press Enter.
A warning message appears.
4. Press Y to continue.
The screen will go blank.
5. Wait for two to three minutes.
6. Re-establish your Telnet connection to the VTrak CLU.
If you cannot re-establish a connection, wait 30 seconds, then try again.

Restart over Serial

To restart the VTrak subsystem on a serial connection:

1. From the Main Menu, highlight *Additional Info and Management*, and press Enter.
2. Highlight *Shutdown or Restart* and press Enter.

3. Press the spacebar to display *Restart* then press Enter.
A warning message appears.
4. Press Y to continue.
The screen will display shutdown and startup functions.
5. When the `Log in:` prompt appears, log into the CLU again.

Replace Power Supply

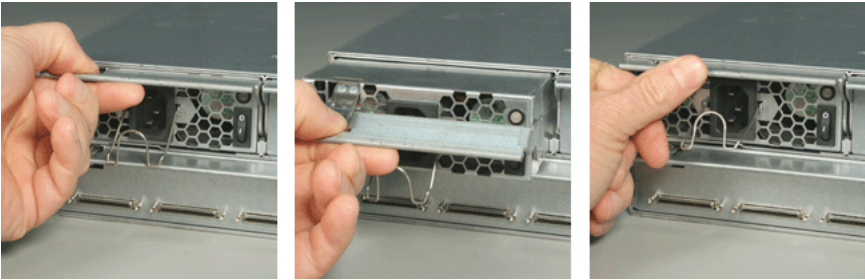


Figure 6. The VTrak M310p/M210p power supply

The power supply and its fans are replaced as one unit. There are no individually serviceable parts. No tools are required for this procedure.

To remove the power supply:

1. Verify that the power supply LED is amber or red.
2. Switch off the power.
3. Unplug the power cord.
4. Press the release button and pull the handle downward as shown (above, left).
5. Pull the power supply out of the VTrak enclosure (above, center).

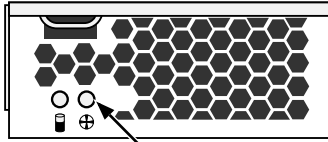
To install the power supply:

1. Carefully slide the power supply into the enclosure.
2. Gently press the handle in and upward until it locks (above, right).
3. Plug in the power cord.
4. Switch on the power supply.
5. Verify that the new power supply LED is green.

This completes the power supply replacement procedure.

Replace Cooling Unit Blower

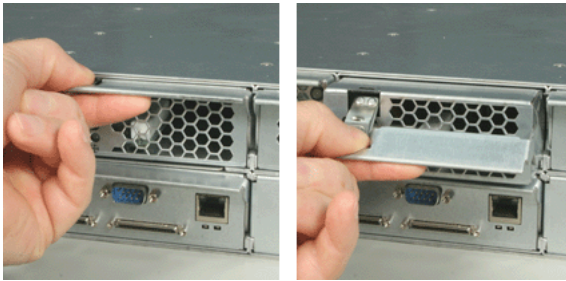
The blower (scroll fan) in each cooling unit is replaced as an individual part. No tools are required for this procedure.



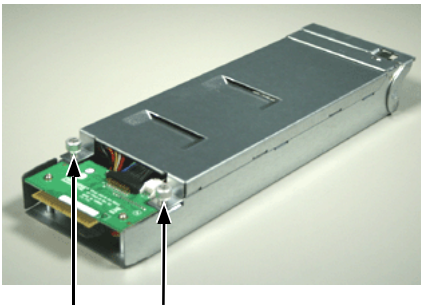
Fan LED

To replace a blower:

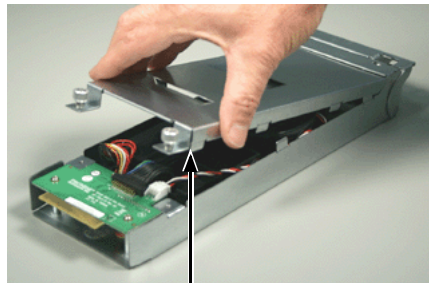
1. Verify that the Fan LED is amber or red (above).



2. Press the release button and pull the handle downward as shown above.
3. Pull the cooling unit out of the VTrak enclosure. An example of a VTrak cooling unit appears below.



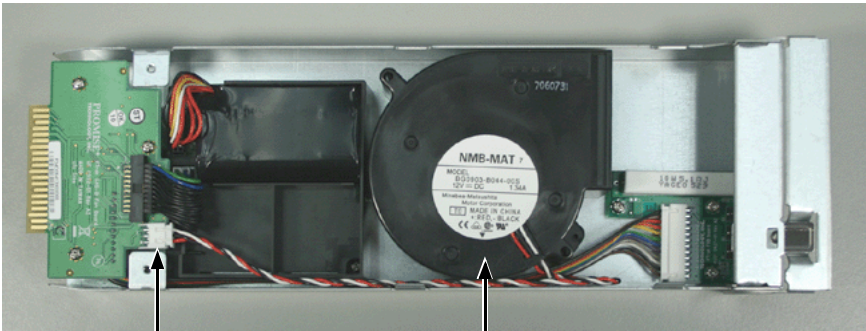
Loosen the thumbscrews



Lift the top section

4. Loosen the thumbscrew (above, left). A retainer keeps the thumbscrew in place.

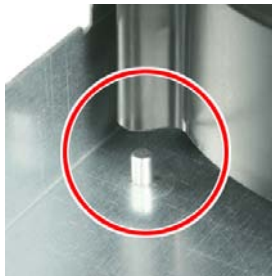
5. Grasp the top section near the thumbscrews and lift it off the bottom section (above, right). Separate the cooling unit section to access the blower.



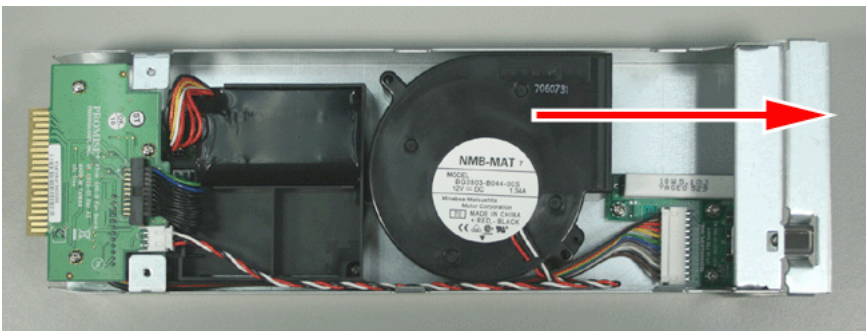
Electrical connector

Blower

6. Lift the blower off the mounting pins and detach the electrical connector.
7. Attach the electrical connector of the new blower and set it in place.



Be sure you set the blower on the mounting pins, as shown above.



Be sure the blower points outward, towards the handle (above).

8. Place the top section of the cooling unit onto the bottom section and tighten the thumbscrews.
9. Carefully slide the cooling unit into the enclosure.



10. Gently press the handle in and upward until it locks.
11. Verify that the Fan LEDs are green.

This completes the blower replacement procedure.

Replace Cache Battery

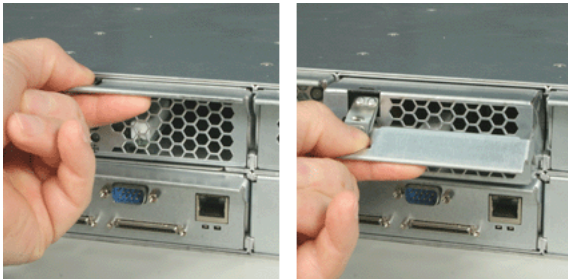
The cache battery is located in the Cooling Unit 1 (the left one). The battery assembly is replaced as an individual part. No tools are required for this procedure.



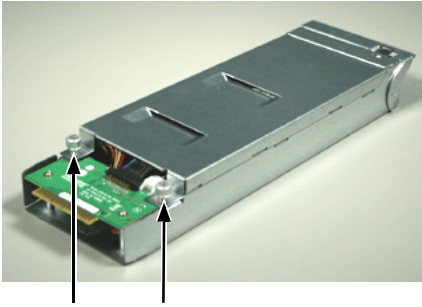
Cautions

- Try reconditioning the battery before you replace it. See page 84 or page 137 for more information.
- The battery assembly is replaced as a unit. Do not attempt to disconnect the battery by itself.
- Installing an incorrect replacement battery may result in an explosion.
- Dispose of used batteries according to the instructions that accompany the battery.
- While the battery is removed, your system will be vulnerable to a power failure. Temporarily set your cache policy to write-through before starting this procedure. See "Logical Drive Settings" on page 107 (WebPAM PROe) or "Logical Drive Settings and Functions" on page 148 (CLU).
- If power service has failed, do not remove the cooling unit if the Controller's Dirty Cache LED is flashing. See "Unsaved Data in the Controller Cache" on page 236.

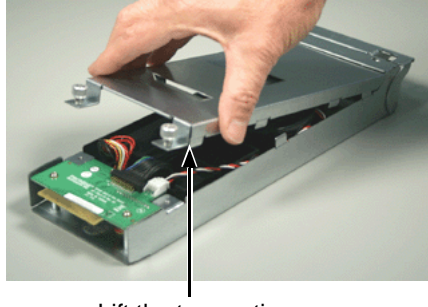
To replace a cache battery:



1. Press the release button and pull the handle downward as shown above.
2. Pull the cooling unit out of the VTrak enclosure.

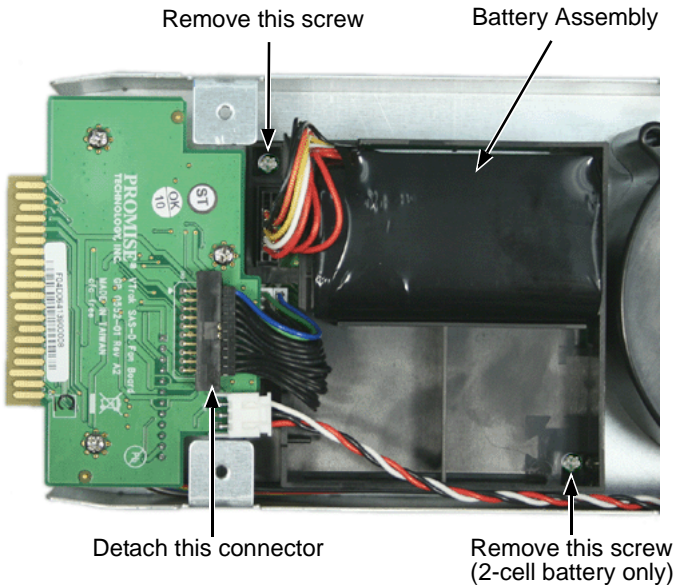


Loosen the thumbscrews



Lift the top section

3. Loosen the thumbscrew (above, left). A retainer keeps the thumbscrew in place.
4. Grasp the top section near the thumbscrews and lift it off the bottom section (above, right). Separate the cooling unit section to access the blower.



5. Remove the screws holding the battery assembly in place (above). The 2-cell battery assembly has two mounting screws. The 4-cell battery assembly has only one mounting screw.
6. Detach the connector on the circuit board. Do not detach any other connectors.
7. Lift the battery assembly out of the cooling unit.

8. Place a new battery assembly into the cooling unit.
9. Attach the connector on the circuit board.
10. Install the screws holding the battery assembly in place to the cooling unit.
The 2-cell battery assembly has two mounting screws. The 4-cell battery assembly has only one mounting screw.
11. Place the top section of the cooling unit onto the bottom section and tighten the thumbscrews.
12. Carefully slide the cooling unit into the enclosure.



13. Gently press the handle in and upward until it locks.

This completes the battery replacement procedure.

Replace RAID Controller

The RAID Controller monitors and manages the logical drives. When this controller is replaced, all of your logical drive data and configurations remain intact because this logical drive information is stored on the disk drives.



Caution

The RAID Controller is NOT a hot-swappable device. Power-down the VTrak before removing it.



Important

Do not replace the RAID Controller based on LED colors alone. Only replace the RAID Controller when directed to do so by Promise Technical Support. See page 239.

To remove and replace the RAID Controller:

1. Power down the VTrak.
2. Remove the network, SCSI, and null modem cables.



3. Grasp the handle and pull it downward (above, left).
4. Grasp the Controller and pull it out of the enclosure.
5. Gently slide the new Controller into the enclosure.
6. Press on the front to seat the Controller. The handle will swing upward as the Controller is properly seated (above, right).
7. Attach the network, SCSI, and null modem cables.
8. Power up the VTrak.

This completes the RAID Controller replacement procedure.

Chapter 7: Technology Background

- Introduction to RAID (below)
 - Choosing a RAID Level (page 188)
 - Stripe Size (page 191)
 - Sector Size (page 191)
 - Cache Policy (page 192)
 - Capacity Coercion (page 193)
 - Initialization (page 194)
 - Hot Spare Drive(s) (page 194)
 - Partition and Format the Logical Drive (page 195)
 - RAID Level Migration (page 195)
 - Media Patrol (page 198)
 - Predictive Data Migration (PDM) (page 199)
 - Transition (page 200)
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Introduction to RAID

RAID (Redundant Array of Independent Disks) allows multiple hard drives to be combined together in a disk array. Then all or a portion of the disk array is formed 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 disk arrays use different organizational models and have varying benefits. Also see Choosing RAID Level on page 188. The following outline breaks down the properties for each type of RAID disk array:

RAID 0 – Stripe

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

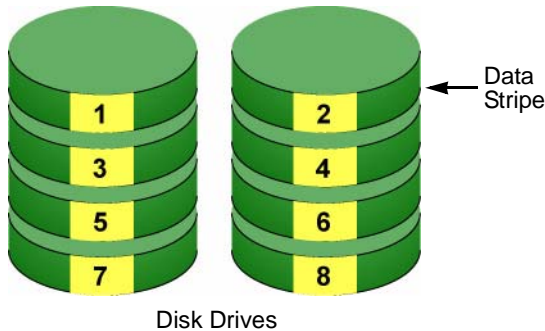


Figure 1. RAID 0 Striping interleaves data across multiple drives

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

RAID 0 arrays require one or more physical drives.

Recommended applications: Image Editing, Pre-Press Applications, other applications requiring high bandwidth.

RAID 1 – Mirror

When a disk array is mirrored, identical data is written to a pair of 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 drive fails or has errors, the other mirrored drive continues to function. This is called *Fault Tolerance*. Moreover, if a spare 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.

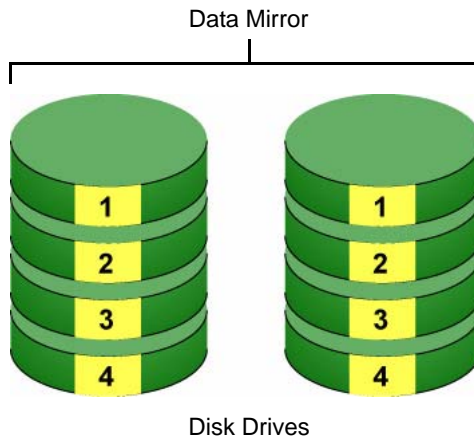


Figure 2. RAID 1 Mirrors identical data to two drives

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

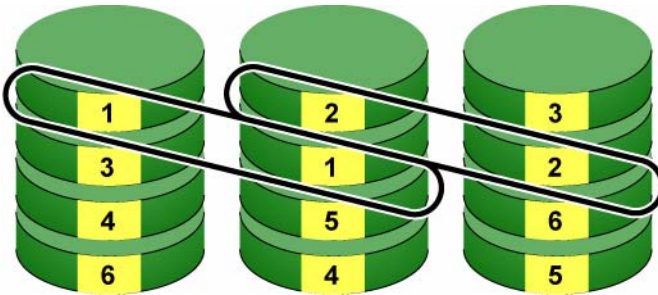
RAID 1 arrays use two physical drives. You can create multiple RAID 1 disk arrays on the same Promise product.

Recommended applications: Accounting, Payroll, Financial, other applications requiring very high availability.

RAID 1E – Enhanced Mirror

RAID 1E offers the security of mirrored data provided by RAID 1 plus the added capacity of more than two disk drives. It also offers overall increased read/write performance plus the flexibility of using an odd number of disk drives. With RAID 1E, each data stripe is mirrored onto two disk drives. If one drive fails or has errors, the other drives continue to function, providing fault tolerance.

Enhanced Data Mirrors



Disk Drives

The advantage of RAID 1E is the ability to use an odd number of disk drives, unlike RAID 1 and RAID 10. You can also create a RAID 1E Logical Drive with an even number of disk drives. However, if you have an even number of disks, you will obtain greater security with comparable performance using RAID 10.

RAID 1E arrays consist of three or more physical drives. You can create an array with just two physical drives and specify RAID 1E. But the resulting array will actually be a RAID 1.

Recommended applications: Imaging Applications, Database Servers, General Fileservers.

RAID 5 – Block and Parity Stripe

RAID 5 organizes block data and parity data across the physical drives. Generally, RAID Level 5 tends to exhibit lower random write performance due to the heavy workload of parity recalculation for each I/O. RAID 5 is generally considered to be the most versatile RAID level

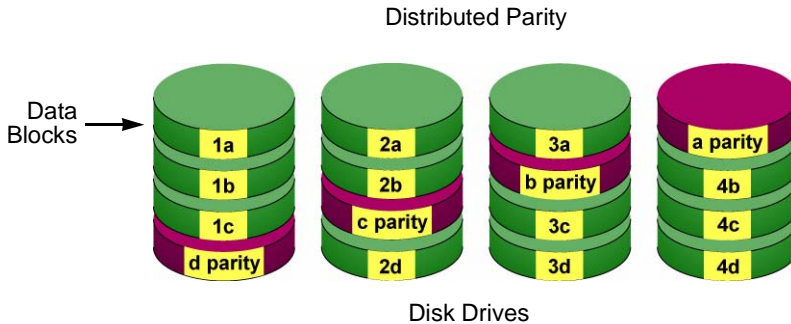


Figure 3. RAID 5 Stripes all drives with data and parity information

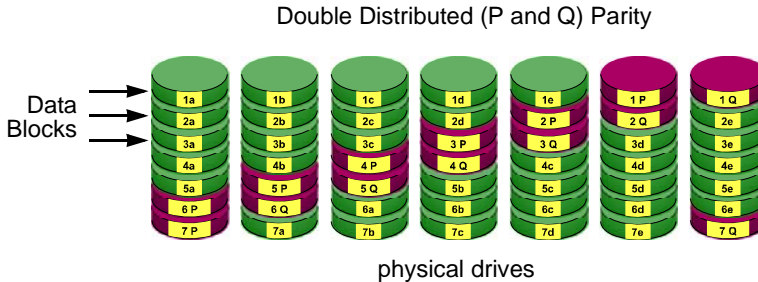
The capacity of a RAID 5 disk array is the smallest drive size multiplied by the number of drives less one. Hence, a RAID 5 disk array with (4) 100 GB hard drives will have a capacity of 300GB. A disk array with (8) 120GB hard drives and (1) 100GB hard drive will have a capacity of 800GB.

RAID 5 arrays consist of three or more physical drives.

Recommended applications: File and Application Servers; WWW, E-mail, News servers, Intranet Servers

RAID 6 – Block and Double Parity Stripe

RAID level 6 stores dual parity data is rotated across the physical drives along with the block data. A RAID 6 disk logical drive can continue to accept I/O requests when any two physical drives fail.



The total capacity of a RAID 6 disk logical drive is the smallest physical drive times the number of physical drives, minus two.

Hence, a RAID 6 disk logical drive with (7) 100 GB hard drives will have a capacity of 500 GB. A disk logical drive with (4) 100 GB hard drives will have a capacity of 200GB.

RAID 6 becomes more capacity efficient in terms of physical drives as the number of physical drives increases.

RAID 6 offers double fault tolerance. Your logical drive remains available when up to two physical drives fail.

RAID 6 is generally considered to be the safest RAID level.

RAID 6 requires a minimum of four physical drives.

RAID 10 – Mirror + Stripe

Mirroring/stripping combines both of the previous RAID 1 and RAID 0 disk array types. RAID 10 is similar though not identical to RAID 0+1. RAID 10 can increase performance by reading and writing data in parallel while protecting data with duplication. At least four drives are needed for RAID 10 to be installed. With four disk drives, the drive pairs are striped together with one pair mirroring the first pair. The data capacity is similar to a RAID 1 disk array, with half of the total storage capacity used for redundancy. An added plus for using RAID 10 is that, in many situations, such a disk array offers double fault tolerance. Double fault tolerance may allow your logical drive to continue to operate depending on which two disk drives fail.

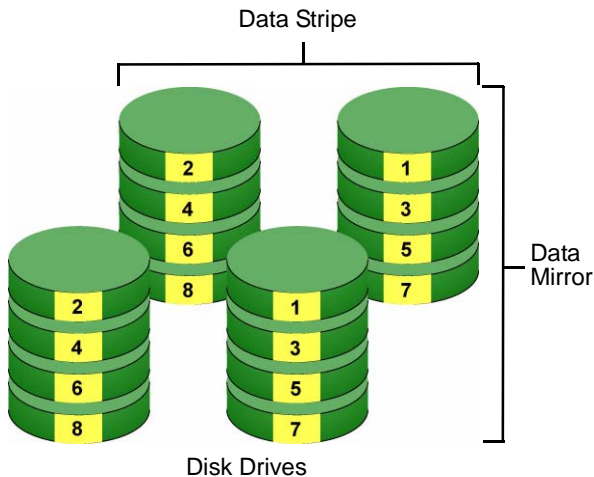


Figure 4. RAID 10 takes a data mirror on one drive pair and stripes it over two drive pairs

RAID 10 arrays require an even number of physical drives and a minimum of four.

For RAID 10 characteristics with an odd number of disk drives, use RAID 1E.

Recommended applications: Imaging Applications, Database Servers, General Fileservers.

RAID 50 – Striping of Distributed Parity

RAID 50 combines both RAID 5 and RAID 0 features. Data is striped across disks as in RAID 0, and it uses distributed parity as in RAID 5. RAID 50 provides data reliability, good overall performance and supports larger volume sizes.

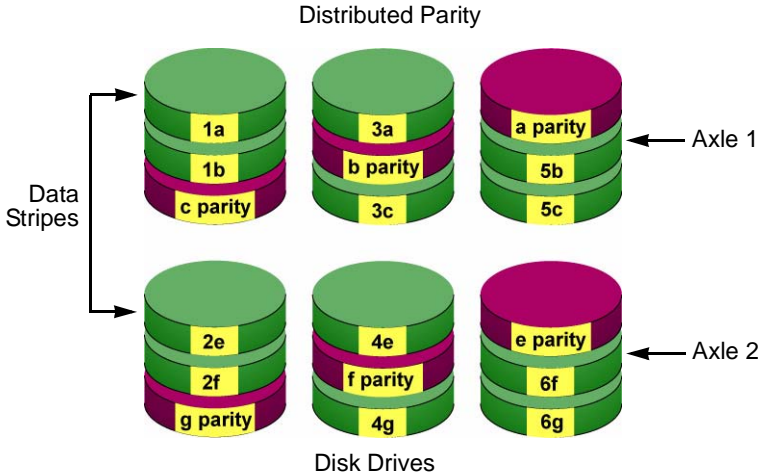


Figure 5. RAID 50 Striping of Distributed Parity disk arrays

RAID 50 also provides high reliability because data is still available even if multiple disk drives fail (one in each axle). The greater the number of axles, the greater the number of disk drives that can fail without the RAID 50 array going offline.

RAID 50 arrays consist of six or more physical drives.

Recommended applications: File and Application Servers, Transaction Processing, Office applications with many users accessing small files.

RAID 50 Axles

When you create a RAID 50, you must specify the number of *axles*. An axle refers to a single RAID 5 array that is striped with other RAID 5 arrays to make RAID 50. An axle can have from three to eight physical drives, depending on the number of physical drives in the array.

The chart below shows RAID 50 arrays with 6 to 15 disk drives, the available number of axles, and the resulting distribution of disk drives on each axle. VTrak

attempts to distribute the number of disk drives equally among the axles but in some cases, one axle will have more disk drives than another.

No. of Drives in RAID 50 Array	No. of Axles in RAID 50 Array	No. of Drives per Axle
6	2	3,3
7	2	3,4
8	2	4,4
9	2	4,5
	3	3,3,3
10	2	5,5
	3	3,3,4
11	2	5,6
	3	3,4,4
12	2	6,6
	3	4,4,4
	4	3,3,3,3

Choosing a RAID Level

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

RAID 0

Advantages	Disadvantages
Implements a striped disk array, 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 disk array 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 1E

Advantages	Disadvantages
Implemented as a mirrored disk array whose segments are RAID 0 disk arrays High I/O rates are achieved thanks to multiple stripe segments Can use an odd number of disks	Very high disk overhead - uses only 50% of total capacity

Recommended Applications for RAID 1E:

- Imaging applications
- Database servers
- General fileserver

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 6

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate Safest RAID level	High disk overhead – equivalent of two drives used for parity Slightly lower performance than RAID 5

Recommended Applications for RAID 6:

- Accounting/Financial
- Database servers
- Any application requiring very high availability

RAID 10

Advantages	Disadvantages
Implemented as a mirrored disk array whose segments are RAID 0 disk arrays 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

RAID 50

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate High reliability Supports large volume sizes	Higher disk overhead than RAID 5

Recommended Applications for RAID 50:

- File and Application servers
- Transaction processing
- Office application with many users accessing small files

Stripe Size

Stripe Size, also called “Stripe Block Size”, refers to the size of the data blocks written to, and read from, the physical drives. Stripe Size is specified when you create a disk array. In order to change the Stripe Size of an existing disk array, you must delete the disk array and create a new one. You can select Stripe Size directly when you use the Advanced function to create a disk array. If you use the Express function to create a disk array, WebPAM PRO selects the Stripe Size when you choose an Application Type.

The available Stripe Sizes are 8, 16, 32, 64, 128, 256, 512 KB, and 1 MB. 64 KB is the default. There are two issues to consider when selecting the Stripe Size.

First, you should choose a Stripe Size equal to, or smaller than, the smallest cache buffer found on any physical drive in the disk array. Selecting a larger value slows read/write performance because physical drives with smaller cache buffers need more time for multiple accesses to fill their buffers.

Second, if your data retrieval consists of fixed data blocks, such as with some database or video applications, then you should choose that size as your Stripe Size.

If you do not know the cache buffer or fixed data block sizes, Promise suggests you select 64 KB as your Stripe Size. Generally speaking, email, POS, and web servers prefer smaller stripe sizes. Video and database applications prefer larger stripe sizes.

Sector Size

A sector is the smallest addressable area on a physical disk drive. Sector Size refers to the size of sector measured by the number of bytes of data it can hold. The most common sector size is 512 bytes (512 B). Depending on its capacity, there can be up to 4,000,000,000 sectors on a single disk drive. The number of sectors is limited by the addressing method of the computer's operating system.

Sector size is important for two reasons. First, data is written to a disk drive in units called *blocks*. If a data block is smaller than the disk drive's sector size, part of the storage space in the sector goes unused. This is why a smaller sector size results in a more efficient use of a disk drive's capacity.

Second, while a logical drive can be expanded by adding more physical disk drives, the number of addresses cannot be increased above 4,000,000,000, as noted above. For example, your logical drive has 512 byte sectors, multiplied by 4 billion addresses. The result is 2,048,000,000,000 bytes or 2 terabytes (TB) of data storage capacity. If you simply add more disk drives, your operating system will not recognize the additional capacity and you will not be able to use it.

To make use of logical drives greater than 2TB in size, a larger sector size is required. The table below correlates sector size with logical drive capacity.

Logical Drive Size	Sector Size
8 to 16 TB	4096 bytes (4 KB)
4 to 8 TB	2048 bytes (2 KB)
2 to 4 TB	1024 bytes (1 KB)
0 to 2 TB	512 bytes (512 B)

When you create a Disk Array using the Express or Advanced methods, and when you create a Logical Drive, you can specify sector size of 512 B; 1, 2, or 4 KB. 512 B is the default.

In most cases, you should select the smallest sector size that will allow full use of the physical disk drives in your disk array.

Because logical drives can be expanded, you may encounter a situation where the usable capacity of your expanded logical drive is reduced by the addressing issue described above. There are two alternatives:

- Limit your logical drive expansion to within the limits described in the chart.
- Back up your data, then delete your existing logical drive and create a new one with a larger sector size.

Cache Policy

As it is used with VTrak, the term cache refers to any of several kinds of high-speed, volatile memory that hold data moving from your computer to the physical drives or vice-versa. Cache is important because it can read and write data much faster than a physical drive. There are read caches, which hold data as it is read from a physical drive; and write caches, which hold data as it is written to a physical drive.

In order to tune the cache for best performance in different applications, user-adjustable settings are provided. Cache settings are made in conjunction with logical drives:

- When you create a logical drive. See “Create a Logical Drive” on page 98
- On an existing logical drive. See “Logical Drive Settings” on page 107

Read Cache Policy

- Read Cache – The read cache is enabled.

- Read Ahead – The read cache and the read-ahead feature are enabled. Read-ahead anticipates the next read and performs it before the request is made. Can increase read performance.
- No Cache – The read cache is disabled.

Write Cache Policy

- Write Back – Data is written first to the cache, then to the physical drive. Better performance. VTrak has a cache backup battery to protect data in the cache from a sudden power failure.
- Write Thru – Also “Write Through”. Data is written to the cache and the physical drive at the same time. Safer.

Cache Line Size

The cache line size refers to the size of data the controller handles internally during a data input/output (I/O) operation.

- 8KB – Increases the number of I/O operations. Use this setting if your I/O operations are low-bandwidth (512B to 8KB).
- 64KB – Decreases the number of I/O operations. Use this setting if your I/O operations are high-bandwidth (64KB to 1MB).

If your I/O operations vary or they fall into the mid-bandwidth range (8KB to 64KB), use either setting.

Capacity Coercion

This feature is designed for fault-tolerant logical drives (RAID 1, 1E, 5, 10, and 50). It is generally recommended to use physical drives of the same size in your disk arrays. When this is not possible, physical drives of different sizes will work but the system must adjust for the size differences by reducing or coercing the capacity of the larger drives to match the smaller ones. With VTrak, you can choose to enable Capacity Coercion and any one of four methods.

Enable Capacity Coercion and select the Method in the Controller Settings menu. The choices are:

- GB Truncate – (Default) Reduces the useful capacity to the nearest 1,000,000,000 byte boundary.
- 10GB Truncate – Reduces the useful capacity to the nearest 10,000,000,000 byte boundary.
- Group Rounding – Uses an algorithm to determine how much to truncate. Results in the maximum amount of usable drive capacity.
- Table Rounding – Applies a predefined table to determine how much to truncate.

Capacity Coercion also affects a replacement drive used in a disk array. Normally, when an physical drive fails, the replacement drive must be the same capacity or larger. However, the Capacity Coercion feature permits the installation of a replacement drive that is slightly smaller (within 1 gigabyte) than the remaining working drive. For example, the remaining working drives can be 80.5GB and the replacement drive can be 80.3, since all are rounded down to 80GB. This permits the smaller drive to be used.

Without Capacity Coercion, the controller will not permit the use of a replacement physical drive that is slightly smaller than the remaining working drive(s).

Initialization

Initialization is done to logical drives after they are created from a disk array. Initialization sets all data bits in the logical drive to zero. The action is useful because there may be residual data on the logical drives left behind from earlier configurations. For this reason, Initialization is recommended for all new logical drives. See “Logical Drive Initialization” on page 108.



Caution

When you initialize a logical drive, all the data on the logical drive will be lost. Backup any important data before you initialize a logical drive.

Hot Spare Drive(s)

A hot spare is a disk drive that is connected to the disk array system but is not assigned as a member of the disk array. In the event of the failure of a drive within a functioning fault tolerant disk array, the hot spare is activated as a member of the disk array to replace a drive that has failed.

VTrak will replace a failing disk drive in a disk array with an unassigned drive, if one is available. The unassigned drive is not part of any disk array. Such a drive is called a *hot spare* drive. There are two types:

- **Global** – An unassigned disk drive available to any disk array on the VTrak.
- **Dedicated** – An unassigned disk drive that can only be used by a specified disk array.

The hot spare policy function lets you select whether a disk array will access any unassigned disk drive or a designated drive in the event of disk drive failure. See “Spare Drive” on page 114 (WebPAM PROe) or “Spare Drive Management” on page 155 (CLU) for information on how to make this setting.

The spare drive effectively takes the place of the failed drive and the RAID system immediately begins to rebuild data onto the drive. When the rebuild is complete, the disk array is returned to fault tolerant status.

VTrak includes a function that enables you to return a hot spare drive from a disk array back to spare status. When you create the hot spare drive, check the Revertible box to enable this feature. See “Transition” on page 200.

See also “Critical & Offline Disk Arrays” on page 228.

Partition and Format the Logical Drive

Like any other type of fixed disk media in your system, a RAID logical drive must also be partitioned and formatted before use. Use the same method of partitioning and formatting on an logical drive as you would any other fixed disk.

Depending on the operating system you use, there may or may not be various capacity limitations applicable for the different types of partitions.

RAID Level Migration

To *migrate* a disk array is to do one or both:

- Change its RAID level
- Increase the number of disk drives (sometimes called Expansion)

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

Different types of disk arrays use different organizational models and have varying benefits. The following outline breaks down the properties for each type of RAID supported by Promise products.

From	To	Increase		Redundancy	
		Capacity	Performance	Add	Lose
RAID 50	RAID 10	•			
	RAID 5		•		
	RAID 0	•	•		•
RAID 10	RAID 50	•			
	RAID 5	•			
	RAID 0	•	•		•
RAID 5	RAID 50			•*	
	RAID 10		•		
	RAID 0	•	•		•
RAID 1/1E	RAID 50	•	•		
	RAID 10	•	•		
	RAID 5	•	•		
	RAID 0	•	•		•
RAID 0	RAID 50	•	•	•	
	RAID 10	•	•	•	
	RAID 5	•	•	•	
	RAID 1/1E			•	

* Increases the existing redundancy.
Migrations to and from RAID 6 are not supported.



Important

- The Target disk array may require more disk drives than the Source disk array
 - If the Target disk array requires an EVEN number of disk drives but the Source disk array has an ODD number, ADD a disk drive as part of the migration process
 - You cannot reduce the number of disk drives in your disk array, even if the Target disk array requires fewer disk drives than the Source disk array
 - RAID 1 (mirroring) works with two drives only. Only a single-drive RAID 0 disk array or a single-drive JBOD can migrate to RAID 1. Other RAID Levels use too many drives to migrate
 - You cannot migrate a disk array when it is Critical or performing activities such as Synchronizing, Rebuilding, and PDM
-

Ranges of Disk Array Expansion

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

The current SCSI HBA cards and PC Operating Systems support a 10-byte LBA format. This means that a disk array 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 disk array:

$4,000,000,000 \text{ blocks} \times 512 \text{ bytes per sector} = 2,048,000,000,000 \text{ bytes of data for a 2TB drive.}$

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

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

- You can expand a 2.5 TB disk array up to 4 TB
- You can only expand a 1.9 TB disk array up to 2 TB

See the chart 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. When the expansion is finished, WebPAM will show the logical drive in the desired size. However, your operating system might show the logical drive at the maximum expansion size (listed in the table above) and the rest of the capacity as unformatted disk space.

At this point, you can:

- Format the disk space, which results in a *second* logical drive
- Create a new logical drive. See below

Create a New Logical Drive

To create a new logical drive:

1. Backup the data from the current logical drive.
2. Delete the current logical drive.
See page 100 (WebPAM PROe) or page 147 (CLU).
3. Create a new logical drive with the desired capacity.
See page 98 (WebPAM PROe) or page 146 (CLU).
4. Restore the data to the new logical drive.

Media Patrol

Media Patrol is a routine maintenance procedure that checks the magnetic media on each disk drive. Media Patrol checks all physical drives assigned to disk arrays. Media Patrol does not check unconfigured drives.

Media Patrol will also check spare drives, if those drives have Media Patrol enabled. Media Patrol for spare drives is enabled by default. You can disable it in VTrak's Command Line Interface (CLI).

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 critical error, it triggers PDM if PDM is enabled.

See "Physical Drive Media Patrol" on page 91.

Predictive Data Migration (PDM)

Predictive Data Migration (PDM) is the migration of data from the suspect disk drive to a spare disk drive, similar to Rebuilding a Logical Drive. But unlike Rebuilding, PDM constantly monitors your disk drives and automatically copies your data to a spare disk drive *before* the disk drive fails and your Logical Drive goes Critical.

After the data is copied from the suspect disk drive, the controller marks it with a Stale configuration and a PFA error.

You can clear the Stale configuration and PFA error and put the disk drive back into service. See “Clear Physical Drive Conditions” on page 89 for WebPAM PROe or see “Clear Stale and PFA Conditions” on page 139 for the CLU. In most cases, however, you will remove the disk drive for repair or replacement.

PDM Triggers

The following actions trigger PDM:

- A disk drive with unhealthy status (see below)
- Media Patrol finds a disk critical error*
- You initiate PDM manually

*PDM also counts the number of media errors reported by Media Patrol.

A disk drive becomes unhealthy when:

- A SMART error is reported
- The bad sector remapping table fills to the specified level

Because data would be lost if written to a bad sector, when a bad sector is detected, the disk drive creates a map around it. These maps are saved in the bad sector remapping table, which has a capacity of 512 reassigned blocks and 1024 error blocks.

When the table fills to a specified percentage of its capacity, PDM triggers a migration of data from the suspect drive (the disk drive with the bad sectors) to a spare disk drive.

During data migration, you will have access to the Logical Drive but it will respond more slowly to read/write tasks because of the additional operation. The time required for data migration depends on the size of the disk drive.

See “Logical Drive PDM” on page 110.

Transition

The Transition feature enables you to specify “permanent” spare drives for your VTrak subsystem. Transition is the process of replacing a revertible spare drive that is currently part of a disk array with an unconfigured physical drive or a non-revertible spare. The revertible spare drive returns to its original status.

Transition happens *automatically* when the following sequence of events takes place:

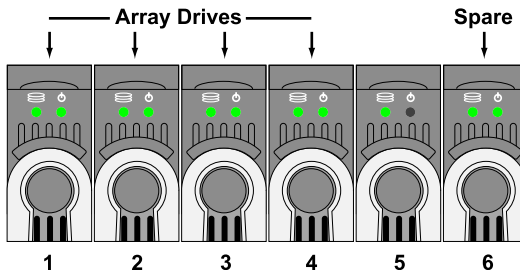
- You create a revertible spare drive.
See page 113 (WebPAM PROe) or page 155 (CLU).
- A physical drive assigned to your disk array fails and the array goes critical or degraded.
- VTrak automatically rebuilds your array to the revertible spare drive and the array becomes functional again.
- You replace the failed physical drive with a new physical drive of equal or greater capacity.
- VTrak automatically transitions (moves) the data from the revertible spare to the new physical drive.
- The new physical drive becomes part of the array and the revertible spare drive returns to its original spare status.

Transition happens *manually* when you specify a different unconfigured physical drive to transition (move) the data from the revertible spare drive.

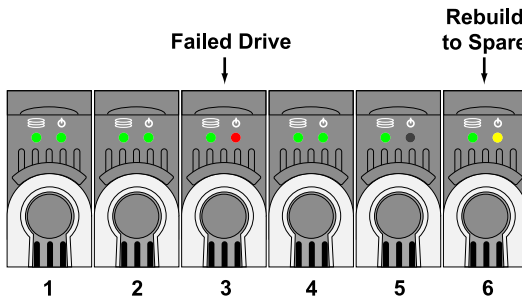
See the example below.

Example

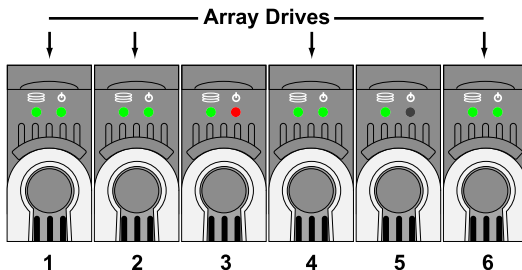
Following is an example to explain the Transition function.



In the example above, there is a four-drive RAID 5 disk array and a global spare drive. Physical drives 1, 2, 3, and 4 belong to the disk array. Physical drive 5 remains unconfigured. Physical drive 6 is a revertible spare drive.



If a physical drive fails in a disk array and there is a spare drive of adequate capacity available, the controller automatically rebuilds the array using the spare drive. In this example, physical drive 3 failed and the array is rebuilt using physical drive 6, the revertible spare drive.

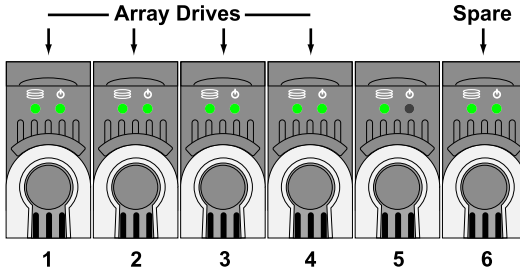


When the rebuild is complete, the spare drive has replaced the failed drive. In this example, failed drive 3 was replaced by spare drive 6. The disk array now consists of physical drives 1, 2, 4, and 6.

There is no spare drive at this moment. Even if physical drive 5 is of adequate capacity, it has not been designated as a spare, therefore the controller cannot use it as a spare.

Automatic Transition

At this juncture, you would replace the failed drive in slot 3 with a new one of the same or greater capacity.



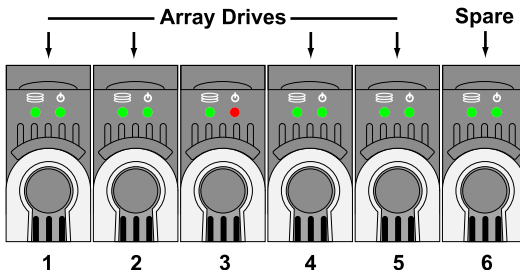
When the VTrak controller detects the new drive in slot 3, it will:

- Automatically transition the data on drive 6 to drive 3
- Return drive 6 to spare status

When the Automatic Transition is finished, physical drives 1, 2, 3, and 4 belong to the disk array and physical drive 6 is a revertible spare drive. The original configuration is restored.

Manual Transition

If you wanted to use the drive in slot 5 as a member of the disk array, rather than the drive in slot 3, you would run the Transition function manually. See page 103 (WebPAM PROe) or page 146 (CLU).



When the Manual Transition is finished, physical drives 1, 2, 4, and 5 belong to the disk array and physical drive 6 is a revertible spare drive.

At this point, you would replace the drive in slot 3. The new drive in slot 3 will be unconfigured until you assign it to a disk array or as a spare.

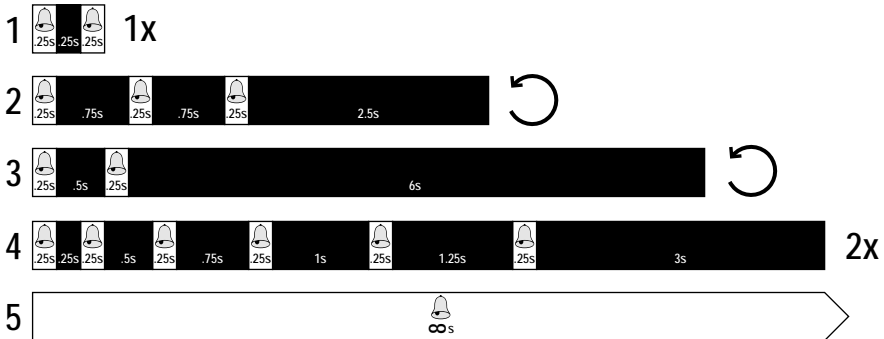
Chapter 8: Troubleshooting

- VTrak is Beeping (below)
- LEDs Display Amber or Red (page 204)
- CLU Reports a Problem (page 208)
- WebPAM PROe Reports a Problem (page 210)
- LEDs Display Amber or Red (page 204)
- Event Notification Response (page 212)
- Critical & Offline Disk Arrays (page 228)
- Enclosure Problems (page 231)
- Connection Problems (page 234)
- Unsaved Data in the Controller Cache (page 236)

This Chapter covers troubleshooting procedures for VTrak.



VTrak is Beeping

VTrak's alarm has five different patterns, as shown below.



When you first power-up the VTrak, it beeps twice to show normal operation.

The audible alarm sounds at other times to inform you that the VTrak needs attention. But the alarm does not specify the condition. When the alarm sounds:

- Check the front and back of VTrak for red or amber LEDs, as described above.
- If email notification is enabled, check for new messages.
- Check for yellow !  red Xs  in Tree View (see page 210).
- Check the event log. See page 49 (WebPAM PROe) or page 154 (CLU).

When a continuous tone sounds, there are multiple alarm patterns sounding at the same time.

To make alarm settings or cancel an alarm, see page 85 (WebPAM PROe) or page 166 (CLU).

LEDs Display Amber or Red

Front Panel

When the power is switched on, the LEDs on the front of the VTrak will light up.

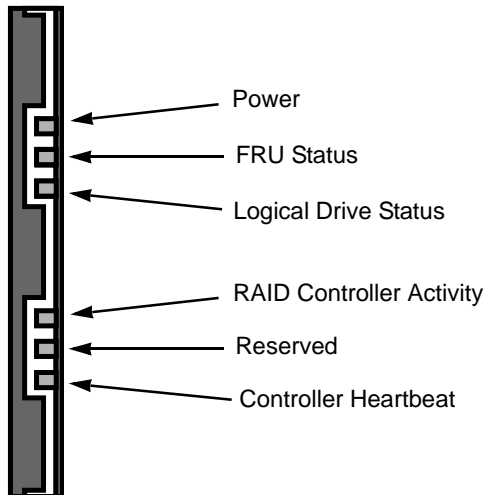


Figure 1. VTrak M310p/M210p front panel LEDs

When boot-up is finished and the VTrak is functioning normally:

- Controller Heartbeat LED blinks green seven times in three seconds, goes dark for six seconds, then repeats the blink pattern.
- Power, FRU, and Logical Drive LEDs display green continuously.
- The RAID Controller LED flashes green if there is activity on that channel.

See the table below.

LEDs	State				
	Dark	Steady Green	Flashing Green	Amber	Red
Power	System Off	Normal			
FRU*	System Off	Normal		Fan, battery or PSU Problem	Fan, battery or PSU Failed
Logical Drive	System Off	Normal		Logical Drive Critical	Logical Drive Offline
Controller Activity	No Activity		Activity		
Controller Heartbeat	System Off		Normal**		

* Field Replacement Unit: includes fan, battery and power supply unit (PSU).
 ** Blinks green seven times in three seconds, goes dark for six seconds, then repeats the blink pattern.

See page 167 for more information about field-replaceable components.
 See page 228 for a discussion of critical and offline logical drives.

Drive Status Indicators

There are two LEDs on each Drive Carrier. They report the presence of power and a disk drive, and the current condition of the drive.

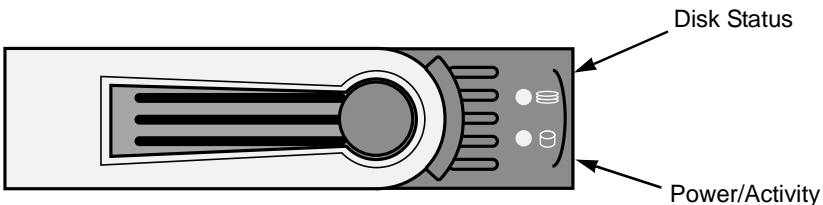


Figure 2. VTrak M310p/M200p disk carrier LEDs

The VTrak spins up the disk drives sequentially in order to equalize power draw during start-up. After a few moments the Power/Activity and Disk Status LEDs should display green.

LEDs	State				
	Dark	Steady Green	Flashing Green	Amber	Red
Power/Activity	No Drive	Drive Present	Activity		
Status	No Power/No Drive	Drive OK		Drive Rebuilding	Drive Error

See “Critical & Offline Disk Arrays” on page 228 for a discussion of rebuilding and failed disk drives.

Back of Enclosure

When the FRU Status LED on VTrak’s front panel shows Amber or Red, check the LEDs on the back of VTrak. These LEDs give the status of the field replaceable units.

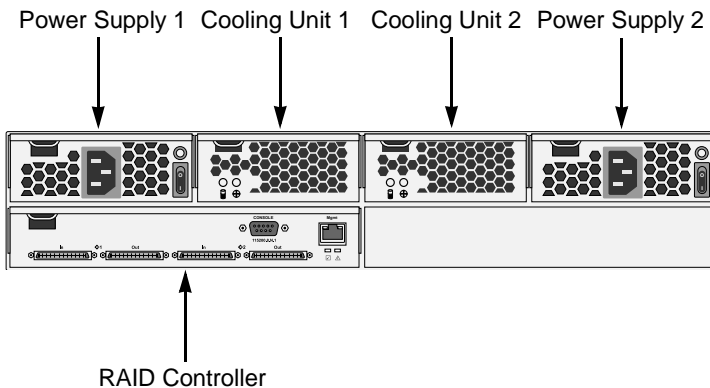


Figure 3. Field Replaceable Units (FRUs) on VTrak M310p/M210p

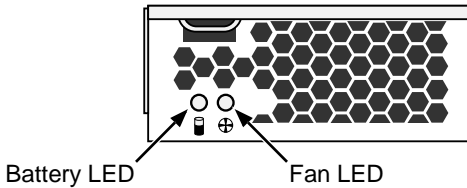


Figure 4. Fan LED on a VTrak M310p/M210p cooling unit

Under normal conditions, the power supply, battery, and fan LEDs should display green.

LEDs	State			
	Dark	Green	Amber	Red
Power supply	Not detected	OK	Fan too slow	Failed
Battery	Not detected	OK	Low capacity	
Fan	Not detected	OK	Fan too slow	Failed

To check a component's installation, follow the same procedure as replacing the component, except that you reinstall the original component rather than a new one. In most cases, this action fixes a bad connection and allows VTrak to detect the component. If this action does not correct the problem, replace the unit. See page 167 for instructions.

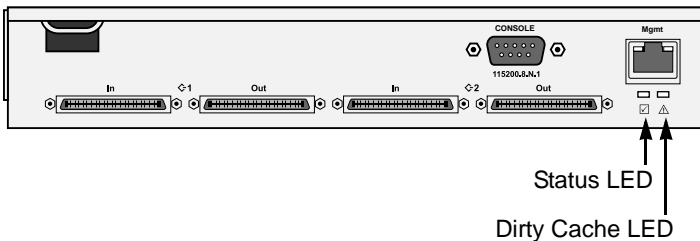


Figure 5. A VTrak M310p/M210p controller

Under normal conditions, the Controller Status LED (marked with icon) is green and the Dirty Cache LED (marked with icon) is dark. See the table, below.

LEDs	State			
	Dark	Green	Amber	Flashing Amber
Status	no power	OK	Error	
Dirty Cache	OK		Unsaved data in cache	OK

If the Controller Status LED is amber, restart the VTrak. See “Restart the Subsystem” on page 76 or “Shutdown and Restart” on page 165.

If the Controller Status LED continues to display amber after startup, contact Promise Technical Support. See “Contact Technical Support” on page 239.

The Dirty Cache LED flashes during input/output operation. If the LED shines amber and the power is off, there is unsaved data in the cache. Do NOT power down the VTrak while this LED is on. See “Unsaved Data in the Controller Cache” on page 236 for more information.

CLU Reports a Problem

The CLU reports information passively—you must determine which functions to check based on the sound of the VTrak’s audible alarm (see page 203) and any amber or red LEDs (see page 204).

In this example, let us check disk array status.

1. Open the CLU.
2. Highlight *Disk Array Management* and press Enter.
3. Observe the status of your disk arrays.

Dald	Alias	OpStatus	CfgCapacity	FreeCapacity	MaxContiguousCap
0	DA0	OK	75.44GB	66.06GB	66.06GB
1	DA1	Degraded	189.06GB	179.68GB	179.68GB
2	DA2	OK	73.57GB	64.20GB	64.20GB

At this point, you can highlight the Degraded array and press Enter to see more information. See below.

Disk Array ID	: 1	Physical Capacity	: 189.06GB
OperationalStatus	: Degraded	MaxContiguousCapacity	: 11.18GB
FreeCapacity	: 179.68 GB	ConfigurableCapacity	: 179.68GB
SupportedRAIDLevels:	0 5 10 1E		
Disk Array Alias	: DA1		

MediaPatrol : Enabled
PDM : Enabled

Transport
Rebuild
Predictive Data Migration
Transition
Dedicated Spare Drives in the Array
Physical Drives in the Array
Logical Drives in the Array
[Locate Disk Array]

Save Settings [CTRL-A]
Restore Settings [CTRL-R]
Return to Previous Menu

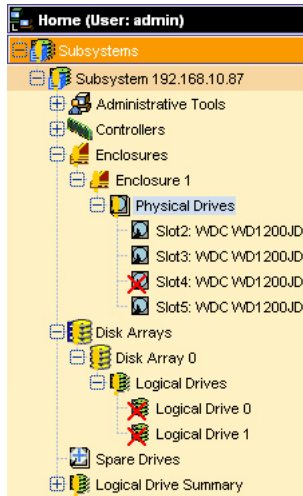
From this screen:

- Highlight *Physical Drives in the Array* and press Enter to identify the failed disk drive
- Highlight *Rebuild* and press Enter to rebuild the array after you replace the failed disk drive

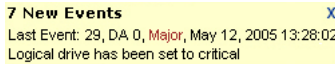
For more information, see “Critical & Offline Disk Arrays” on page 228.

WebPAM PROe Reports a Problem

WebPAM PROe aids in troubleshooting your logical drives and enclosure by continuous monitoring and reporting to the User in the following ways:



- Displays yellow ! red Xs ✗ in Tree View (above)
- Sends email messages, per your configuration



- Displays popup messages, per your configuration (above)

#	Device	Event ID	Severity	Time	Description
34	DA 0	0x000F0001	Info	May 12, 2005 13:28:47	Rebuild is completed
33	LD 0	0x00090006	Info	May 12, 2005 13:28:47	Rebuild marks the logical drive synchronized upon rebuild completion
32	LD 0	0x00090002	Info	May 12, 2005 13:28:47	Logical drive has been placed online
31	DA 0	0x000F0000	Info	May 12, 2005 13:28:03	Rebuild is started
30	PD 5	0x000D0008	Info	May 12, 2005 13:28:02	Physical Disk has been removed
29	LD 0	0x00090004	Major	May 12, 2005 13:28:02	Logical drive has been set to critical
28	PD 5	0x000D001A	Major	May 12, 2005 13:28:02	Physical Disk is marked as DEAD due to removal
27	Spare 0	0x001D0001	Info	May 12, 2005 02:00:26	Spare check completed successfully on the given spare drive
26	Spare 1	0x001D0001	Info	May 12, 2005 02:00:26	Spare check completed successfully on the given spare drive
25	Spare 0	0x001D0000	Info	May 12, 2005 02:00:26	Spare check started on the given spare drive

- Keeps a record in the Event Log (above)

Logical Drive 0 Help

Information Settings Background Activity Check Table LUN Map

Enclosure Front View

Physical drives used by the logical drive are highlighted. Click one of them to locate the logical drive.

Logical Drive Information

Logical Drive ID	0
Alias	
RAID Level	RAID5
Operational Status	Critical, Rebuilding
Capacity	147.15GB
Physical Capacity	220.72GB
Number of Axes	1
Number of Used Physical Drives	3
Stripe Size	64KB
Sector Size	512Bytes
Disk Array ID	0
Read Policy	ReadAhead
Write Policy	WriteBack
Serial Number	0000000000000000000000000064982F237D8D288
WWN	2226-0001-5558-d0c8
Synchronized	Yes
Tolerable Number of Dead Drives	1
Parity Pace	N/A
Codec Scheme	N/A

Auto Rebuild Replacement Drive

Failed Disk Drive

Critical / Rebuilding Status

- Displays full information on the selected component in the Management Window (above)

Also see these troubleshooting topics:

- “Event Notification Response” on page 212
- “Critical & Offline Disk Arrays” on page 228
- “Frequently Asked Questions” on page 237

Event Notification Response

When you select Event Notification, WebPAM PROe sends popup and/or email messages regarding its status. The messages you see depend on your notification selection (see page 56) and what is currently happening in the VTrak.

The chart below gives the suggested action when the corresponding message is displayed. A list of major categories is shown below.

- Battery (page 212)
- Blowers (page 214)
- Cache (page 214)
- Controller (page 214)
- Disk Array (page 215)
- Drive Interface Controller (page 215)
- Enclosure (page 216)
- Event Log (page 216)
- Host Interface Controller (page 216)
- Logical Drive (page 217)
- Media Patrol (page 218)
- Online Capacity Expansion (page 219)
- PDM (page 219)
- Physical Disk (page 220)
- PSU (Power Supply Units) (page 221)
- PSU Fans (page 222)
- RAID Level Migration (page 222)
- Rebuild (page 223)
- Redundancy Check (page 224)
- Resource (page 224)
- SMART (page 224)
- Spare Check (page 224)
- Spare Drives (page 225)
- Stripe Level Migration (page 225)
- Subsystem (page 226)
- Synchronization (page 226)
- System (VTrak) (page 226)
- Transition (page 226)
- Watermark (page 227)

Event	Action
Battery	
Battery temperature is above the threshold	The battery is too hot. Verify proper airflow around the through the VTrak. If airflow is OK, replace the battery. See page 175.
Battery temperature is normal	Normal.
Battery capacity is below the threshold	Battery is drained. Run battery reconditioning. See page 84 or page 137.
Battery capacity is normal	Normal.
Battery is discharging	Battery is undergoing reconditioning.
Battery is charging	Battery is being recharged.

Event	Action
Battery reconditioning is complete	Battery reconditioning is finished.
Battery is malfunctioning	Run battery reconditioning. See page 84 or page 137. If this message reappears, replace the battery.
Battery reconditioned successfully	Battery reconditioning is finished.
Battery reconditioning has failed	Replace the battery. See page 175.
Battery is reaching end of life	Replace the battery. See page 175.
Battery is removed	The battery was disconnected or removed. Reinstall the battery. See page 175.
Battery is inserted	The battery has been connected or installed.
Battery charging has failed	Replace the battery. See page 175.
Battery reconditioning started	Battery reconditioning has begun.
Battery recondition has been terminated	The battery was disconnected or removed during reconditioning. Reinstall the battery. See page 175. Or the battery became too hot during reconditioning. Replace the battery. See page 175
Cache policy switched to write-thru based on the battery condition	Check battery condition. The battery might be removed or have reduced capacity. Reinstall or replace the battery. See page 175. Normal during reconditioning. Check again when reconditioning is done.
Cache policy switched write-back based on the battery condition	Normal.
Battery is charged with a temperature over the normal range	Check fan and blower function and environmental temperature. Correct as needed.
Battery pack is not matched with the battery board	Wrong battery installed. Replace the battery. See page 175.

Event	Action
Cache policy is in writeback mode without battery	Install or replace the battery. See page 175.
Blowers	
Blowers have started	Normal.
Blowers have stopped	Verify that the cooling unit is properly installed. If the blower still does not turn, replace the blowers. See page 172.
Blower speed is increased	Check the VTrak for overheating. See page 231.
Blower speed is decreased	Temporary overheat condition was corrected.
Blowers are NOT functioning	Replace the blowers. See page 172.
Blowers have been inserted	Normal.
Blowers have been removed	Reinstall the cooling unit(s). If the blowers does not turn, replace the blowers. See page 172.
Blowers are functioning normally	Normal.
Blowers are NOT installed	Reinstall the cooling unit(s). If the blowers does not turn, replace the blowers. See page 172.
Blower status is unknown	Check for airflow out of the cooling unit. If there is none, check for proper installation.
Cache	
BBU flushing has started	VTrak's cache is being flushed.
BBU flushing has ended	VTrak's cache has been flushed.
BBU flushing has failed	VTrak's cache could not be flushed. Check your cache flush interval setting. See page 80.
Controller	
The controller parameter(s) changed by user	The user successfully change controller settings. See page 80.
The controller is reset by Watch Dog timer	The Watch Dog timer has started.

Event	Action
The controller has new crash information	Check the event logs. See page 49.
Controller temperature is above the threshold/ warning threshold	The VTrak controller is overheating. Check for airflow around and through the controller, and verify that all fans are working. Replace fans as needed.
Controller temperature is above the critical threshold	The VTrak controller is seriously overheating. Check for airflow around and through the controller, and verify that all fans are working. Replace fans as needed.
Disk Array	
New disk array has been created	Result of settings or user action. Normal.
Disk array has been deleted	Result of settings or user action. Normal.
Disk array has been added	Result of settings or user action. Normal.
Disk array has been removed	The physical drives of the disk array were removed from the enclosure.
Disk array settings have been changed	The user successfully logical drive settings. See page 98.
Drive Interface Controller	
Drive-interface controller found	Normal.
Drive-interface controller is NOT found	Restart the VTrak. See page 169. If this message appears repeatedly, contact Technical Support. See page 239.
Drive-interface diagnostics has passed	Normal.
Drive-interface diagnostics has failed	Restart the VTrak. See page 169. If this message appears repeatedly, contact Technical Support. See page 239.
Drive-interface controller has generated a general/ data parity error.	Drive-to-controller parity error. If this message appears repeatedly, contact Technical Support. See page 239.

Event	Action
Enclosure	
Enclosure temperature is above the threshold/ warning threshold	The VTrak is overheating. Check for airflow around and through the VTrak, and verify that all fans are working. Replace fans as needed.
Enclosure temperature is above the critical threshold	The VTrak is seriously overheating. Check for airflow around and through the VTrak, and verify that all fans are working. Replace fans as needed.
Enclosure temperature is within the normal range	Normal.
Event Log	
Event logging is enabled	Event logging has been successfully enabled.
Event logging is disabled	Event logging has been disabled.
Event log buffer is cleared in RAM	The event log was cleared.
Event log buffer is cleared in NVRAM	The non-volatile RAM event log was cleared.
Event log buffer is cleared in MDD	The MDD (disk drive) event log was cleared.
Host Interface Controller	
Host-interface controller has detected bus reset	The initiator sent a reset command. If this message appears repeatedly, contact Technical Support. See page 239.
Host-interface controller has encountered an unrecoverable error	Restart the VTrak. See page 169.
Host-interface controller has received an abort-task/abort task set/clear task set command.	Result of user action. Normal.
Host-interface controller has received an clear ACA command.	Result of clearing an auto contingent alliance condition. If this message appears repeatedly, contact Technical Support. See page 239.
Host-interface controller has received a LUN reset command.	Result of user action. Normal.

Event	Action
Host-interface controller has received a bus reboot	The VTrak rebooted itself. If this message appears repeatedly, contact Technical Support. See page 239.
Host-interface controller has encountered an unknown error	An unidentified error occurred. If this message appears repeatedly, contact Technical Support. See page 239.
Host-interface controller has encountered a system error	A VTrak system error occurred. If this message appears repeatedly, contact Technical Support. See page 239.
Host-interface controller has encountered a fatal error	Restart the VTrak. See page 169. If this message appears repeatedly, contact Technical Support. See page 239.
Host-interface controller settings have changed	Result of user action. Normal.
SCSI host interface controller settings have changed	Result of user action. Normal.
External bus reset has occurred	The initiator sent a reset command. If this message appears repeatedly, contact Technical Support. See page 239.
Logical Drive	
Logical drive initialization has started	Result of user action. Normal.
Logical drive initialization has completed	Logical drive is ready to use. Normal.
Logical drive initialization has paused	Initialization paused because of user intervention, schedule or a higher priority background activity.
Logical drive initialization has resumed	Initialization has resumed again after a pause.
Logical drive initialization has stopped	Initialization stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
Logical drive initialization marks the logical drive offline	Initialization failure due to a failed disk drive. Replace the disk drive, delete and recreate the logical drive. See page 10 and page 98.
Logical drive initialization is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 169.

Event	Action
Logical drive initialization is queued	Initialization has been set manually or by schedule.
A new logical drive has been created	Result of user action. Normal.
Logical drive has been deleted	Result of user action. Normal.
Logical drive has been placed online	The physical drives of the array are restored to online status.
Logical drive has been placed online. Possible data loss	One or more physical drives in the array went offline. See page 228.
Logical drive has been set to critical.	One or more physical drives in the array went offline. See page 228.
Logical drive axle has been placed online	RAID 50. One of the axles (RAID 5 arrays) returned on online status.
Rebuild marks the logical drive synchronized upon rebuild completion	Result of successful rebuild. Normal.
Logical Drive Settings has been changed through a user command	Result of user action. Normal.
Logical drive has been set to degrade	A physical drive in RAID 6 logical drive is offline
Media Patrol	
Media patrol is started	Result of settings or user action. Normal.
Media patrol is completed	Normal.
Media patrol is paused	Media patrol paused because of user intervention, schedule or a higher priority background activity.
Media patrol is resumed	Media patrol has resumed again after a pause.
Media patrol is stopped	Media patrol stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
Media patrol is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 169.
Media patrol is queued	Media patrol has been set manually or by schedule.

Event	Action
Media patrol is stopped internally	Media patrol stopped because the disk array was deleted or removed.
Online Capacity Expansion	
Online capacity expansion has started	Result of settings or user action. Normal.
Online capacity expansion has completed	Normal.
Online capacity expansion has paused	Expansion paused because of user intervention, schedule or higher priority background activity.
Online capacity expansion has resumed	Expansion has resumed again after a pause or a reboot.
Online capacity expansion has stopped	Expansion stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
Online capacity expansion has encountered a physical disk error	Bad block found on a disk drive. Migration will finish. Check the disk drive check table after migration and replace disk drive as needed. See page 110.
Online capacity expansion is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 169.
Online capacity expansion is queued	Synchronization has been set manually or by schedule.
PDM	
PDM is started	Result of settings or user action. Normal.
PDM is completed	Normal.
PDM is paused	PDM paused because of user intervention, schedule or a higher priority background activity.
PDM is resumed	PDM has resumed again after a pause.
PDM is stopped	PDM stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
PDM is switched to rebuild.	PDM changed to rebuild because the logical drive went critical

Event	Action
PDM is stopped internally	The destination drive was removed or used for a rebuild.
Physical Disk	
Physical disk is marked online	Disk drive restored to normal operation.
Physical disk is marked offline	Disk drive removed from service due to errors. If necessary, try to force the disk online. See page 90 or page 140.
Physical disk is marked as dead.	Disk drive failure. Replace the disk drive. See page 10.
Physical disk has been reset	Disk drive reset after error and should function normally.
Physical disk assigned as global spare	Result of settings or user action. Normal.
Physical disk is no longer assigned as global spare	Result of settings or user action. Normal.
Physical disk assigned as dedicated spare	Result of settings or user action. Normal.
Physical disk is no longer assigned as dedicated spare	Result of settings or user action. Normal.
Physical disk has been inserted	Disk drive was inserted into the VTrak subsystem.
Physical disk has been removed	Disk drive was removed from the VTrak subsystem.
Command on physical disk has been re-tried	A command to a disk drive was re-tried. If this message appears repeatedly, replace the disk drive.
Physical disk ECC error is detected	Disk drive had an ECC error. If this message appears repeatedly, replace the disk drive.
Physical disk CRC error is detected	Disk drive has a CRC error. If this message appears repeatedly, replace the disk drive.
Bad sector is found on physical disk	Disk drive has a bad sector. The drive should remap around the bad sector. If this message appears repeatedly, replace the disk drive.

Event	Action
Error is detected in remap sectors	Disk drive has a bad remap sectors. If this message appears repeatedly, replace the disk drive.
Command times out on physical drive	Disk drive not responding to commands. If this message appears repeatedly, replace the disk drive.
Physical disk negotiation speed is decreased.	Disk drive had to reduce its data rate. If this message appears repeatedly, replace the disk drive.
Previously configured disk is no longer found	Disk drive may have failed or was removed from the enclosure. Replace or reinstall the disk drive as needed.
A physical disk has encountered an unknown (non-ECC) media error.	Disk drive experienced an unknown error. If this message appears repeatedly, replace the disk drive.
A physical disk has encountered PFA condition	A potentially faulty address or bad sector was found.
A configured dead physical drive has been inserted	The disk drive inserted into the VTrak was marked as dead and will not work on the VTrak. Replace the disk drive.
A physical drive page 0/1 settings have been changed	Result of settings or user action. Normal.
Physical disk is marked as dead due to removal/ failure of reassign sectors/PFA condition/ forced offline state	Replace the disk drive.
One of the physical disk paths has failed	A path to a physical drive failed. If this message appears repeatedly, contact Technical Support. See page 239.
PSU (Power Supply Units)	
PSU is not inserted/has been removed	A power supply unit is missing from the VTrak. Reinstall the power supply unit.
PSU is off	A power supply unit is present but turned off. Turn on the power supply.
PSU is on	Normal.

Event	Action
PSU is installed/functional/operational and turned on	Normal.
PSU is installed/functional/operational and turned off	A power supply unit is present but turned off. Turn on the power supply.
PSU is malfunctioning and turned on/off	Replace the power supply unit.
PSU 12V/5V/3.3V power is out of the threshold range	Replace the power supply unit.
PSU 12V/5V/3.3V power is within the range	Normal.
PSU Fans	
PSU fan has turned on.	Normal.
PSU fan has turned off.	Verify that the power supply is turned on. If the fan still does not turn, replace the power supply. See page 171.
PSU fan speed increased.	Check the VTrak for overheating. See page 231.
PSU fan speed decreased.	Temporary overheat condition was corrected.
PSU fan is malfunctioning	Replace the power supply. See page 171.
PSU fan is inserted	Normal.
PSU fan is removed	Normal.
PSU fan is functioning normally	Normal.
PSU fan is NOT installed	Normal.
PSU fan status is unknown.	Check for airflow out of the power supply. If there is none, check for proper installation and turn the power supply on.
RAID Level Migration	
RAID Level migration is started	Result of settings or user action. Normal.
RAID Level migration is completed	Normal.

Event	Action
RAID Level migration is paused	Migration paused because of user intervention, schedule or a higher priority background activity.
RAID Level migration is resumed	Migration has resumed again after a pause.
RAID Level migration is stopped	Migration stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
RAID Level migration has encountered a physical disk error	Bad block found on a disk drive. Migration will finish. Check the disk drive check table after migration and replace disk drive as needed. See page 110.
RAID Level migration is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 169.
RAID Level migration is queued	Migration has been set manually or by schedule.
Migration has detected/ cleared stale NV Watermark	Watermarks are progress markers left as the result of interrupted RAID migrations. If the watermark was cleared, migration should finish.
Array was incomplete due to missing NV Watermark	RAID migration was interrupted by a shutdown. If array is online, try migration again. See page 100. If array is offline, delete and recreate array. See page 95 and page 94.
Rebuild	
Rebuild is started	Result of settings or user action. Normal.
Rebuild is completed	Normal.
Rebuild is paused	Rebuild paused because of user intervention, schedule or a higher priority background activity.
Rebuild is resumed	Rebuild has resumed again after a pause.
Rebuild is stopped	Rebuild stopped because of user intervention, schedule or the logical drive was deleted or the target disk drive encountered an error. If rebuild stopped by user intervention, restart the rebuild. See page 101.
Rebuild stopped internally	The logical drive is offline. See page 228.
Rebuild is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 169.
Rebuild is queued	Rebuild has been set manually or by schedule.

Event	Action
Rebuild marks logical drive synchronized upon rebuild completion	Result of successful rebuild. Normal.
Redundancy Check	
Redundancy Check is started	Redundancy Check has started manually or by schedule.
Redundancy Check is completed	Redundancy Check has finished.
Redundancy Check is paused	Redundancy Check paused because of user intervention, schedule or a higher priority background activity.
Redundancy Check is resumed	Redundancy Check has resumed again after a pause.
Redundancy Check is stopped	Redundancy Check stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
Redundancy Check is aborted due to internal error	System resources are low. Reduce system load or restart the VTrak. See page 169.
Redundancy Check encountered inconsistent block(s)	Check the logical drive's inconsistent block table. See page 110. Rebuild the disk array if necessary. page 101.
Redundancy Check task is queued	Redundancy Check has been set manually or by schedule.
Redundancy Check task is stopped internally	The logical drive is offline. See page 228.
Resource	
Resource is NOT available	System resources are low. Reduce system load or restart the VTrak. See page 169.
SMART	
SMART error is received	A disk drive reported a SMART error. If this message appears repeatedly, replace the disk drive
Spare Check	
Spare check started on the given spare drive	Result of settings or user action. Normal.

Event	Action
Spare check completed successfully on the given spare drive	Normal.
Spare Drives	
Physical disk assigned as global spare	Result of settings or user action. Normal.
Physical disk is no longer assigned as global spare	Result of settings or user action. Normal.
Global Spare has been deleted	Result of settings or user action. Normal.
Physical disk assigned as dedicated spare	Result of settings or user action. Normal.
Physical disk is no longer assigned as dedicated spare	Result of settings or user action. Normal.
Dedicated Spare has been deleted	Result of settings or user action. Normal.
Stripe Level Migration	
Stripe Level migration is started	Result of settings or user action. Normal.
Stripe Level migration is completed	Normal.
Stripe Level migration is paused	Migration paused because of user intervention, schedule or a higher priority background activity.
Stripe Level migration is resumed	Migration has resumed again after a pause.
Stripe Level migration is stopped	Migration stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
Stripe Level migration has encountered a physical disk error	Bad block found on a disk drive. Migration will finish. Check the disk drive check table after migration and replace disk drive as needed. See page 110.
Stripe Level migration is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 169.

Event	Action
Stripe Level migration is queued	Migration has been set manually or by schedule.
Subsystem	
Subsystem parameter(s) are changed by user	Result of user action. Normal.
Synchronization	
Synchronization is started	Result of settings or user action. Normal.
Synchronization is completed	Normal.
Synchronization is paused	Synchronization paused because of user intervention, schedule or higher priority background activity.
Synchronization is resumed	Synchronization has resumed again after a pause or a reboot.
Synchronization is stopped	Synchronization stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
Synchronization is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 169.
Synchronization is queued	Synchronization is already running on another logical drive in the same array.
Synchronization is stopped internally	Synchronization stopped because the disk array was deleted or removed.
System (VTrak)	
The system is started	The VTrak has been started.
The system is stopped	The VTrak was shut down.
Transition	
Transition is started	Result of settings or user action. Normal.
Transition is completed	Normal.
Transition is paused	Transition paused because of user intervention, schedule or a higher priority background activity.
Transition is resumed	Transition has resumed again after a pause.
Transition is stopped	Transition stopped because of user intervention or the logical drive was deleted.

Event	Action
Transition was switched to rebuild	Transition changed to rebuild because the logical drive went critical.
Watermark	
Migration has detected/ cleared stale NV Watermark	Watermarks are progress markers left as the result of interrupted RAID migrations. If the watermark was cleared, migration should finish.
Array was incomplete due to missing NV Watermark	RAID migration was interrupted by a shutdown. If array is online, try migration again. See page 100. If array is offline, delete and recreate array. See page 95 and page 94.

Critical & Offline Disk Arrays

A fault-tolerant disk array—RAID 1, 1E, 5, 6, 10, and 50—goes *critical* when a disk drive is removed or fails. Due to the fault tolerance of the disk array, the data is still available and online. However, once the disk array goes critical, the disk array has lost its fault tolerance, and performance may be adversely affected.

If the fault was caused by a failed 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.

If your fault-tolerant disk array—RAID 1, 1E, 5, 6, 10, and 50—goes *offline*, contact Promise Technical Support. See “Contact Technical Support” on page 239.



Warning

Take no further corrective action until you have consulted with Promise Technical Support.

A non-fault tolerant disk array—RAID 0—goes *offline* when a disk drive is removed or fails. Since the disk array 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 disk array is lost. You must replace the failed drive. Then, if the disk array had more than one disk drive, delete the disk array and re-create it. Restore the data from a backup source.

When a Disk Drive Fails

VTrak provides both audible and visual indicators to alert you of a disk drive failure. The following will occur when a disk drive fails or goes offline:

- The Disk Array LED changes from green to amber. See page 204.
- The Disk Carrier Status LED changes from green to red. See page 205.
- The audible alarm repeatedly sounds two short beeps. See page 203.
- WebPAM PROe reports the condition. See page 210.

With a Hot Spare Drive

When a physical drive in a disk array fails and a spare drive of adequate capacity is available, the disk array will begin to rebuild automatically using the spare drive.

After the disk array rebuilds itself using the spare drive, you must replace the failed drive.

To set up a spare drive, see “Create Spare Drive” on page 113 (WebPAM PROe) or “Create New Spare Drive” on page 155 (CLU).

Without a Hot Spare Drive

If there is no hot spare drive of adequate capacity, you must remove the failed drive and install an unconfigured replacement drive of the same or greater capacity in the same slot as the failed drive. Until you install the replacement drive, the logical drive will remain Degraded.

- If the Auto Rebuild function is ENABLED, the disk array will begin to rebuild automatically as soon as you replace the failed drive.
- If the Auto Rebuild function is DISABLED, you must manually rebuild the disk array after you replace the failed drive.

To enable Automatic Rebuild, see page 50 (WebPAM PROe) or page 153 (CLU).

To set Hot Spare Policy, see page 112 (WebPAM PROe) or page 155 (CLU).



Important

If your replacement disk drive was formerly part of a different disk array or logical drive, you must clear the configuration data on the replacement drive before you use it.

See “Clear Physical Drive Conditions” on page 89 (WebPAM PROe) or “Clear Stale and PFA Conditions” on page 139 (CLU).

Rebuild Operation

During rebuild:

- The alarm sounds a single short beep, repeated
- No warning icon displays over the Disk Array or Logical Drive

The Management Window reports the Disk Array’s Operational Status as OK, Rebuilding.

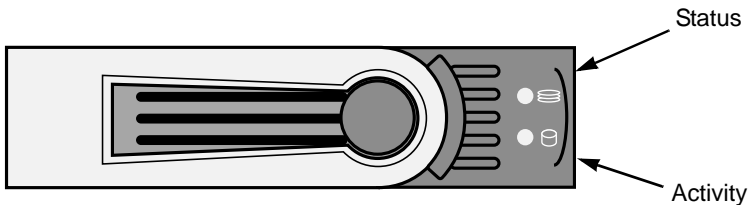


Figure 4. VTrak M310p/M200p disk carrier LEDs

- The drive carrier holding the rebuilding physical drive displays a green Activity (left) LED while the Status (right) LED flashes green once per second.

During rebuilding, you can still read and write data to the logical drive. However, fault tolerance is lost until the Disk Array returns to OK (not-rebuilding) status.

After a successful rebuild:

- The alarm is silent
- The Disk Array's Operational Status as OK
- The rebuilt disk drive Status LED displays steady green

Enclosure Problems

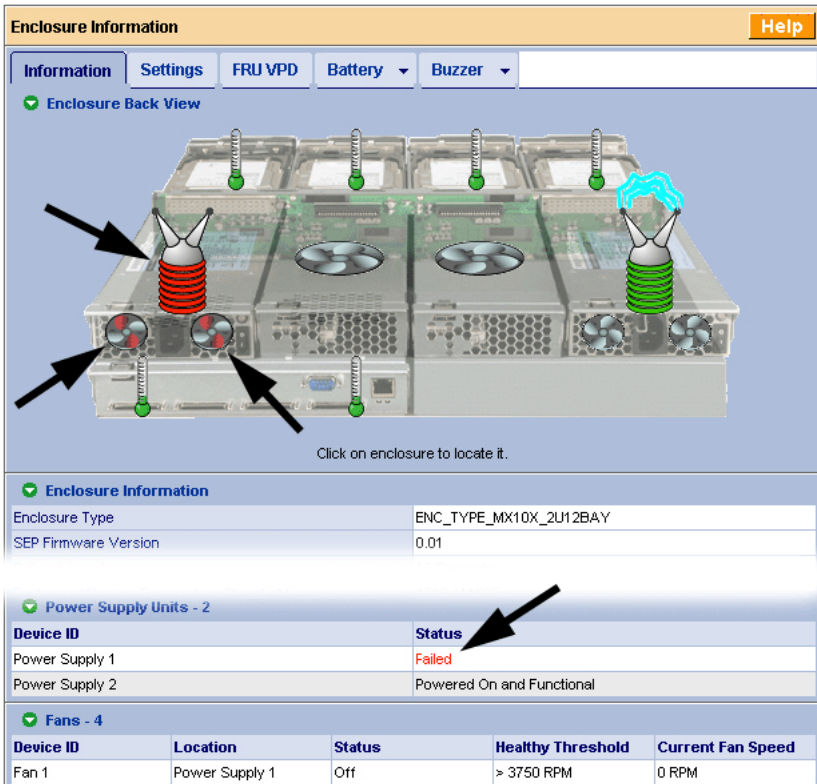
WebPAM PROe displays yellow !s and red Xs in Tree View to identify components that need attention.

When a yellow ! appears over a Subsystem in Tree View, click on the Enclosure icon. The Enclosure screen will display (below).

Enclosure Information
Help

Information
Settings
FRU VPD
Battery ▾
Buzzer ▾

✓ Enclosure Back View



Click on enclosure to locate it.

✓ Enclosure Information

Enclosure Type	ENC_TYPE_MX10X_2U12BAY
SEP Firmware Version	0.01

✓ Power Supply Units - 2

Device ID	Status
Power Supply 1	Failed
Power Supply 2	Powered On and Functional

✓ Fans - 4

Device ID	Location	Status	Healthy Threshold	Current Fan Speed
Fan 1	Power Supply 1	Off	> 3750 RPM	0 RPM

In this example, a power supply has failed. The Enclosure Diagram displays color and motion changes to identify the failed power supply. In this case, you must replace the power supply.

Note that the image above was shortened to fit on the page.

Overheating

Temperature Sensors



Overheating

Overheating is a potentially serious condition because the excessively high temperatures can lead to disk drive failure and controller malfunction.

Overheating usually results from:

- Fan failure
- Poor air circulation around the enclosure



Too Warm

WebPAM PROe reports failed fans along with elevated temperature. On VTrak, there are two kinds of fans:

- Power supply, 1 fan each, 2 fans total
- Cooling units, 2 fans each



Normal

If a power supply fan fails, you must replace the power supply. If a cooling unit fan fails, you can remove the cooling unit and replace only the fan itself.

Cooling Unit Fan Condition



OK

No tools are required for either procedure. See page 172 for instructions on replacing the fans.



Replace Now

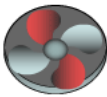
Air circulation around the VTrak enclosure may be a more complex problem. Use the thermometer icons to help you locate the specific hot spot. Check for these conditions:

Power Supply Fan Condition



OK

- Accumulated dust or objects blocking the fans
- Less than a minimum of 5 inches (13 cm) space between the back of the VTrak and the wall or other object
- Ambient temperature above 95°F (35°C) where the VTrak is operating



Replace Now

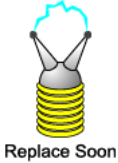
To cool down a VTrak:

- Correct any problems identified above
- Power it down and let it sit for an hour or longer

Power Supplies



VTraks are equipped with redundant power supplies. The advantage of dual power supplies is that, should one fail, the other will continue powering the subsystem until the faulty one can be replaced. VTrak is capable of operating on a single power supply. As a result, if one power supply fails you must watch the front panel LEDs or WebPAM PROe in order to become aware of the condition.



The power supplies are hot-swappable, meaning you can leave the VTrak running when you replace the bad one. Be careful, however, to remove the faulty power supply and not the good one, or VTrak will come to an immediate stop and your data will be unavailable until the system is powered and booted again.



As noted above, if a power supply fan fails, you must replace the power supply. Without the fan to cool it, the power supply will overheat and eventually fail anyway.

No tools are required for the procedure. See your page 171 for instructions on replacing a power supply.

Battery

Battery
Condition



OK



Replace Soon



Replace now

VTrak uses a battery as backup power for the cache. Should a power failure occur, the battery enables the cache to hold data up to 72 hours. The battery recharges during normal VTrak operation.

In most cases, installing a replacement battery will correct a marginal or failed condition. The battery is located on the left cooling unit. Remove the cooling unit for access. The battery is hot-swappable.

No tools are required for the procedure. See See page 175 for instructions on replacing the battery.

Connection Problems

When you install your Promise product following the instructions in the *Quick Start Guide* and this *Product Manual*, you should have little trouble getting your equipment to work the first time. But connection problems can arise that are not the User's or Installer's fault. Every conceivable problem cannot be covered in the documentation but some guidelines could be helpful.

Connection problems cause a majority of failures in almost any electrical system. While the installation of the cables and components was correct, they don't function properly, or at all, because:

- A connector is dirty or corroded
- A connector is loose or damaged
- A cable looks OK outside but has an open circuit inside
- The wrong cable was used

VTraks ship with a full set of new cables, as required for each specific model. Be sure to use these components because: 1.) They are the proper ones for your RAID subsystem, 2.) They are in brand-new condition, and 3.) You paid for them with the purchase of your VTrak.

SCSI Connections

VTrak uses a network connection to pass command and management information. Data is transmitted via the SCSI bus. Proper termination and SCSI-3 compliant cables are required for the system to operate correctly.

SCSI connections are both physical (outside) and electrical (inside). You can see a physical connection, you can clean it or try a different cable on it. Electrical connections are made by firmware and software.

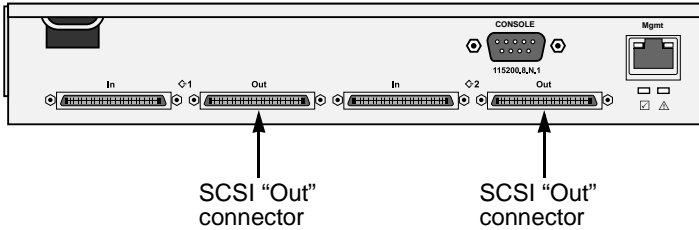
VTrak makes use of SCSI Target IDs (TIDs) and Logical Unit Numbers (LUNs) to enable multiple VTrak arrays managed by a single Host PC

SCSI channels are completely intolerant of TID conflicts. If you have a conflict, the devices on your SCSI chain will not work correctly until it is resolved.

The VTrak RAID subsystem is sensitive to the presence of other devices on the SCSI chain. Do not connect other devices to the SCSI chain with a VTrak, except for an other VTrak.

Termination

VTrak has an internal termination feature but it works only on the "Out" connector. Internal termination is set to "Automatic" by default. For termination settings, see "SCSI Channel Settings" on page 62 or "Channel Settings" on page 151.



This means you can, for example, connect your Host PC to one of the VTrak's SCSI "In" ports without the need of an external SCSI terminator. You can also connect both SCSI connectors in a "daisy-chain" with other VTraks.

Be sure to enable termination on the last VTrak in the chain. Promise recommends that you attach the SCSI cable to the "In" connector and set the internal termination to "On" or "Automatic".

Or you can attach the SCSI cable to the "Out" connector and install a physical terminator (not supplied) onto the "In" connector.

Serial Connections

VTrak uses a serial connection for the command line interface (CLI) and the command line utility (CLU). After you set the IP address, you can access the CLI and CLU through a network connection, also. Normally, users prefer WebPAM PROe because of its graphic user interface. But the CLI and CLU can do the same jobs. And they will work when your network connection is down.

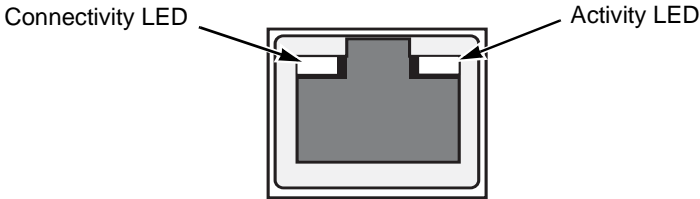
For VTrak, you must use the CLI or CLU to set the Management Port IP address in order for WebPAM PROe to connect with it. See "VTrak Setup with CLI or CLU" on page 17. This issue is discussed further under Network Connections (below). See the "Set Up Serial Cable Connections" on page 14 for more information on making the connection.

The CLI and CLU control and manage but they do not move data. They communicate through a null-modem cable, supplied with the VTrak. A straight-through serial cable will not work for this purpose. You may choose not use the CLI or CLU often and want to disconnect and store the cable. Consider leaving it connected, to be sure it will be there when you need it.

Network Connections

VTrak has an RJ-45 Management Port connector on the back of its cabinet. This is a Gigabit Ethernet connector designed to connect to your network. The VTrak becomes a node on your network like any other PC, server or other component with an IP address.

VTrak ships from the factory an IP address of 10.0.0.1. You must change this address to one that will work with your network. You make the initial IP address setting using the CLI or CLU. See “VTrak Setup with CLI or CLU” on page 17.

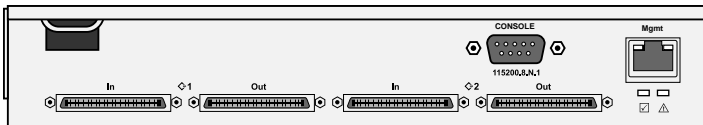


LEDs	State			
	Dark	Amber	Green	Flashing Green
Connectivity	10BaseT	1000BaseT	100BaseT	
Activity	No activity			Activity

Note that VTrak Management Port can accept IP address assignments from a DHCP server. Use VTrak’s Command Line Utility (CLU) to enable this feature. If you have not activated DHCP support but there is a DHCP server on your network, there is a chance that it will inadvertently assign the VTrak’s Management Port IP address to another node. You might see a warning to this effect on your PC’s monitor. If this happens, WebPAM PROe may not be able to connect. See your network administrator to work out a suitable arrangement.

Unsaved Data in the Controller Cache

An LED (marked with the Δ icon) is provided to inform you that there is data in the cache that has not been saved to non-volatile memory. Such data is sometimes called “dirty,” not to suggest it is corrupted in some way but because it has not been saved to a disk drive.



Dirty Cache LED

If there is unsaved data in the controller’s cache, the Dirty Cache LED shines amber. During this time, do NOT power down the VTrak. Wait until the LED will go dark.

Chapter 9: Support

- Frequently Asked Questions (below)
 - Contact Technical Support (page 239)
 - Limited Warranty (page 242)
 - Returning product for repair (page 243)
-

Frequently Asked Questions

What kind of disk drives can I use with VTrak?

VTrak supports 1.5 and 3.0 GB/s Serial ATA disk drives.

Can I take the disk drives from my UltraTrak, put them into the VTrak and keep my disk array or logical drive intact?

Yes. UltraTrak and early VTrak subsystems used a proprietary method of disk metadata, stored in the reserve sector of each physical drive. VTrak M310p/M210p uses the industry-standard DDF and has a metadata-to-DDF conversion feature. To use the conversion feature, you must restart the VTrak M310p/M210p after installing disk drives from an older system.

M310p and M210p do not support Parallel ATA (PATA) disk drives.

Note that if you move the disk drives from the VTrak M310p/M210p to the older subsystems, they will not recognize your disk array or logical drive.

Can I use my existing SCSI card with VTrak M310p/M210p?

Yes. However, for best performance results, use an Ultra320 SCSI card.

How can I tell when the VTrak has fully booted?

During the VTrak power-up process, the Power, FRU Status, and Logical Drive Status LEDs will light up. When the Logical Drive Status LEDs light up, the VTrak is fully booted. See pages 37 and 39, or pages 119 and 121.

Why does VTrak come with a Command Line Utility?

First, to assign your VTrak an IP address in order for the WebPAM management software to connect to it. Second, in the event of a network failure, you can still access the VTrak. Third, some users prefer the Command Line Utility.

My WebPAM connection was working OK. But later on, it timed out. What do I do now?

The network condition can time-out for several reasons. When an open connection has no action for a specific amount of time (the Administrator can change it), the connection times-out automatically for security reasons. When you attempt to use WebPAM, it returns to the login screen. Enter your user name and password and click Login, and WebPAM will establish a new connection.

I can access the VTrak over my company's intranet. But I can't access it from an outside Internet connection. How do I make the Internet connection work?

This condition is not related to VTrak, but is due to your firewall and network connection protocol. Contact your MIS Administrator.

With other Promise VTraks, I used the Server's IP address in WebPAM to connect with the RAID subsystem. Why is this VTrak M310p/M210p different?

VTrak M310p/M210p has the server software embedded. With the M310p/M210p, you point your browser directly to the VTrak rather than a server. Also, with M310p/M210p you do not have to create a subsystem because the subsystem already exists.

Why can a RAID 1 logical drive on VTrak consist of only two disk drives?

On VTrak, RAID 1 logical drives work in mirrored physical drive pairs. You could create up to six RAID 1 logical drives. Or you can create a single RAID 10 logical drive with data mirroring and up to 12 physical drives. If you have an odd number of drives but still want data mirroring, use RAID 1E.

See "Install Disk Drives" on page 10 and "Introduction to RAID" on page 179 for more information on the number of physical drives you can use for each RAID level.

Are logical drives on VTrak limited to 2.199 terabytes?

No. But verify that your operating system *supports* logical drives over 2.199 TB. Also, for the operating system to *recognize* the full capacity of logical drives over 2.199 TB, you must specify a sector size of 1 KB or larger when you create the logical drive. See "Sector Size" on page 191 or more information.

I have two UltraTraks and use WebPAM to monitor them. Can I use my existing WebPAM setup to monitor the VTraks also?

No. Use the WebPAM embedded with the VTrak M310p/M210p.

How can I be sure everything is working OK on the VTrak?

Locally: The VTrak enclosure has LEDs on the front to monitor the status of power, field replaceable units (FRUs) and logical drives. When these are green, VTrak is functioning normally.

Remotely: Check the Tree Icons in WebPAM. If there are no yellow or red warning icons displayed, VTrak is functioning normally.

What happens if a logical drive goes critical?

On the front of VTrak, the logical drive LED turns amber and an audible alarm sounds. See “Critical & Offline Disk Arrays” on page 228.

Can VTrak run using just one power supply?

Yes, it is possible to run VTrak on a single power supply. There are two power supplies so that VTrak will continue running if one of the power supply fails. But deliberately leaving one power supply off negates this advantage.

In addition, leaving one power supply off reduces air flow through the VTrak enclosure and can contribute to overheating. Always switch on both power supplies.

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
- BIOS, firmware, 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.)
Promise Online™ eSupport	https://support.promise.com/support (online request form)

United States

E-mail Support	support@promise.com
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

Europe, Africa, Middle East

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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 3 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.

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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.

Returning Product For Repair

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

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

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



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).

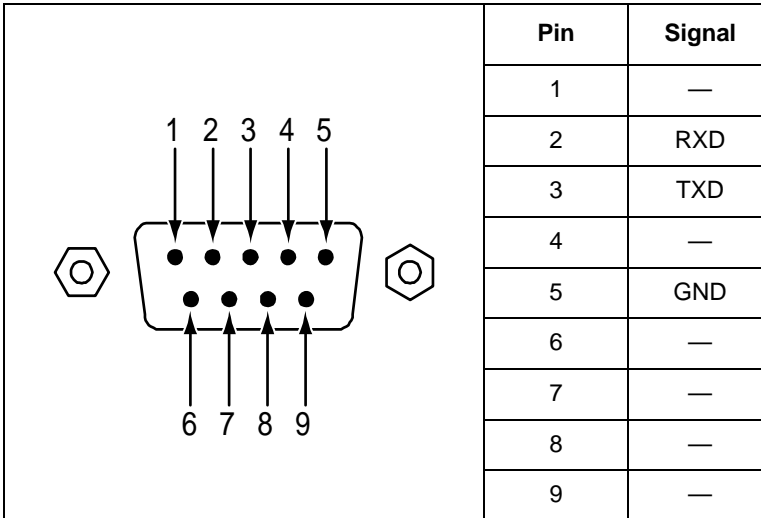
Appendix A: Useful Information

- Serial Connector Pinout (below)
- SNMP MIB Files (page 246)

Serial Connector Pinout

Below is the pinout diagram for the DB-9 serial connector on all VTraks.

The diagrams represent the connector as you see it looking at the back of the VTrak.



SNMP MIB Files

Promise supplies seven MIB files to integrate the VTrak M310p/M210p subsystem into your SNMP system. These files are in the SNMP folder on the VTrak Product CD. The MIB files include:

- promise.mib
- system.mib
- interface.mib
- IF-MIB.mib
- FCMGMT-MIB.mib
- ISCSI-MIB.mib
- Islavistastorage.mib
- Islavistasystem.mib

Load MIB Files

To prevent error messages, you must load the Promise-supplied MIB files in this order:

1. Load the **promise.mib** file.
2. Load the **system.mib** file.
3. Load the **interface.mib** file.
4. Load the remaining **.mib** files in any order.

For help with this procedure, see the instructions that came with your MIB browser.

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